C. H. ENGLAND.

VALVE MECHANISM.

APPLICATION FILED DEC. 19, 1919.

1,372,874.

Patented Mar. 29, 1921.

FIG. 3.

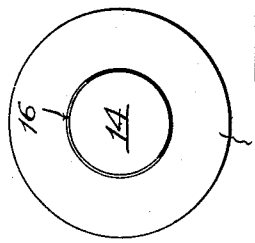



FIG. 4.

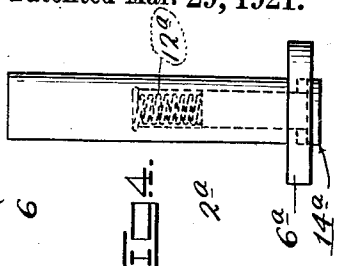



FIG. 2.

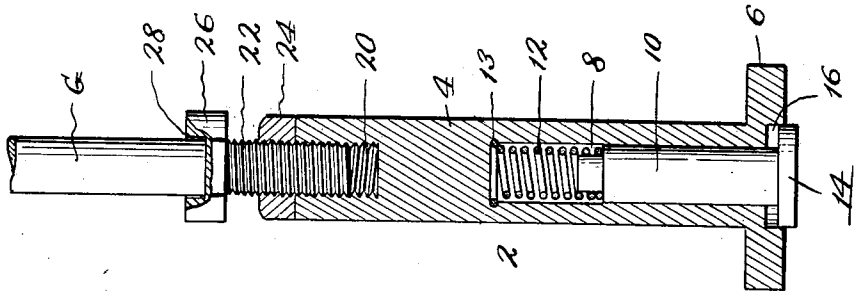
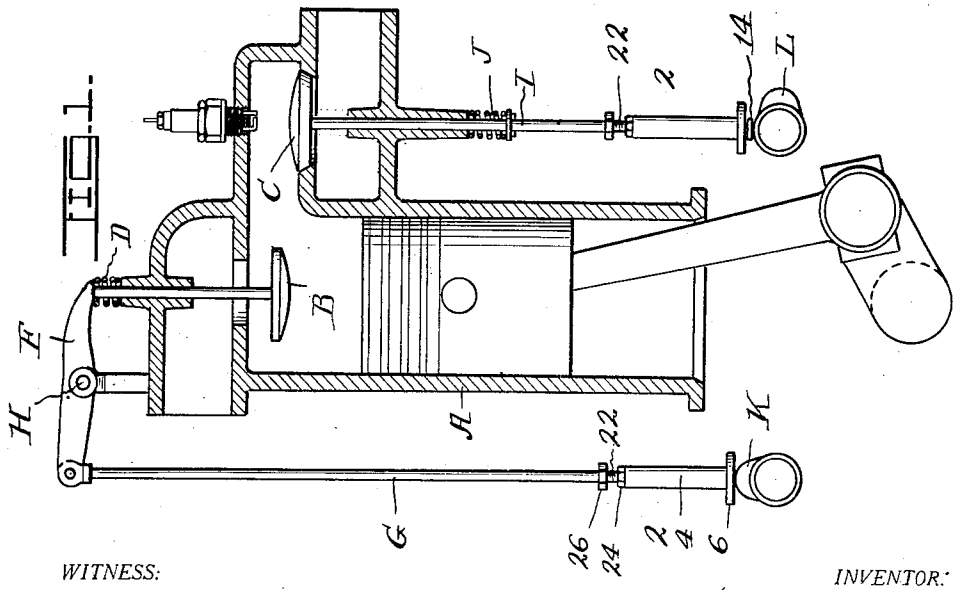



FIG. 1.




WITNESS:

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# UNITED STATES PATENT OFFICE.

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## VALVE MECHANISM.

1,372,874. Specification of Letters Patent. Patented Mar. 29, 1921.

Application filed December 19, 1919. Serial No. 346,159.

*To all whom it may concern:*

Be it known that I, CHESTER H. ENGLAND, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Valve Mechanisms, of which the following is a specification.

My invention relates to improvements in the valve mechanisms of internal combustion engines and pertains more particularly to the tappets for opening the puppet valves of such engines.

In carrying out my invention, I employ a tappet which is constantly held in engagement with the push rod or the stem of the associated valve, so that it may open said valve without striking the push rod or the stem a hammer-like blow such as occurs in the usual construction where the push rod or valve stem is spaced from the tappet to allow the valve mechanism to expand without unseating the valve when the engine becomes heated from explosion of the combustible charges. Instead of providing the usual space above-mentioned between the push rod and the valve stem, I provide said tappet with yieldable means to automatically take up the expansion and contraction of the valve mechanism and at the same time hold the tappet in constant engagement with push rod or the valve stem without danger of unseating the valve when the parts expand and become slightly elongated from the heat generated by the explosions, as above stated.

By the use of my invention the tappet and the valve mechanism are not only relieved of the hammer-like blows each time the valve is opened, but they are also relieved of the shock and wear, and the noisy clatter incident thereto.

In order that the invention may be fully understood, reference will now be had to the accompanying drawing, in which:

Figure 1 is a vertical cross section of an internal combustion engine provided with my invention.

Fig. 2 is an enlarged vertical central section of the tappet associated with the lower portion of a valve stem.

Fig. 3 is an end elevation of the tappet.

Fig. 4 is a side elevation of a simplified form of tappet.

Referring now in detail to the various parts, A designates a cylinder of the valve in the head type. Said cylinder A, has inlet and exhaust valves B and C, respectively. The inlet valve B is opened against the action of a spring D by a rocker-arm F fulcrumed at H and actuated by a push rod G, which in turn is actuated by one of the tappets 2 comprising the important feature of the present invention.

The exhaust valve C is provided with a valve stem I which is opened against the action of a spring J by one of the tappets 2. The tappets 2 are actuated by the usual inlet and exhaust cams K and L, respectively. Each tappet 2 comprises a stem 4 provided at its lower end with a flange 6 through which a counterbore 8 extends upwardly into said stem 4 to receive a plunger 10 and a light coil spring 12. The lower end of the plunger 10 has a marginal flange 14 adapted to fit in a recess 16 in the bottom of the flange 6. The plunger 10 and the spring 12 are held in assembly with the tappet 2, by reducing the upper end of said plunger 10 to fit tightly in the lower convolution of the spring 12 and fitting the upper convolution of said spring in an annular groove 13 communicating with the upper end of the counterbore 8.

The upper end of the tappet stem 4 has a threaded counterbore 20 to receive a screw 22 provided with a lock nut 24 to secure it at any point of its adjustment in the counterbore 20. The screw 22 is provided at its upper end with a head 26 having a recess 28 constituting a seat for the lower end of the associated push rod G or valve stem I, as the case may be. As the valve mechanism wears the screw 22 is adjusted upwardly to compensate for such wear.

After the parts have been properly adjusted, the flange 14 of the plunger 10 rests upon the associated cam, while the tappet 2 is pushed upwardly by the spring 12 and holds the upper end of the screw 22 in engagement with the lower end of the valve stem. The spring 12 is stiff enough to hold the tappet 2 and the screw 22 in raised position, so that said screw 22 will be in constant engagement with the push rod or the valve stem, but said spring 12 is not stiff enough to lift the associated valve from its seat.

In practice, when the cams rotate and their high radii roll into engagement with the plungers 10, the same are pushed upwardly until the flange 14 is seated against

the upper wall of the recesses 16. The high radii of the cams also engage the flanges 6 and lift the tappets 2, causing them to open their respective valves in proper time. As the cams engage the flanges 6 and start to raise the respective tappets 2 before the flanges 14 become seated in the recesses 16, such seating of the flanges 16 will be unaccompanied by either noise or shock.

By providing each tappet 2 with a plunger 10 and a spring 12 to hold said tappet 2 in raised position, the space or clearance usually provided between the head of the screw 22 and the valve stem to allow for expansion of the valve mechanism is unnecessary, and hence said valve mechanism is not subjected to a hammer-like blow each time the tappet is raised by the cam. Furthermore, any play between the valve stem and the rocker-arm and between the rocker-arm and its fulcrum, is automatically taken up by the plunger 10 and the spring 12 and wear on these parts is reduced accordingly. The usual clatter accompanying the operation of the valve mechanism and which is especially objectionable in valves of the overhead type, is also practically silenced.

In the form disclosed by Fig. 4, the construction of the tappet is the same as that disclosed by the other figures of the drawings, as evidenced by corresponding reference numerals with exponents "a," the only difference being that the screw 22 and its lock nut 24 are dispensed with, so that the upper end of the tappet stem $4^a$ may be arranged in actual contact with the push rod or the valve stem.

From the foregoing description, it is apparent that I have produced a tappet embodying the advantages above-pointed out, and while I have shown and described two embodiments of my invention, I reserve the right to make such other modified forms as properly fall within the spirit and scope of the claims.

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

1. In combination with a puppet valve mechanism and a cam to actuate the same, a tappet interposed between the valve and the cam and provided with a counterbore, a plunger slidably mounted in the counterbore and having a lower end of less diameter than the adjacent end of said tappet to bear against the cam, and a spring interposed between the upper ends of the counterbore and the plunger to hold the same in engagement with the cam and also allow said plunger to move into the tappet, so that the cam may engage and lift said tappet, substantially as described.

2. In combination with a puppet valve mechanism and a cam to actuate the same, a tappet interposed between the valve and said cam and having a counterbore with recesses at each end, a plunger slidably mounted in said counterbore and having a flange bearing upon the cam and adapted to operate in the recess in the adjacent end of the counterbore, and a spring in the counterbore having an enlarged convolution at one end disposed in the inner recess of the counterbore and a convolution at its opposite end firmly embracing the adjacent end of the plunger to hold the flanged end thereof in engagement with the cam and also hold the plunger and said spring in assembly with the tappet, substantially as shown and described.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHESTER H. ENGLAND.

Witnesses:

F. G. FISCHER,

L. J. FISCHER.