W. SCHENKER.

VALVE GEARING.

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Fig. 1.

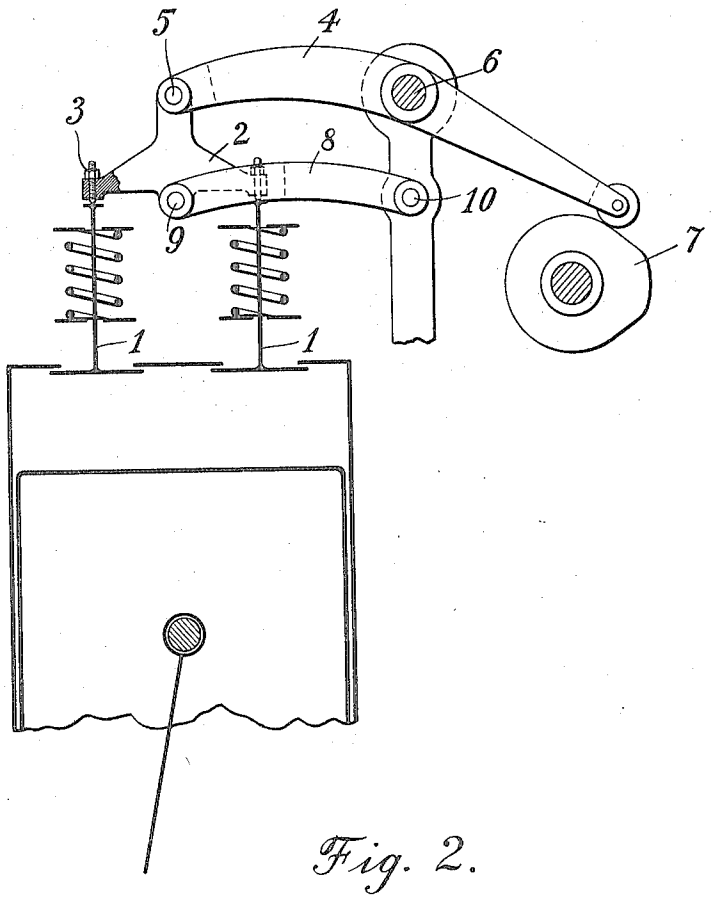
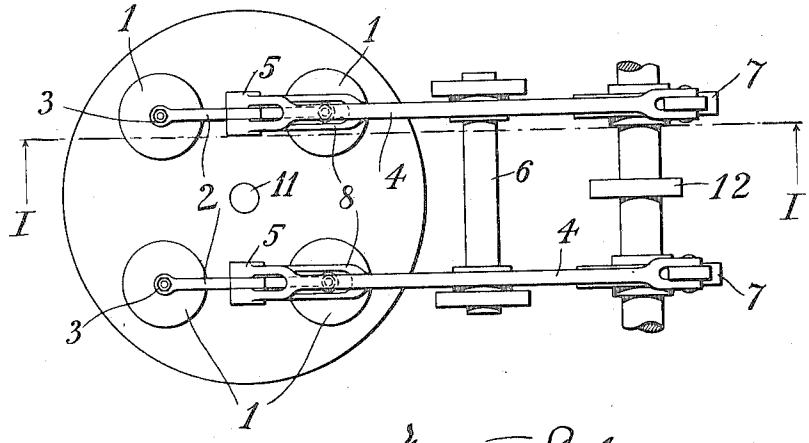


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

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VALVE-GEARING.

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To all whom it may concern:

Be it known that I, WALTER SCHENKER, a citizen of the Republic of Switzerland, and a resident of Winterthur, Canton of Zurich, Republic of Switzerland, have invented certain new and useful Improvements in Valve-Gearing, as hereinbelow described.

The invention is more particularly an improvement in valve gearing for large size combustion engines, and consists in simple and effective means for producing synchronous and equal operation of two or more of the valves of such engines. The unrestricted passage for air or gas to or from the relatively large combustion spaces of such large size engines is desirably obtained by means of several similar ports and valves arranged in distributed relation in the wall which confines the combustion space, so that, on the one hand, the entering air or gas will quickly reach all parts of the combustion or compression space, and, on the other hand, so that the exhaust gases will have an easy and prompt escape, thereby imposing the least amount of negative work upon the engine. The valves controlling the several similar ports require to be opened and closed synchronously and equally, as otherwise a disproportionate burden is thrown on one of the valves, while the others do not work up to their full capacity, and the full efficiency of the machine design is therefore not obtained.

The gearing described below provides in compact and simple form a useful means for synchronously operating two or more valves, so that each will be opened uniformly with an effect equal to that of the others or with any desired effect. Its principle of operation will be observed to apply indifferently to several valves for admitting air to the cylinder for any purpose, or fuel, or for exhausting the combustion gases.

In the drawings the invention is illustrated diagrammatically and may be assumed to be shown in connection with a Diesel engine.

Figure 1 illustrates a vertical section of the cylinder and cylinder head of such an engine on line I—I of Fig. 2; and Fig. 2 shows a top plan of the same engine, all superfluous parts being omitted from both views.

The several valves marked 1 are symmetrically arranged in the cylinder head at equal distances from the center and from each other, and open inwardly against the pressure of their springs. In the present case, as in the actual and preferred form of embodiment, the valves are all of equal capacity and hence require to be equally and simultaneously opened, but for convenience in constructing and assembling, the set of four valves, as shown in Fig. 2, is divided into two groups of two each, and the individual members of each group are operated in a synchronous manner according to this invention, although all the valves of both groups could be so operated and by a single cam and valve gearing if desired. The operating means for the synchronously operated valves comprises a yoke 2 common to all the valves of the group and adapted to have constant or intermittent operative engagement with their valve stems through adjustable bearings 3. The yoke is supported by a pair of links of which one serves as the actuating lever for imparting movement to the yoke, while the other is an idle link serving to guide the movement of the yoke and maintain for it a uniform manner of operation on each valve stem independent of the load thereon. The upper link 4 which constitutes the actuating lever of the yoke, being pivoted thereto at 5, is fulcrumed upon a relatively fixed axis 6 and is oscillated by a cam 7. The other link 8 is also pivotally connected to the yoke at the point marked 9 and to an independent fixed axis 10, and is of substantially the same effective length of the working arm of the actuating lever 4 after the manner of so-called parallel motion links. The pivotal axes of the adjacent ends of the two links are thus disposed in parallel planes as shown in the drawings, and preferably these planes are vertical or parallel with the axis of the engine so that the yoke is thereby caused to move parallel to itself and to the axes of the valves. By the proper adjustment of the bearings 3 it can thus be made to have simultaneous engagement with each valve stem and to open both valves to exactly equal extents. It will be obvious, however, that variations from true parallel motion in the yoke can be produced in the same construction by varying the relation of the links, and it will also be obvious that the plane of the connecting

pivots on the yoke can be centrally disposed with respect to the group of operated valves or otherwise as preferred.

As indicated in the drawings the actuating lever 4 is forked to embrace the top of the yoke, and the guiding link 8 is also similarly forked to embrace the lower part of the yoke, both links being thus symmetrically disposed with respect to the yoke and in the same plane as the latter, which arrangement facilitates the use of the new gearing on the engine heads where other valves are also mounted. The central circle 11, in Fig. 2 indicates the usual fuel valve of an oil engine adapted to be operated by means of suitable levers, not shown, by the cam 12 on the cam-shaft.

The adjustable bearings 3 may be composed of set screws threaded into the arms of the yoke and adapted to bear on the ends of the valve stems as indicated in Fig. 1, but the manner in which the yoke engages the valves can obviously be varied to any extent desired according to the kind of valve and the direction of its operation.

I claim:

1. In a combustion engine two or more valves controlling ports to the combustion space of the engine, and means for synchronously operating the valves comprising a yoke common to both and supports for the yoke constraining it to move parallel with itself.

2. In a combustion engine, two or more valves, an operating yoke therefor common thereto and an actuating lever for the yoke, in combination with a link pivotally connecting the yoke to a fixed axis and maintaining a predetermined movement of the valves thereby.

3. In a combustion engine, a yoke adapted for the synchronous operation of two or more valves, a means for supporting the yoke comprising a cam lever and a link, the plane of one pair of adjacent pivotal axes of said lever and link being substantially parallel to the plane of the other pair of adjacent pivotal axes thereof.

4. In a combustion engine, the combination with means forming the combustion space of the engine and two or more valves therefor, of an operating yoke common to both valves, and having adjustable engagement with one or more of them, an actuating lever and guiding means for the yoke adapted to produce uniform operation thereby of both valves.

5. In a combustion engine the combination of a cylinder having several valves therein, a common shaft for operating all the valves, and connecting means between the shaft and valves comprising a yoke engaging a plurality of valve stems, and means for constraining such yoke to move all of such stems simultaneously and to equal extent.

6. In a combustion engine, a cylinder having a plurality of valves therein, an operating yoke spanning two valves of each pair, each yoke having adjustable engagement with each valve stem operated by it, and means including a common shaft for causing each yoke to move its valve stems simultaneously.

In testimony whereof, I have signed this specification in the presence of two witnesses.

WALTER SCHENKER.

Witnesses:
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