

J. SCHEITLER.
VALVE ACTUATING MEANS FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED MAR. 5, 1912.

1,065,001.

Patented June 17, 1913.

2 SHEETS-SHEET 1.

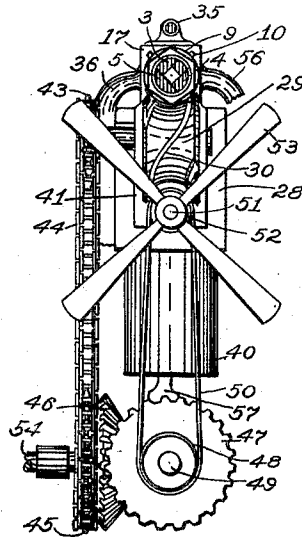
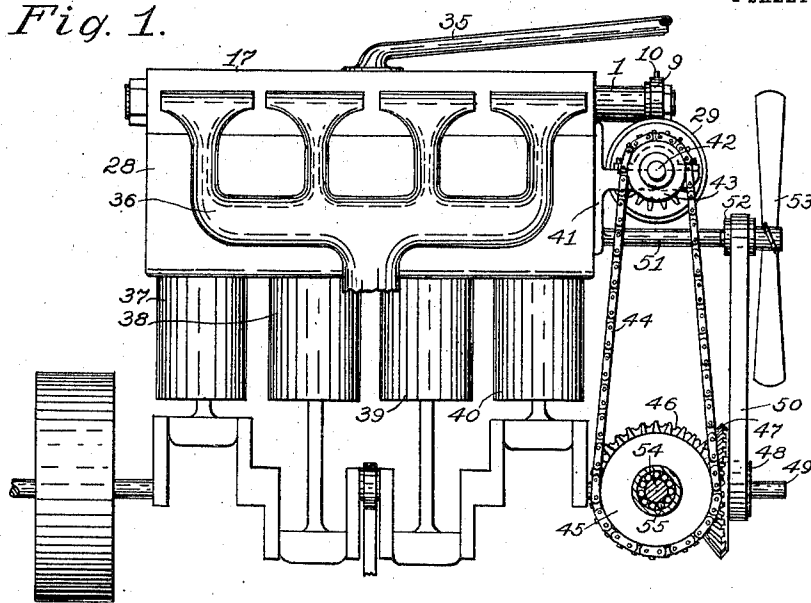


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

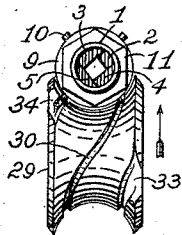


Fig. 4.

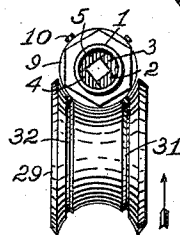


Fig. 5.

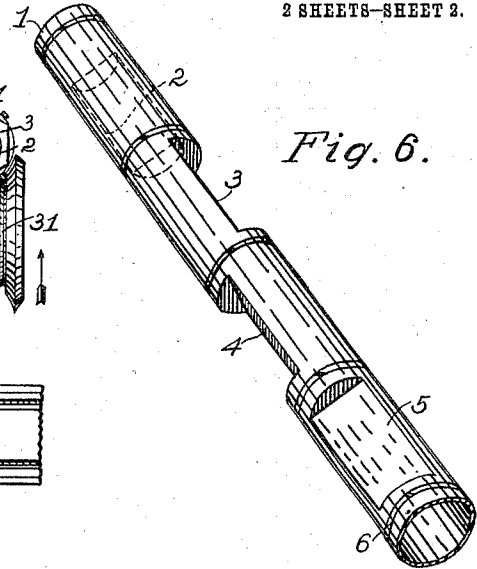
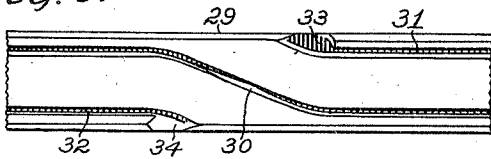


Fig. 6.

Fig. 7.

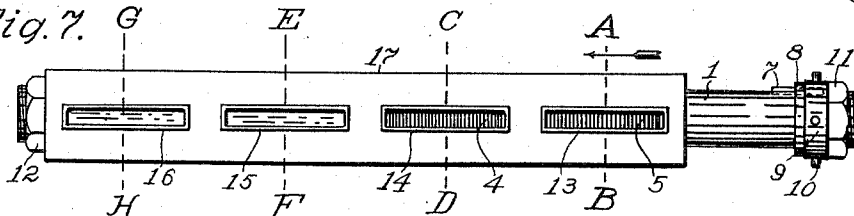


Fig. 8.

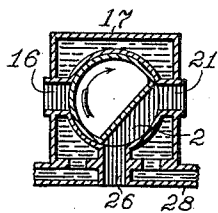


Fig. 12.

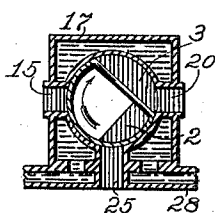


Fig. 11.

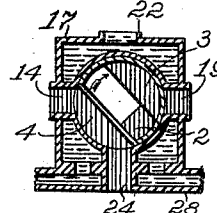


Fig. 10.

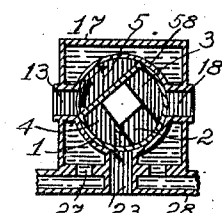


Fig. 9.

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UNITED STATES PATENT OFFICE.

JOSEPH SCHEITLER, OF WATERLOO, IOWA.

VALVE-ACTUATING MEANS FOR INTERNAL-COMBUSTION ENGINES.

1,065,001.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed March 5, 1912. Serial No. 681,700.

To all whom it may concern:

Be it known that I, JOSEPH SCHEITLER, a citizen of the United States of America, and a resident of Waterloo, Blackhawk county, Iowa, have invented certain new and useful Improvements in Valve-Actuating Means for Internal-Combustion Engines, of which the following is a specification.

My invention relates to improvements in valve-actuating means for internal-combustion engines, and the object of my improvement is to provide springless means for opening and closing the admission- and exhaust-ports of such engines regularly and automatically, such means being simple, effective, and quickly demountable for cleaning or repairs. This object I have accomplished by the means which are hereinafter described and claimed, and which are illustrated in the accompanying drawings, in which:

Figure 1 is a right-hand side elevation of a four-cylinder internal-combustion engine equipped with my improved valve-regulating and operating means. Fig. 2 is a front elevation of said engine and valve-actuating means, with parts broken away. Fig. 3 is an enlarged detail front elevation of the cam-wheel and its driven disk, in the position wherein the edge studs of the disk are about to traverse the cross-cam-groove of the wheel. Fig. 4 is a similar view of said cam-wheel and disk, showing the same in their positions assumed at the end of the traversing of the cross-cam-groove by a stud of said disk. Fig. 5 is a development upon a plane surface of the cam-groove carrying face of said cam-wheel. Fig. 6 is a perspective detail, with parts broken away, of the hollow valve-way shaft. Fig. 7 is a right-hand side elevation, enlarged, of the boxing for the said valve-way shaft. Fig. 8 is a left-hand side elevation of said boxing. Fig. 9 is an enlarged transverse section of said boxing and its contained rotary valve-way shaft, taken on a line A—B of Fig. 7, looking in the direction of the arrow, and showing the position of the valve-way in said shaft for the forward cylinder at the beginning of the power-stroke of the piston thereof. Fig. 10 is a transverse section of the said parts taken on the line C—D of Fig. 7, the valve-way of the shaft for the second cylinder being in its proper position at the time when the parts for the first cylinder are as shown in Fig. 9. Figs. 11 and 12 are like sections on the

lines E—F and G—H respectively of Fig. 7, but showing the proper positions of the valves in said shaft for the third and fourth cylinders respectively, when the valve-way in the shaft is in the position shown in Fig. 9.

Similar numerals of reference denote corresponding parts throughout the several views.

I have shown a four-cylinder engine, having the cylinders 37, 38, 39 and 40 with combustion-chambers supplied with the usual casing 28 to contain water, the piston-rods of said cylinders pivoted to the cranks of a common crank-shaft, in a suitable order as shown, so that the power strokes thereof will succeed each other in the succession from the cylinders 40, 39, 37 and 38, but any other order of succession may be adopted when desired, and the valve-ways may then be rearranged accordingly without departing from the scope of my invention.

In order to do away with spring-actuated puppet-valves and the like, I have adopted the following described means to govern the admission- and exhaust-ports of the engine: Upon the top of the water jacket 28 of the combustion-chambers of the four engine cylinders mentioned above, I mount a relatively long oblong boxing 17 longitudinally, which may be integral with said water-jacket and cylinders, or may be separate and secured thereon. The said boxing 17 is hollow to contain water, and ports 27 afford a communication between the interior of said boxing and the interspaces of the water-jacket 28 of the cylinders. A conduit 35 leads from the interior of said boxing to a radiator (not shown). Within said boxing is supported in its interspace and spaced apart from the walls thereof, a cylindrical hollow body 58 integrally connected therewith, and extending longitudinally therethrough. The interior cylindric hollow of said body 58 is adapted to be the seat in which a rotatable hollow cylindrical shaft 1 is mounted removably. The rear end of said shaft 1 is exteriorly threaded to receive a retaining nut 12, and its forward projecting end has an integral collar 8 to act as a stop for a disk or ring 9 which is removably mounted thereon over a key 7 to prevent rotation of the ring relative to the shaft. The ring 9 is secured on said shaft by means of a retaining-nut 11. The ring 9 has four equally spaced apart short studs 10 radially projected from its circumferential periphery

which are adapted to extend movably within a cam groove 31—30—32 best shown in Fig. 5 as developed on a plane surface, of a concave-edged cam-wheel 29 fixed on a rotary shaft 42 set at right angles to said shaft 1. The ends of the shaft 42 are mounted in bearings on brackets 41, which latter depend from the boxing 17 over the forward face of the water-jacket 28. Upon the right-hand end of the shaft 42 is secured a sprocket-wheel 43 engaged operatively by a chain 44 driven by a sprocket-wheel 45 mounted on a parallel shaft 54 below. Secured on the same shaft 54 is a bevel-gear 46 in mesh with a bevel-gear 47 secured on the forward part of the engine crank-shaft 49. A small pulley fixed on said crank-shaft at 48 drives a belt 50 which transmits rotation to another pulley 52 rotatably mounted on a fixed shaft 51 projected forwardly from the bracket 41. Secured to and driven by said pulley 52 is a fan-wheel 53 anterior to said engine of the usual type. The bevel-gear wheels 47 and 46, also the sprocket-wheel 45 have pitch-circles of the same diameter, while the wheels 46 and 45 are mounted on anti-friction ball-bearings 55, and the other sprocket-wheel 43 is made with a pitch-circle of a proper diameter to be rotatable through two revolutions to one revolution of the other said wheels and said crank shaft, thus rotating the cam-wheel 29 twice during one rotation of said crank-shaft. It will be observed that the concave-faced cam-wheel 29 has its concave face thus arranged to pass over the circumference of the ring 9 in rotating in the direction of the arrows in Figs. 3 and 4. The cam-groove on the concave face of said wheel 29 has its middle portion 30 crossed obliquely across the wheel, while the ends of the groove at 31 and 32 end in the excised parts 33 and 34 in the angular edges of the wheel to permit of the entry and exit of the studs 10 on said disk or ring 9 of the hollow shaft 1. Since the obliquely-crossed portion 30 of said cam-groove occupies but a portion or fraction of the extent of the circumference of the cam-wheel 29, it is obvious that when one of the studs 10 of the ring 9 enters and is caused to traverse said groove by reason of the rotation of the cam-wheel in the direction of the arrow, the stud must traverse in its induced movement with said ring said oblique part of the groove, and only while so traversing such oblique part of the groove can it act in rotating the ring 9 one quarter of one rotation of the latter. At other times the next stud 10 which enters the end 31 of the groove remains quiescent therein until it is shifted for another quarter revolution by the action of the transverse part of the groove. The ring 9 and shaft 1 are thus induced to receive intermittent actuations by said cam-wheels to produce succes-

sive quarter rotations thereof at equal intervals for the purpose to be now described.

The hollow shaft 1 is subdivided into as many portions longitudinally as there are cylinders in the engine to be served, in this example, four. The shaft therefore, is at a part of each of these subdivisions provided with a depressed portion in the shape of a segment of a cylinder with the chordal plane a bounding wall, rendering the wall imperforate at those parts, all the depressions, or ways 2, 3, 4 and 5 being of the same dimensions, but varied in their locations about the circumference of said shaft so as to be each a one quarter turn apart from the preceding or succeeding one. Annular grooves between the said depressions or ways in the outer wall of the shaft 1, as also at either end thereof, are made seats for the split-rings 6, which latter thus render the contacts tight and gas proof at those places between said shaft and the seat-cylinder 58, preventing any transmission of gases or leakage past said places.

Referring to the Figs. 9 to 12 inclusive, the Fig. 9 is a section of the boxing 17, the seat-cylinder 58, and the hollow shaft 1, taken at a moment when the way 5 of said shaft is in a position where it has just closed the communication between the carbureter port 13 and the inlet-port 23 of the combustion-chamber of the cylinder 40. The ignition now is effected and the piston of said cylinder driven downwardly in its power-stroke. The shaft 1 has been previously shifted automatically by the intervening gearing and devices already described in the movement of the crank-shaft of the engine, by the rotation of the shaft 1 a one quarter turn to the left. The rotation of the cam-driven ring 9 this quarter turn is effected at the moment while the crank on the piston-rod 57 of the cylinder 40 passes from a point about five degrees on one side of one dead-center to another point in its rotation about five degrees on the other side of the dead-center, in other words through a space of about ten degrees and just preceding the ignition at the beginning of the power-stroke. The ring and shaft 1 with its way 5 has been therefore shifted a quarter turn from its preceding position, wherein said way 5 had furnished a means of communication between the carbureter port 13 and the inlet-port 23 in the preceding indraft stroke of the piston in said cylinder 40. The next quarter turn of the shaft 1 occurs when the crank is passing through the opposite dead center, and thus in succession, the shaft 1 is rotated by quarter turns at equal intervals to open or close the communications, by means of the way 5, between the carbureter port 13 and the inlet-port 23, and between the inlet-port 23 and the exhaust-port 18 for the cylinder 40. The Figs. 9 to 12 in-

clusive show the simultaneous positions of the ways 5, 4, 3 and 2 of said shaft 1, relative to the carbureter-, inlet- and exhaust-ports of the respective cylinders 40, 39, 38 and 37. Since the pistons of the different cylinders move in the predetermined succession, the ways placed in the shaft 1 are located appropriately to effect the proper actions relative thereto as above described.

Since the shaft 1 is hollow, air driven by the fan 53 may pass through its interior hollow for cooling purposes. The shaft 1 may be readily removed from its seat by merely removing its rear retaining-nut 12, for cleaning or repairs.

It will be observed that this device may be applied to any ordinary type of internal-combustion engine, with but little if any, readjustment thereof, and that the mechanism, while simple, works automatically in the governing of the engine-ports.

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

1. The combination with the rotary valve of an internal-combustion engine, of means adapted to intermittently rotate the valve, comprising a rotary cam-wheel having a circumferential groove beginning at or near one side, passing therealong and then crossing the edge abruptly and obliquely, then passing therealong at or near the other side to end thereon, a disk secured coaxially to the rotary valve and having pins on its circumferential edge adapted to project in succession into said cam-groove and be actuated by the walls thereof in rotation to rotate the disk intermittently with abrupt beginnings and cessations of motion while either pin is entering, traversing and leaving the oblique part only of the groove, the disk remaining quiescent while a pin is travers-

ing the other parts of the groove, and means for rotating said cam wheel adapted to cause it to rotate said disk a one-half rotation during one rotation of the crank-shaft of the engine.

2. The combination with the rotary valve of an internal-combustion engine, of means adapted to rotate the valve with alternate partial rotations and cessations of movement, begun and ended abruptly, comprising a rotary cam-wheel with concaved circumferential edge, and having in said edge a cam-groove beginning at one side, then carried straight along and adjacent to that side for a distance, then carried abruptly and obliquely across the edge to the other side, then carried abruptly and into a straight course along and adjacent to the other side to end at a point opposite the point of ending of the oblique part thereof, a body coaxially mounted on said rotary valve and having four equally-spaced radial pins projecting from its circumferential edge, said pins being adapted to enter said cam groove in succession to permit the cam-wheel to rotate the said body and valve only while a stud is traversing the oblique part of the cam-groove, and operative connections between said cam-wheel and the crank-shaft of the engine adapted to rotate the cam-wheel twice during each rotation of the crank-shaft to cause a one-half rotation to said body and rotary valve during one rotation of the crank-shaft, and actuate said valve only during the passage of the crank on said shaft through its dead-centers.

Signed at Waterloo, Iowa, this 2nd day of March, 1912.

JOSEPH SCHEITLER.

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