Dec. 27, 1927. 1,654,020

B. F. SCHMIDT

INCREASING VALVE LIFTER FOR GAS ENGINES

Filed April 18, 1925

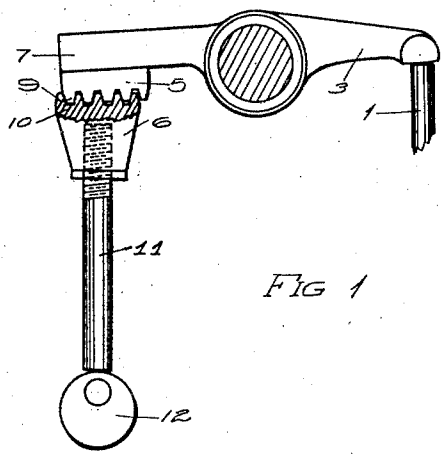


FIG 1

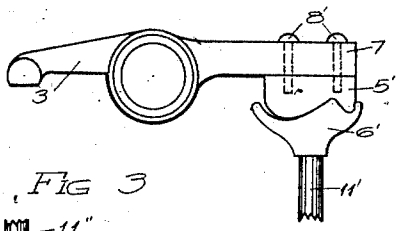


FIG 3

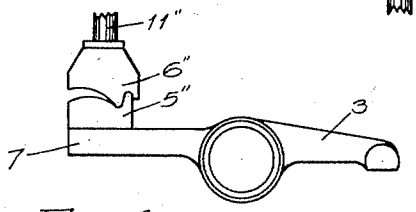


FIG 4

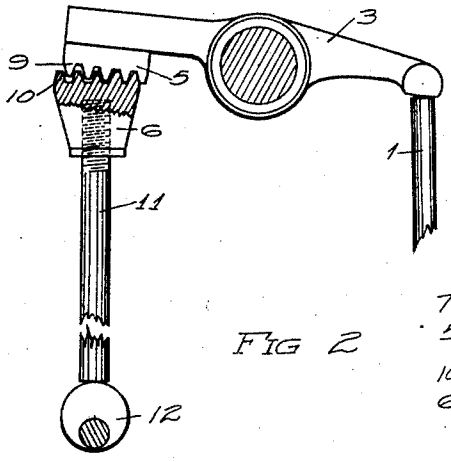


FIG 2

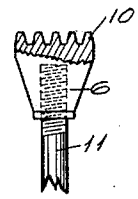


FIG 5

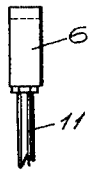


FIG 6

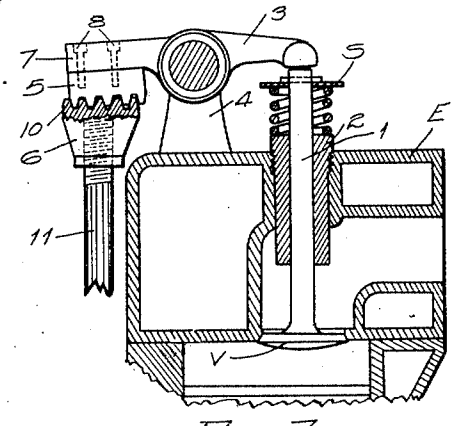


FIG 7

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UNITED STATES PATENT OFFICE.

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INCREASING VALVE LIFTER FOR GAS ENGINES.

Application filed April 18, 1925. Serial No. 24,172.

My invention relates to valve operating mechanisms for an internal combustion engine, and more particularly to a novel form of mechanism for increasing the valve lift or period of opening of the valves associated with said engine, said mechanism providing for a marked increase in power for said engine.

It accordingly is an object of my invention to provide a novel form of valve operating mechanism for internal combustion or other engines in which a novel form of variable lever mechanism is used to increase the valve lift of such engines.

A further object of my invention is to provide a novel form of valve operating mechanism in which the rocker arms for operating the valves associated with an internal combustion engine are provided with a shiftable member, which member has associated therewith one or more projections adapted to be made to coact with a complementary device positioned on a reciprocating member, which reciprocating member is adapted to be operated by one of the moving parts of said engine through, for example, a cam or an eccentric.

It is also within the province of my invention to associate my novel form of variable lever arm device with the rocker arms of the valve operating mechanism of an internal combustion engine either above or below said arms, as preferred, at least one of such fulcrums being provided on said rocker arms.

It is also an object of my invention to provide a novel form of valve operating mechanism which is simple in form, easy and inexpensive to construct, composed of a minimum number of parts, thoroughly reliable and efficient in operation, and which will result by its use in a marked increase in the power of the engine with which it is associated.

Further objects and advantages of my invention will become more apparent as the description thereof proceeds.

Reference is had to the accompanying drawings in which similar reference characters denote similar parts. In the drawings,

Fig. 1 is a fragmentary cross sectional view of my improved valve operating mechanism with certain parts omitted, and parts broken away for the sake of clearness, showing the position of said mechanism when the engine valve is closed,

Fig. 2 is a similar view showing the parts when the valve is open,

Fig. 3 is a fragmentary elevational view of a modified form of my invention,

Fig. 4 is a similar view of a still further modified form of my invention,

Figs. 5 and 6 are fragmentary detail views of one of the complementary members providing the variable lever arm device of the form shown in Figs. 1 and 2, and

Fig. 7 is a fragmentary cross sectional view showing the application of my invention to an internal combustion engine.

Describing my invention more in detail, it may be stated that said invention is especially useful in connection with the overhead valves of an internal combustion engine, although it is to be distinctly understood that in its practical application it is not to be so limited, but may be used anywhere found in practice to be desirable, the use of said invention involving a marked increase in power in the engine to which it is applied.

As shown in Fig. 7, the engine E is equipped with a valve V of the poppet type, which valve is provided with a stem 1 adapted to be reciprocated in a sleeve 2 screwed into or otherwise associated with the cylinder head of said engine, said valve being operated against the action of a suitable spring S associated with said stem and sleeve as shown, or in any other preferred manner.

Suitably mounted on the cylinder head of the engine E is a standard 4 on which is pivoted, or associated therewith in any desired manner, a rocker arm 3, said rocker arm having, if desired, any preferred means for connecting the same to the valve stem 1, or, if preferred, being separate and distinct therefrom, as shown. It is of course to be distinctly understood that the specific manner of associating the rocker arm 3 with the engine E and its valve mechanism may be any that in practice may suggest itself.

On one end 7 of the arm 3 is positioned one of the complementary members 5, which member is adapted to coact with another complementary member 6 to provide for a variable lever arm, hereinafter more particularly described.

A complementary member 5 may be either integral with the rocker arm 3, or may be

associated therewith in any preferred manner as, for example, by means of bolts or screws or other suitable fastening means 8, which, if desired, may be countersunk in said arm. The member 5 has positioned thereon or associated therewith as preferred a number of projections or teeth 9, fashioned as shown, or in any other desirable manner, which projections or teeth are adapted to coact with similar projections, or teeth, either integral with or associated in any desired manner with the complementary member 6, to provide the variable lever arm, or the changing points of contact, to provide for the increase in valve lift hereinafter more fully set forth.

The member 6 may be of any desired shape, and may be associated with a tappet rod 11 in any preferred manner, such as being screwed thereon, as shown or integral therewith, or provided with any desired adjusting means. The rod 11 is adapted to be actuated by the cam or eccentric means 12, operated by a moving part of the engine with which it is associated, which means may be any that in practice may be suggested.

As hereinbefore stated, the complementary members 5 and 6 may have any contour desired, and, if preferred, there may be sets of said members, and the number of projections thereon may be varied at will.

It may also be stated, that if desired the complementary members 5 and 6 may have associated therewith any form of mechanism or sets of devices, such as cheek bars or plates and the like, to prevent said members from displacement.

In operation, as the cam or eccentric member 12 is rotated, the rod 11 is lifted, the member 6 with its projections 10 coacting with the projections 9 on the member 5, thus lifting the rocker arm 3 against the action of the spring S, and causing the valve V to be opened. As will be clear from Fig. 1, as the rod 11 is lifted, the projections at the left side of said figure will rise, and the point of contact will be shifted to the position shown on the right side of said members as shown in Fig. 2, the lever arm being thus changed and a greater valve lift accomplished by the peak of said projections, and thus providing for a marked increase in the power of the engine.

When the mechanism is in the position shown in Fig. 1, the spring S has brought the valve V to its seat, closing the same, the parts being in the position shown in Figs. 1 and 7. When the valve V is open, the position of the various parts will be that shown in Fig. 2, said valve having the increased lift hereinbefore explained.

In the modified form shown in Fig. 3, the end 7 of the rocker arm 3 is equipped with a member 5′, shaped as shown, to provide but one contact member, secured to the end 7 by bolts 8′, which member 5′ is adapted to coact with a complementary member 6′ associated in any desired manner with the rod 11′. The operation of this form of my invention is precisely the same as that of the form previously described, except that but one contact device is provided.

In the form shown in Fig. 4, the rocker arm 3 has its end 7 equipped with a complementary member 5″, similar to those previously described, coacting with a member 6″ associated in any preferred manner with the rod 11″, all functioning as previously disclosed, except that the valve is differently associated with its operating mechanism, as will be understood. The operation of the single contact point in this modification is precisely the same as that described in connection with the other form of my invention.

While I have thus described my invention with great particularity, it is clear that the same may be modified throughout a wide range. I accordingly do not propose to be limited to the exact details of construction shown and described, but reserve the right in practice to make any and all modifications thereof that fall within the scope of the appended claims.

I claim as my invention:

1. In an internal combustion engine, in combination, a poppet valve therefor, a stem for said valve, a rocker arm for intermittently actuating said stem, a tappet rod, means for intermittently operating said tappet rod, and a set of toothed devices on said rocker arm and on said tappet rod, which devices, when said means is operated, are adapted to coact to cause said valve to be opened for a longer period than were said devices omitted.

2. A valve mechanism for an internal combustion engine comprising in combination a valve, a stem therefor, a rocker arm for operating said stem, a tappet rod, and a plurality of shiftable means on said rocker arm and on said tappet rod for appreciably varying the length of said rocker arm.

3. In a valve mechanism for internal combustion engines, in combination, a valve, a pivoted rocker arm for operating said valve, said rocker arm being equipped with a lever arm of uniform cross-section throughout its length, a tappet rod, mechanism for intermittently operating said tappet rod, and a pair of flattened complementary devices, each having engaging means of identical construction, associated with said lever arms and said tappet rod, which engaging portions are adapted to coact to give an increased lift to said valve when said mechanism is operated.

4. In a valve mechanism for internal combustion engines, in combination, a valve, a rocker arm for operating said valve, a tappet rod for operating said arm, detachable complementary devices associated with said

rocker arm and said tappet rod, said devices being provided with mating portions of identical configuration whereby an increased lift may be given to said valve.

5. In a valve mechanism for internal combustion engines, in combination with a valve, its rocker arm and the tappet rod for operating said arm, associated with said engine, a leverage changing mechanism associated with said rocker arm and said tappet rod for changing the leverage of said rocker arm during each cycle of operation of said valve, substantially as described.

6. In a valve mechanism for internal combustion engines, in combination with a valve, its rocker arm and the tappet rod for operating said arm, associated with said engine, means associated with said tappet rod and said rocker arm for progressively changing the contact between said tappet rod and said rocker arm during the operation thereof, substantially as described.

In testimony whereof I have signed my name to this specification.

BENJAMIN F. SCHMIDT.