Feb. 10, 1959 J. M. STOUT 2,872,909

PISTON

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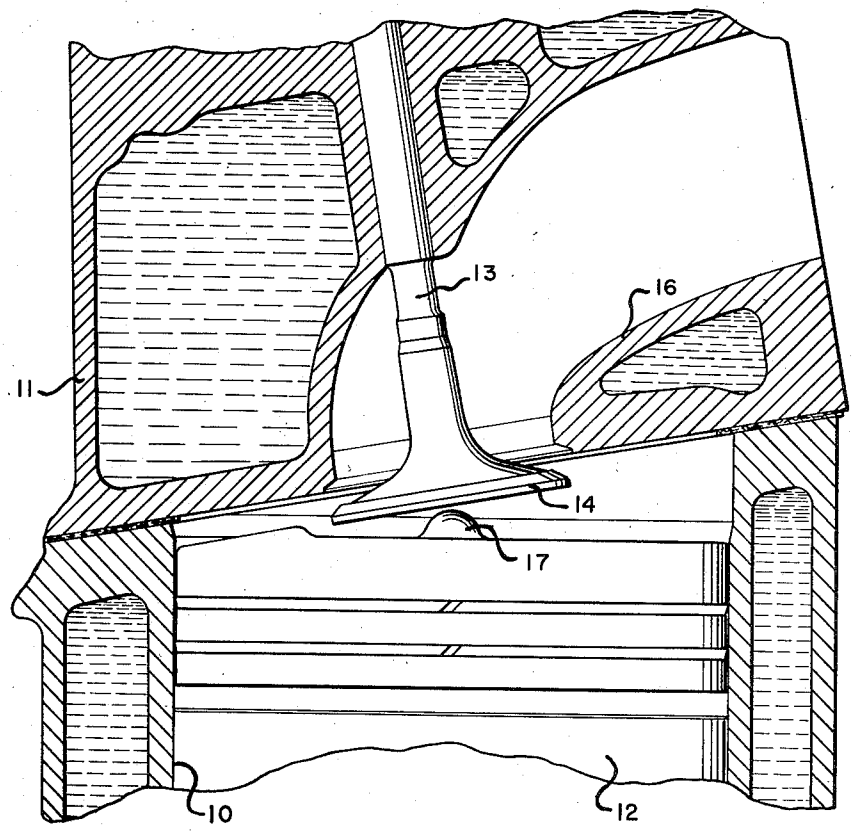


FIG. 1

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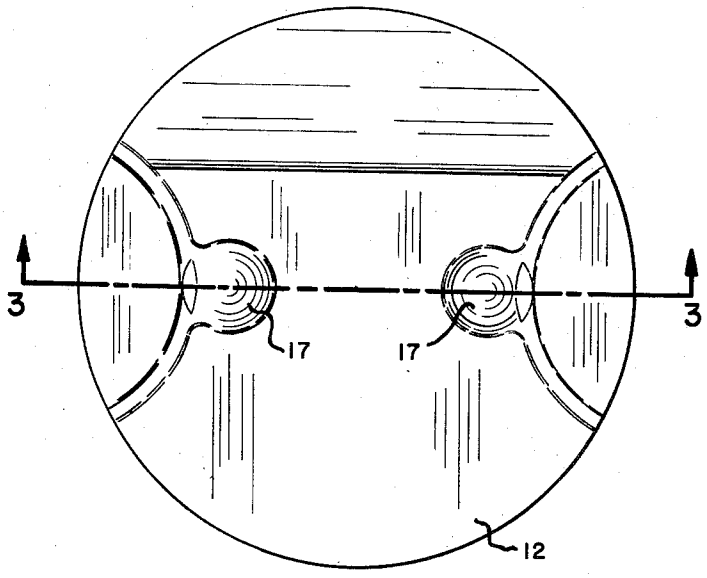


FIG. 2

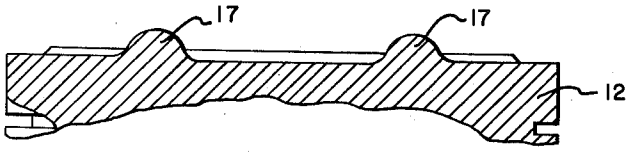


FIG. 3

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United States Patent Office 2,872,909 Patented Feb. 10, 1959

2,872,909

PISTON

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Application March 10, 1958, Serial No. 720,479

15 Claims. (Cl. 123—90)

The present invention relates generally to internal combustion engines and more particularly to the construction of pistons and valves for overhead valve engines whereby sticky valves may be loosened in the normal operation of the engine before extensive valve damage can result.

Sticky valves usually result from carbonization of the lubricant and fuel on the valve stem causing the valve to stick inside the valve guide. The valve return spring is unable to overcome this stickiness and return the valve to its closed position. When the valve fails to seat, it is subjected to considerable erosive action by the combustion gases in the engine compartment causing the valve to overheat, distort, and burn out. Compression is also lost in the engine resulting in the loss of power. The replacement of burned out valves is both time consuming and expensive.

In the applicant's construction, the piston crown is provided with a pair of camlike projections sufficiently high enough to contact the valve head when the valve has failed to close. The point of contact is as near as possible to the valve axis to avoid bending or deforming the valve at the time of contact. The force of the contact loosens the valve permitting the valve return spring to return the valve to its normal operating position.

One of the principal objects of the applicant's invention, therefore, is to provide means whereby stuck open valves are loosened before engine damage takes place.

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 represents a cross section through an engine cylinder, cylinder head, and piston embodying the instant invention;

Figure 2 is a plan view of the piston shown in Figure 1; and,

Figure 3 is a cross section of the piston taken on the line 3—3 of Figure 2.

Referring now to the drawings, reference numeral **10** designates a cylinder, and **11** a cylinder head. A piston **12** is shown approaching the top dead center position in the cylinder with the exhaust valve **13** shown in an open stuck position. Inlet and exhaust valves, of which only the exhaust valve is shown **13**, are positioned in the cylinder head and by means of valve face **14**, opens or closes the exhaust opening **16** in a predetermined time arrangement. Because of the nature of the invention, it is not necessary to also show the arrangement of the intake valve and its respective intake passage.

The crown of the piston is formed with a pair of raised nublike projections **17**. Projections **17** are arranged so that when valve **13** is in an open stuck position, one of the projections will strike the valve face **14** at substantially its axis and jar it loose. The height of the projections varies with the angularity of the valves with respect to the piston centerline. The greater the angularity, the greater the height required to prevent the piston from striking the valve face peripheral edge.

The invention may also be practiced by placing the projection on the valve head face rather than on the piston. A weight penalty is incurred, however, as compared with the described embodiment. It is also possible to practice the invention by placing a portion of the nub on both the piston and the valve. Rounding the projections **17** permits the piston to strike the valve at positions other than fully open. When the piston is at top dead center and the valves are in the closed position, projections **17** are a substantial distance from the valve face. After striking the stuck valve, the piston does not maintain contact with the valve. The only purpose of the projections is to impart a momentary sharp blow to the valve, loosening it and thus permitting the valve return spring to return the valve to its normal position in the predetermined firing pattern.

It will be understood 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.

What is claimed is:

1. In an overhead valve engine, the combination comprising a cylinder, a head closing one end of said cylinder, a pair of reciprocating poppet valves slidingly mounted in the head portion closing said cylinder, and a piston reciprocable in said cylinder, said piston having a pair of projections aligned with said poppet valves whereby the piston projections will strike said poppet valves in event of their sticking.

2. In an overhead valve engine, the combination comprising a cylinder, a head closing one end of said cylinder, a pair of reciprocating poppet valves slidingly mounted in the head portion closing said cylinder, and a piston reciprocable in said cylinder, said piston having a pair of projections engageable with said poppet valves on the axis of said valves when said valves fail to close whereby said piston projections will strike said valves as the piston approaches top dead center.

3. In an internal combustion engine, the combination comprising a cylinder, a head closing one end of said cylinder, a pair of reciprocating poppet valves slidingly mounted in the head portion closing said cylinder, and a piston reciprocable in said cylinder, said piston having a pair of nubs formed on its crown portion engageable with said poppet valves before the piston reaches top dead center whereby said piston will impart a striking force to a sticky unclosed valve sufficient to break it loose.

4. The structure defined by claim 3 which is further characterized in that said nubs are formed in the piston crown portion substantially on the axis of the poppet valves in the unclosed position.

5. In an internal combustion engine, the combination of a piston compartment, a piston mounted in said compartment for slidable movement thereof, a cylinder head and a pair of valves slidable in said cylinder head and open to said piston compartment, a pair of nubs on said piston, said nubs being located on the piston crown on the axis of the poppet valves whereby a striking force will be imparted to the poppet valves when said poppet valves are out of synchrony with the piston.

6. In an overhead valve engine, the combination comprising a cylinder, a head closing one end of said cylinder, a reciprocating poppet valve slidably mounted in the head, a piston reciprocable in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation, and to come into contact in the event of failure of said poppet valve to completely close.

7. In an overhead valve internal combustion engine, that improvement comprising in combination a cylinder, a cylinder head closing one end of said cylinder, a reciprocating poppet valve slidably mounted in the head, a piston

reciprocable in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation and to come into contact substantially on the axis of said poppet valve in the event of failure of said poppet valve to completely close.

8. In an overhead valve engine, the combination comprising a cylinder, a head closing one end of said cylinder, a poppet valve slidably mounted in the head portion closing said cylinder, and a piston reciprocable in said cylinder, said piston having a projection aligned with said poppet valve whereby the piston projection will strike said poppet valve in the event of its sticking.

9. In an overhead valve engine, the combination comprising a crankshaft, a cylinder, a head closing one end of said cylinder, a reciprocating poppet valve slidably mounted in the head, a piston connected to said crankshaft and reciprocable in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation, and to come into contact in the event of failure of said poppet valve to close.

10. In an overhead valve engine having a rotatable crankshaft, the combination comprising a cylinder, a head closing one end of said cylinder, a reciprocating poppet valve slidably mounted in the head, a piston connected to said crankshaft for reciprocative movement in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation, and to come into contact in the event of failure of said poppet valve to close.

11. In an overhead valve internal combustion engine, that improvement comprising in combination a crankshaft, a cylinder, a cylinder head closing one end of said cylinder, a reciprocating poppet valve slidably mounted at the head, a piston connected to said crankshaft and reciprocable in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation and to come into contact substantially on the axis of said poppet valve in the event of failure of said poppet valve to close.

12. In an overhead valve internal combustion engine having a rotatable crankshaft, that improvement comprising in combination a cylinder, a cylinder head closing one end of said cylinder, a reciprocating poppet valve slidably mounted in the head, a piston connected to said crankshaft for reciprocable movement in said cylinder, said piston and valve being figured to clear each other at top dead center in normal operation and to come into contact substantially on the axis of said poppet valve in the event of failure of said poppet valve to close.

13. In an overhead valve engine, the combination comprising a crankshaft, a cylinder, a head closing one end of said cylinder, a poppet valve slidably mounted in the head portion closing said cylinder, and a piston connected to said crankshaft and reciprocable in said cylinder, said piston having a projection aligned with said poppet valve whereby the piston projection will strike said poppet valve in the event of its sticking.

14. In an overhead valve engine having a rotatable crankshaft, the combination comprising a cylinder, a head closing one end of said cylinder, a poppet valve slidably mounted in the head portion closing said cylinder, and a piston connected to said crankshaft for reciprocable movement in said cylinder, said piston having a projection aligned with said poppet valve whereby the piston projection will strike said poppet valve in the event of its sticking.

15. In an overhead valve engine, the combination comprising a rotatable crankshaft, a cylinder, a head closing one end of said cylinder, a pair of reciprocating poppet valves slidably mounted in the head portion closing said cylinder, a connecting rod mounted upon said crankshaft, a piston mounted upon said connecting rod and reciprocable in said cylinder, said piston having a pair of projections aligned with said poppet valves whereby the piston projections will strike said poppet valves in the event of their sticking.

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