Dec. 23, 1924. 1,520,208

G. PIELSTICK

VALVE ACTUATING GEAR FOR INTERNAL COMBUSTION ENGINES

Filed Sept. 8, 1922

Fig. 1.

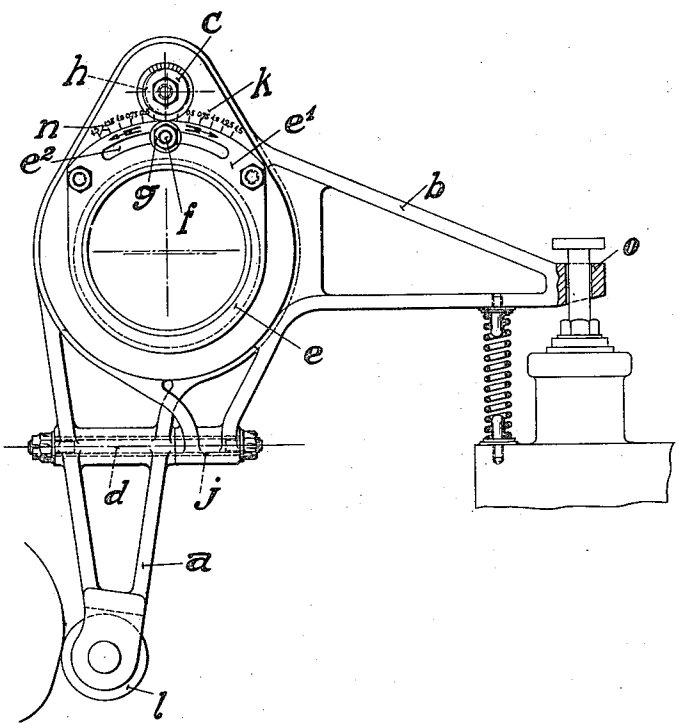
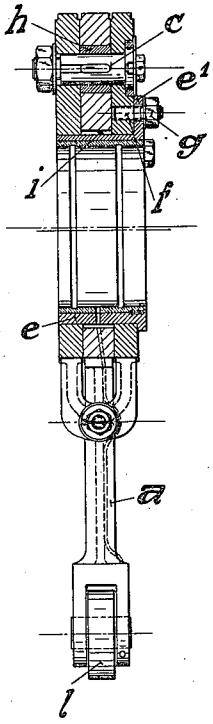


Fig. 2.



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UNITED STATES PATENT OFFICE.

GUSTAV PIELSTICK, OF AUGSBURG, GERMANY.

VALVE-ACTUATING GEAR FOR INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, GUSTAV PIELSTICK, a citizen of the German Republic, residing at Augsburg, Germany, have invented certain new and useful Improvements in Valve-Actuating Gears for Internal-Combustion Engines, of which the following is a specification.

This invention relates to the valve actuating rocking levers of internal combustion engines and its main object is to provide a rocking lever which will eliminate certain drawbacks existing in the present type of rocking levers and which consist in the difficulty of adjusting or timing the valves to suit varying conditions of engine running.

It is known that hitherto the valves have been timed by adjustment of the valve operating cam and by altering the distance of the cam roller from the cam. In stationary engines this adjustment is effected during the engine test, whereas in marine engines, which, as a rule, do not undergo such engine tests, adjustment is carried out during the trial run of the vessel. But even apart from such initial timing it is often necessary to alter the timing under normal working conditions when, for example, after changing the valves, or after changing from one fuel to another, the working diagram of the engine has been altered so that re-timing is required. At the present time, since this adjustment of the valves must be carried on by altering the position of the cam, it is necessary that the engine be stopped and in the case of marine engines this involves stopping the ship. Furthermore, this adjustment by altering the position of the cam is accompanied by great inconvenience and delay on account of the difficulty and delicacy of the work.

The present invention eliminates the disadvantages above mentioned and permits the valves to be timed under normal running conditions without interruption of the work, and with this object in view the invention consists in the provision of means to allow of an adjustment of the cam roller relative to the cam instead of altering the position of the cam itself. The rocking lever, for this purpose, is made in two parts and has two eccentricities of which each may be altered independently of the other. By suitably altering the eccentricity of the one or the other part, which may be done while the engine is running, the radial distance, or the tangential distance, of the roller from the cam may be independently adjusted as required, whereas a suitable adjustment of both eccentricities will effect an alteration of the valve lift as regards stroke as well as time and duration of opening. The working diagram may thus be conveniently corrected without the necessity of stopping the engine.

The accompanying drawing illustrates the invention by way of example.

Fig. 1 is a side elevation of the improved rocking lever arrangement, some minor parts being shown in section.

Fig. 2 is a cross section through the centre of Fig. 1 seen in the direction of the cam roller.

As will be seen from this drawing the working lever is made to consist of two parts, namely the roller arm *a* and the lifter portion *b*, the latter terminating in a forked end in which the former is received. Both parts are held to one another by bolts *c* and *d*. Within the boss of the rocking lever there is loosely arranged an eccentric bushing *e* which fits over the valve rocker pin upon which it may be circumferentially adjusted. The said bushing is provided at its upper portion with a flange extension e^1 and is adapted to turn to an extent limited by the slot e^2 in the flange in which is received a pin or stud *f* mounted in the lifter arm *b*. The bushing is held in relation to the lever by means of a nut *g* which is threaded on the pin *f*.

An eccentric disc *h* is keyed or otherwise fixed to the aforesaid connection bolt *c* and adapted to turn within a cavity of the roller arm *a* so as to adjust the vertical position of the latter. To permit this adjustment to be made the bore *i* of the roller arm *a* is greater in diameter than the bushing *e* by an amount which corresponds to the amount of eccentricity of the disc *h*. In addition there is a like amount of clearance between the bolt *d* in its bolt hole *j*. To facilitate setting the roller, the lifter arm *b* is provided at its top with a graduated scale *k*, from which the

amount of adjustment of the bushing *e* and the eccentric disc *h* may be observed.

In order, now, to alter the distance from the cam of the roller *l* of the rocking lever the rigid bolt connection between the bushing *e* and the lifter arm *b* must be slackened by loosening the nut *g* and turning the bushing *e* upon its pivot to the desired extent and in the direction required, the graduated scale *n* affording a means by which an accurate adjustment may be secured. The eccentric shape of the said bushing will thus cause the centre point of the rocking lever boss to be shifted and, the lifter arm end *o* serving as fulcrum, to cause a radial movement of the roller *l* towards or away from the cam. In this way the lift of the needle valve as well as the duration of opening may be altered. After this adjustment has been carried out the bushing *e* may again be secured in position by tightening up the nut *g*. This having been done, the connection bolts *c* and *d* are slackened and the eccentric disc *h* turned as far as required, whereby the roller arm *a* will be moved within its enclosing lifter arm in a direction tangential to the circumference of the cam, whereby the time of valve opening will be altered correspondingly.

It will be seen that, by simply slackening a few screw connections and turning the two eccentrics *e* and *h*, the position of the roller may be altered as required and the valve gear timed so as to obtain proper working diagrams.

The invention is mainly designed for use in marine engines, in which connection it offers unusual advantages, one being that with an engine provided with these rocking levers it is no longer necessary to interrupt the run of the vessel when the valve-timing is to be altered, thus eliminating the dangers resulting from unmanœuvreability of the ship during the time of adjusting the valve gear as well as any waste of time in connection with such work. However, the invention is equally well adapted for use on stationary engines in which very similar advantages may be obtained.

What I claim is:

1. In an internal combustion engine, the combination of a valve, a cam for controlling the movement of the valve, and a lever for actuating the valve interposed between the valve and the cam, this lever comprising a pair of arms secured together and pivotally mounted on a single pivot, one of said arms having an end engaging the cam, and means for varying the position of said end relative to the cam in two directions, approximately normal to each other.

2. In an internal combustion engine, the combination of a valve, a cam for controlling the movement of the valve, and a lever for actuating the valve interposed between the valve and the cam, this lever comprising a pair of arms secured together and pivotally mounted on a single pivot, one of said arms having an end engaging the cam, and independent means carried by the arms for varying the position of the said end in radial and tangential directions with respect to said cam.

3. A rocking lever for internal combustion engine valves comprising the combination of a pair of arms secured together and mounted on a single pivot, one of said arms having an end adapted to be acted on by a cam, and means carried by the arms for effecting independent adjustments of the cam-engaging arm relative to said other arm, one of said adjustments being in a direction radially of said cam, and the other in a direction tangentially of said cam.

4. A rocking lever for internal combustion engines consisting of two separate parts, two independently movable eccentric members in connection with the said parts, a cam roller carried at the end of one part, valve lifting means at the end of the other part, and a forked boss to the valve lifting part enclosing the bearing portion of the cam roller carrying part.

5. In a valve actuating gear for internal combustion engines a rocking lever comprising a cam roller carrying arm, a valve lifting arm separately therefrom, means for detachably connecting the two arms, a rotatable eccentric bushing in connection with said valve lifting part for alternating the position of the cam roller in a direction radially to the cam, and eccentric means to alter the position of the cam roller in a direction tangentially to the cam.

6. In a valve actuating gear for internal combustion engines a rocking lever comprising a cam roller carrying arm, a valve lifting arm separate therefrom, means for detachably connecting the two arms, eccentric means in connection with the valve lifting arm for altering the position of the cam roller in a direction radially to the cam, and an eccentric disc on the roller carrying arm and rotatable in the valve lifter arm to alter the position of the cam roller tangential to the cam.

7. In a rocking lever for internal combustion engines, a valve lifting arm having a forked boss, a rotatable eccentric bushing in connection with said valve lifting arm, an upwardly extending flange portion to said bushing, a slot in said flange portion, a stud carried by the valve lifting arm passing through the said slot, a cam roller carrying arm journalled within the forked boss of the valve lifting arm, and a rotatable eccentric disk carried by the valve lifting arm so as to act on the roller carrying arm.

8. In a rocking lever for internal combustion engines, a cam roller carrying arm, a valve lifting arm separate therefrom, means

to detachably connect both arms to one another, two mutually independent eccentric members to alter the position of the cam roller radially and tangentially in relation to the cam, and a graduated scale to enable a correct setting of both the said eccentric members.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

GUSTAV PIELSTICK.

Witnesses:

ALEXANDER DE SOTO,

ALEXEI PHILIPPOFF.