

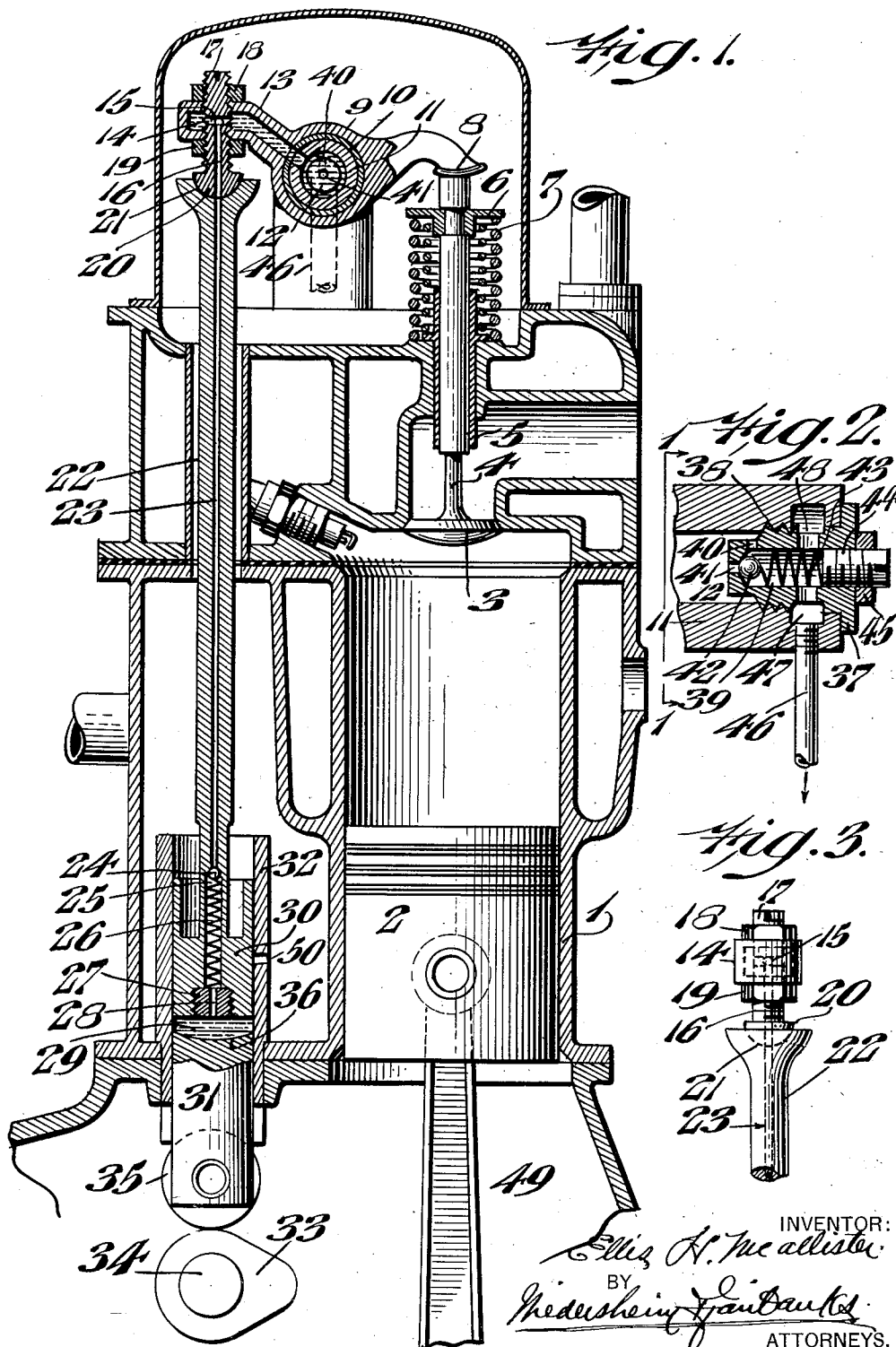
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AUTOMATIC VALVE ADJUSTER AND SILENCER

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AUTOMATIC VALVE ADJUSTER AND SILENCER.

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My invention relates to a novel construction of an automatic valve adjuster and silencer for an internal combustion engine, wherein I make provision not only for thoroughly lubricating the moving parts in the valve mechanism, but I further provide a novel cushioning means in the train intermediate the cam shaft and the rocker arms, whereby the various moving parts are at all times automatically retained in contact so that an automatic and noiseless valve operating mechanism, which is efficient and thoroughly lubricated at all times is produced.

To the above ends my invention consists in the employment of a tappet made in two parts or pistons mounted in a guide, which pistons are actuated in unison by the cam shaft, there being a chamber between the juxtaposed ends of said pistons in which a body of lubricant is at all times maintained, the upper of said pistons having an upwardly seated spring pressed ball or check valve therein, which latter controls a passage extending longitudinally through the push rod, which passage is continued through the universal joint member composed of the socket at the top of the push rod and the drilled ball end adjusting screw adjustably mounted in the apertured rocker arm mounted on the rocker arm tube, through which oil is fed under pressure from the pressure oil system by closing the end of said rocker tube with a special ball and spring adjusted relief valve, whereby oil can be readily fed to the valve tappets or pistons at an even and regular pressure, through holes in said ball end screw drilled to align with holes in the rocker arm, whereby there is an unobstructed lubricant passage formed from the rocker arm tube to the pistons constituting the valve tappet.

My invention further consists of a novel manner of controlling the passage of the lubricant from the hollow rocker arm tube into the overflow, and with respect to the spring pressed check valve in the upper piston of the tappet.

It further consists of a novel construction of a hollow push rod and a hollow ball end adjusting screw coacting therewith.

It further consists of a novel construction of a valve tappet, composed of a plurality of pistons, mounted in a guide cylinder, one of said pistons containing an upwardly seating check valve, controlling a passage in the coacting push rod, the lower of said pistons

being actuated by the cam shaft, and there being a lubricant chamber formed between the juxtaposed inner ends of said pistons.

It further consists of a novel construction of a valvular control for the end of the rocker arm tube leading to the overflow to the crank case.

It further consists of other novel features of construction and advantage, all as will be hereinafter pointed out in the specification and claims appended hereto.

For the purpose of illustrating my invention I have shown in the accompanying drawings several forms thereof which are at present preferred by me, since the same have been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

Figure 1 represents a vertical sectional view of an internal combustion engine, having applied thereto an automatic valve adjuster and silencer embodying my invention, certain of the parts being shown in elevation, the section being taken on line 1—1, Figure 2.

Figure 2 represents a longitudinal sectional view of the front end of the rocker arm tube showing a spring actuated check valve therein and the coacting ports and passages leading to the overflow therefrom.

Figure 3 represents a side elevation of the upper left hand portion of the push rod and its socket and the drilled ball end adjusting screw.

In carrying out my invention which is applicable in its broad aspects to any type of poppet valve engine, I have shown a conventional form of such engine, embodying the cylinder 1, the piston 2 and the upwardly seating valve 3, having the valve stem 4 slidable in the bushing 5, the upper portion of said valve stem carrying the abutment 6 against which the upper end of the valve spring 7 contacts, the lower end of said spring resting upon the cylinder head.

The aforesaid parts may be of any conventional or standard type, and need not be described in greater detail.

With the upper end of the valve stem 4 contacts the terminal 8 of the rocker arm 9 which is mounted on the sleeve 10, which surrounds the hollow rocker arm tube 11,

within which is a chamber 12 for the reception of the lubricant.

The portion 13 of the rocker arm opposite to the terminal 8 is provided with a lubricant chamber 14, which communicates through the ports 15 with the vertical drilled passage 16 through the threaded ball end adjusting screw 17, which is in threaded engagement with the arm 13 above and below which are the lock nuts 18 and 19. The lower end of the threaded stem or adjusting screw 17 terminates in a ball 20, which is seated in the socket 21 formed at the upper end of the hollow push rod 22, which has the longitudinally extending lubricant passage 23 therein, at whose lower end is located a valve seat which is closed by the ball or check valve 24, which seats upwardly.

25 designates a chamber in the upper end of which said ball is received, the latter being pressed against its seat by the spring 26 against the lower end of which contacts the plug 27 having the passage 28 therethrough.

It will be seen from the foregoing that by reason of the provision of the ports 15, the continuous lubricant passages 16, 23, 25 and 28 are formed, which lead from the chambers 12 and 13 to the lubricant chamber 29 formed between the juxtaposed ends of the upper plunger 30 and the lower plunger 31. The pistons 30 and 31 reciprocate in the open ended cylinder or guide casing 32, which is positioned at the lower portion of the engine housing and said pistons are actuated by cam 33 on the cam shaft 34, which latter contacts with the roller 35 journaled in the lower end of the lower plunger 31. 50 designates a relief port in the cylinder 32 which may be located about one-eighth of an inch above the highest point, the lower end of the upper piston normally reaches.

I preferably make the upper end of the lower plunger slightly concave, as indicated at 36, so as to provide an ample lubricant chamber for the lubricant or fluid between the juxtaposed ends of the plunger 30 and 31.

In Figure 2 I have shown the preferred construction employed at the front end of the hollow rocker arm tube 11, wherein the flanged plug 37 is shown in threaded engagement at 38 with the front end of the lubricant chamber 12.

The plug 37 contains the chamber 39 having the constantly open port 40 and the port 41 which is controlled by the check or ball valve 42 against which the spring 43 presses, the tension of said spring being adjusted as desired by the screw 44 which is locked in the desired adjusted position by the nut 45, it being evident that when the pressure in chamber 12 overcomes the tension of spring 43, oil can flow through the port 41 to the overflow 46.

46 designates the overflow pipe for the lubricant, which leads to the crank case 49 from the annular chamber 47, having the ports 48 leading to the chamber 39. In practice it requires about 50 to 60 pounds of pressure against the tension of the valve spring 7 to unseat the valve 3. The spring 43 is adjusted by the screw 44, to seat the valve 42, until it requires 12 pounds pressure to the square inch in chamber 12 to unseat said valve 42. The pressure is taken from the force feed oil system of the engine and said pressure is exerted or conducted through hollow rocker arm 9, adjusting screw and hollow push rod and valve 24 to space 29, the lifting pressure in 29 being about 8 pounds with all the moving parts in contact from cam 33 to top of valve stem 4. This lifting pressure of about 8 pounds in chamber 29 and the tension of spring 26 keeps the check valve 24 seated at all times but whenever the pressure on the bottom of the check valve 24 is less than the pressure in the passage 23 the valve 24 automatically unseats and lets oil into the chamber 29. During the reciprocations of the tappet pistons 30 and 31 there is always pressure on them from the forced feed, which helps the silencing and reduces wear.

It will be understood that the right hand or front end of the rocker arm tube 11 seen in Figure 2 is equipped as shown in Figure 2 and that the rear end of said tube 11 is connected to a supply line from the oil pump, which carries the oil under pressure to said hollow rocker arm tube or shaft 11, from which point the oil is conducted through the ports 15 to the passages 16 and 23. The manner of pumping the oil as above referred to is well known to those skilled in the art and is as described on pages 15 and 16 of the Buick reference book of 1924 and need not be described in greater detail. Through the constantly open port 40 oil is permitted constantly to flow through the chamber 39 port 48 and passage 47 to the overflow 46 and thence to the crank case 49.

It has heretofore been the practice to make the ball end adjusting screw 17 solid so that the oil merely descends around the exterior of said screw 17 and the push rod 22 which latter has also heretofore been made solid, and a considerable amount of lubricant has consequently been wasted, which is avoided by my construction.

In my novel construction, the oil without waste passes through the passages 16 and 23 to the upper piston 30, thence past the check valve 24, and through passages 25 and 28 to the chamber 29, wherein the pressure of the oil will raise the upper piston 30 and automatically take up any clearance between the hollow push rod 22 and the rocker arm and between the rocker arm at 8, and the top of the valve stem 4.

The ball check or one way valve 24 prevents any oil from flowing upwardly in the passage 23 in the push rod, when the lower piston 31 of the valve tappet is raised by the cam 33, and since oil is a non-compressible liquid, the space between the two pistons will remain the same and when heat from the engine expands the valve stem, this expansion is automatically taken up by the oil which will leak out between the pistons 30 and 31 and the guide 32, which leakage is automatically replaced by oil fed in past the check valve 24. All the above operations occur automatically and by my novel device, the oil pressure system is extended from the rocker arms to the hollow push rods, and the valve tappets or pistons 30 and 31 and their adjuncts, which in practice greatly reduces wear and noise, and automatically takes up all clearance in the train of moving ports intermediate the valve stems 4 and the cam shaft 34.

If desired the relief port 50 may be provided in the guide casing 32, which is located at a point beyond the highest point the bottom of the piston 30 normally attains or would reach in case the valve stem 4 sticks when the valve is open. In practical use of my device for a period of between one and two years covering a distance of many thousand miles, I have had no occasion to use said port 50, but it may obviously be provided if desired.

It will now be apparent that I have devised a novel and useful automatic valve adjuster and silencer which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in present instance, shown and described a preferred embodiment thereof which will give in practice satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars, without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent, is:—

1. In a device of the character stated, a valve, a valve stem therefor, a rocker arm tube, a rocker arm on said tube, a cam shaft, a valve tappet composed of a plurality of pistons having a lubricant chamber between their juxtaposed ends, actuated by said cam shaft hollow connections intermediate said rocker arm and said pistons and forming a continuous internal passage from said rocker arm tube to said lubricant chamber between said pistons and a check valve arranged in said passage.

2. In a device of the character stated, a valve, a valve stem therefor, a rocker arm tube, a rocker arm mounted on said tube, a

cam shaft, a valve tappet composed of a plurality of pistons actuated by said cam shaft, there being a lubricant chamber formed between the juxtaposed ends of said pistons, hollow connections forming a continuous passage from said rocker arm tube to said lubricant chamber between said pistons, and a spring pressed check valve in the lower portion of the passage leading to the lubricant chamber between said pistons.

3. In a device of the character stated, a hollow push rod having a passage axially therethrough, a valve tappet formed of upper and lower pistons, there being a lubricant chamber between the juxtaposed ends of said pistons with which the passage in said push rod communicates, an upwardly seating check valve in the upper of said pistons, a valve stem and devices intermediate the upper end of said push rod and valve stem for actuating the latter.

4. In a device of the character stated, a hollow push rod having a passage axially therethrough, a valve tappet formed of upper and lower pistons, there being a lubricant chamber between the juxtaposed ends of said pistons with which the passage in said push rod communicates, a valve stem, and devices intermediate the upper end of said push rod and valve stem for actuating the latter, in combination with a check valve in the lower end of said push rod passage.

5. In a device of the character stated, a valve, a cam shaft, a valve tappet composed of a plurality of pistons actuated by said cam shaft, a guide casing for said pistons, there being a lubricant chamber formed between the juxtaposed ends of said pistons, a hollow push rod connected to the upper of said pistons, a ball end adjusting screw seated in a socket in the top of said push rod and having an axial passage therethrough, a hollow rocker arm tube, a rocker arm mounted on said tube and having a passage communicating with the passage in said ball end screw, a check valve arranged in said passage and an extension on said rocker arm to actuate said valve.

6. In a device of the character stated, a valve, a cam shaft, a valve tappet, composed of a plurality of pistons actuated by said cam shaft, a guide casing for said pistons, a hollow push rod connected to the upper of said pistons, a ball end adjusting screw seated in a socket in the top of said push rod and having an axial passage therethrough, a hollow rocker arm tube, a rocker arm mounted on said tube and having a passage communicating with the passage in said ball end screw, an extension from said rocker arm to actuate said valve, and an upwardly seating check valve controlling the lower end of the passage in said push rod.

7. In a device of the character stated, a hollow rocker arm tube in communication

with a source of oil supply under pressure, a closure for one end of said tube, comprising a threaded plug having a chamber therein, a constantly open port leading from
5 said rocker arm tube to said plug chamber, an inlet port in said plug and a spring pressed check valve controlling said inlet port, and an overflow pipe leading from said chamber in said plug for conveying lubricant therefrom, a push rod communicating 10 with said tube and having a passage therein, in combination with an upwardly seating check valve in said push rod passage.

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