S. LÖFFLER.

VALVE OPERATING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAY 26, 1906.

928,390. Patented July 20, 1909.

FIG. I.

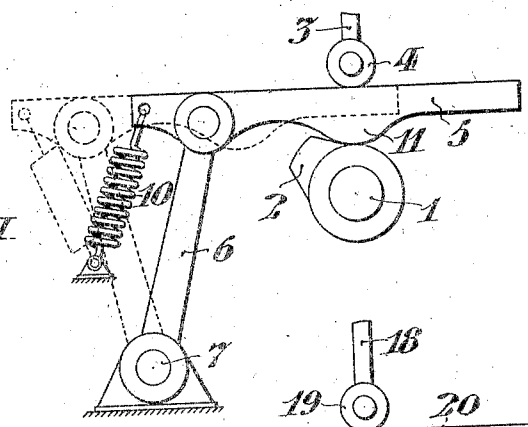


FIG. II.

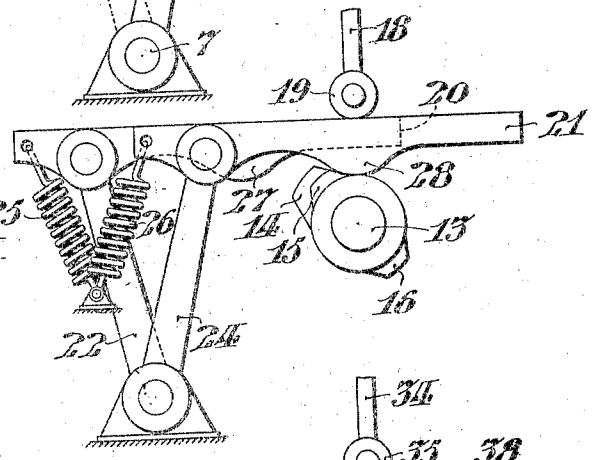


FIG. III.

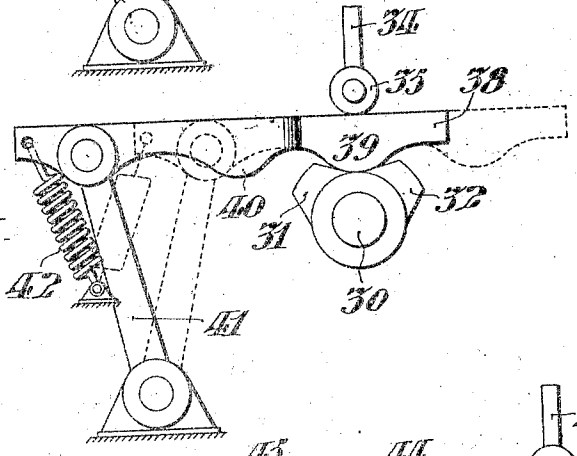
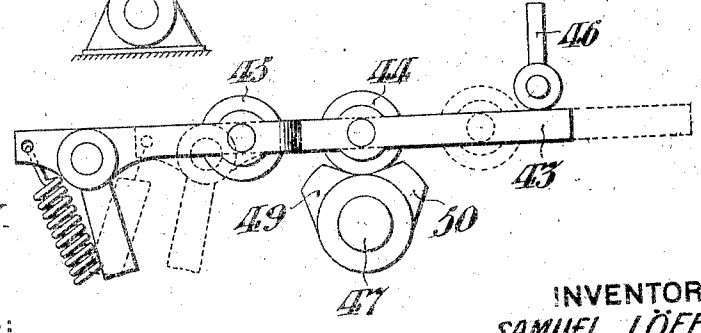


FIG. IV.



WITNESSES:

Clifton C. Hallowell

John C. Bergner.

INVENTOR:

SAMUEL LÖFFLER,

by Cargy, Paul & Finley

Attys.

UNITED STATES PATENT OFFICE.

SAMUEL LÖFFLER, OF WITKOWITZ, AUSTRIA-HUNGARY.

VALVE-OPERATING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

No. 928,390. Specification of Letters Patent. Patented July 20, 1909.

Application filed May 26, 1906. Serial No. 318,795.

To all whom it may concern:

Be it known that I, SAMUEL LÖFFLER, of Witkowitz, Austria-Hungary, have invented a certain new and useful Improvement in Valve-Operating Mechanism for Internal-Combustion Engines, whereof the following is a specification, reference being had to the accompanying drawings.

My improvement is particularly applicable to valves provided with reciprocatory rods arranged to be actuated by rotary cams.

My invention provides mechanism which may be utilized to adjustably vary the points in the cycle of operation of an engine at which the valves are opened or closed, and the period during which they remain open.

As hereinafter described my invention comprises one or more members of different cross section in different regions of their length, and hereinafter termed wedge bars, which may be adjustably interposed between valve actuating cams and valve rods, or be withdrawn, so as to control the operation of the cams with respect to the valves, without changing either the cams or the valves.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified.

Figure I, is a diagrammatic view, of a valve operating mechanism adapted for starting an internal combustion engine in which the outlet valve is rendered inoperative after the engine has been set in motion. Fig. II, is a diagrammatic view of a valve operating mechanism adapted for starting a four cycle engine of the type which, during the starting operation is operated as a two cycle engine, compressed air being admitted through the inlet valve. Fig. III, is a diagrammatic view of valve operating mechanism adapted for changing over a four cycle engine. Fig. IV, is a diagrammatic view of valve operating mechanism adapted for changing a four cycle engine to operate as a two cycle engine.

Referring to Fig. I; 1, is the cam shaft carrying the cam 2, and 3 is the valve actuating rod provided with the roller 4. The wedge bar 5 is conveniently supported by the lever 6 having the pivot 7, and said bar 5 is upheld against the roller 4, by the spring 10. In the position of said bar 5 shown in dotted lines in Fig. I, the cam 2 may rotate freely beneath it without moving the valve rod 3. However, when said bar 5, is shifted to the position shown in full lines, in said figure, its high portion 11, is interposed between said cam 2 and roller 4, so that the latter is uplifted and the valve operated by the rotation of said cam 2.

The valve operating mechanism shown in Fig. I, may be advantageously employed in an internal combustion engine requiring that the outlet valve shall be positively actuated during the starting operation, and released after the engine has been set in motion. In such an embodiment the rod 3 would be connected to the outlet valve, and the bar 5 be presented in the position shown in full lines during the starting operation, and in the position shown in dotted lines during the continued operation of the engine. Moreover, it may be observed that if said rod 3 is connected with the igniter, the latter may be rendered operative or inoperative at will, in accordance with the position of said bar 5.

Referring to Fig. II; the cam shaft 13, carries the cams 14, 15 and 16, and the valve rod 18, is provided with the roller 19, which bears upon both of the wedge bars 20 and 21, although said bars extend in different planes. Said bars are respectively carried by the levers 22, and 24, and provided with the springs 25, and 26, to uphold said bars in contact with said roller 19. The cam 14, rotates in the plane of the bar 20, so as to raise the valve rod 18, when the high portion 27, of said bar 20, is presented between said cam and the roller 19; the position shown being such that said cam 14, may be rotated beneath said bar 20, without operating said rod 18. The cams 15, and 16, rotate in the plane of the bar 21, so that when the high portion 28, of the latter is presented beneath the roller 19, as shown, the valve rod 18, is raised by said cams 15, and 16, in succession, as the shaft 13 rotates. It may be noted that the wedge bars 20, and 21, may be shifted independently of each other, so that either or both can be engaged by the cams, or both be rendered inoperative.

The arrangement last described may be advantageously employed in a four cycle engine, which during the starting operation must be operated as a two cycle engine; compressed air being admitted through the inlet valve. In such an engine it is desirable to open the inlet valve during a short time at the beginning of the inlet stroke and during a short time at the beginning of the working stroke, in which case the inlet valve would be connected with the rod 18, and, the bars 20

and 21 being set as shown in Fig. II; the inlet valve would be operated by the two cams 15, and 16, during the desired periods during the two cycle starting operation of the engine. However, when it is desired to effect a four cycle operation of the engine; the wedge bar 21 is withdrawn so as to render the cams 15, and 16, inoperative, and the wedge bar 20, is interposed so as to render the cam 14 operative during the regular running of the engine. The mechanism last described may also be employed to operate the exhaust valve of an engine of the type last described, in the same manner as the inlet valve.

Referring to Fig. III; the cam shaft 30, is provided with the cams 31, and 32, which rotate in different planes, and the valve rod 34, is provided with the roller 35. The wedge bar 38, has high portions 39, and 40, extending in different planes, respectively in registry with said cams 31, and 32. Said bar 38, is carried by the lever 41 and provided with the spring 42, which normally upholds it against the roller 35. When said bar 38, is in the position shown in full lines in Fig. III; the cam 31, is operative and the cam 32, inoperative, but when said bar 38, is shifted to the position shown in dotted lines in said figure, the cam 31, is rendered inoperative and the cam 32 operative.

The mechanism last described may be advantageously employed for changing four cycle engines to operate as two cycle engines. It is to be understood that rollers, may be substituted for the rigidly projecting high portions of the wedge bars above described; for instance, as shown in Fig. IV, wherein the bar 43, is provided with the rollers 44, and 45, which extend in different planes, like the projections 39, and 40, shown in Fig. III.

Although the valve rods may be conveniently disposed in radial relation with the cam shafts, as indicated in Figs. I, II, and III; they may be otherwise located. For instance, as indicated in Fig. IV; the valve rod 46, extends in eccentric relation to the cam shaft 47, so that a greater extent of motion is imparted to said rod than if the cams 49, and 50, operated radially thereon.

It is to be understood that the levers 22 and 24, shown in Fig. II, and the corresponding parts in the other figures, may be conveniently operated by hand in the manner above described.

It may be observed that one advantage of the mechanism above described, is that the desired change in the operation of the engine may be accomplished in any desired position of the crank shaft, because said mechanism is at all times free to be operated.

I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim:—

1. In valve operating mechanism for internal combustion engines, the combination with a rotary cam; of means whereby the effect of said cam upon the valve may be variably determined; comprising a wedge bar arranged to be adjusted relatively to said cam; means pivotally supporting said bar; and, means counterbalancing said bar on its pivotal support, substantially as set forth.

2. In valve operating mechanism for internal combustion engines, the combination with a rotary cam; of means whereby the effect of said cam upon the valve may be variably determined; comprising a wedge bar arranged to be adjusted relatively to said cam; means supporting said bar for horizontal reciprocation with respect to said cam, comprising a vertically disposed lever; a pivotal connection between the upper end of said lever and said bar; a stationary fulcrum at the lower end of said lever; and, a counterbalance connected with said bar at the end thereof opposite to said cam, substantially as set forth.

3. In valve operating mechanism for internal combustion engines, the combination with two rotary cams of different extent; of means whereby the effect of said cams upon the valves may be variably determined; comprising two wedge bars arranged to be independently adjusted relatively to the respective cams; means supporting said bars for horizontal reciprocation with respect to said cams, comprising two independent vertically disposed levers; a pivotal connection between the upper ends of said levers and respective bars; and a stationary fulcrum at the lower ends of said levers, whereby said levers may be presented and withdrawn in alternation with respect to said cams, substantially as set forth.

4. In valve operating mechanism for internal combustion engines, the combination with two rotary cams, having a common axis, but extending in different planes; of means whereby the effect of said cams upon the valves may be variably determined; comprising a wedge bar provided with projections respectively arranged to register with the respective cams in alternation; and means supporting said bar for horizontal reciprocation transversely with respect to the axis of said cams, substantially as set forth.

In testimony whereof, I have hereunto signed my name, at Cologne, Germany, this 11th day of May 1906.

SAMUEL LÖFFLER.

Witnesses:
LOUIS VANDORN,
EUGEN FRIEGLER.