March 10, 1925. 1,529,240

R. C. CHESNUTT

VALVE

Filed March 11, 1922 3 Sheets-Sheet 1

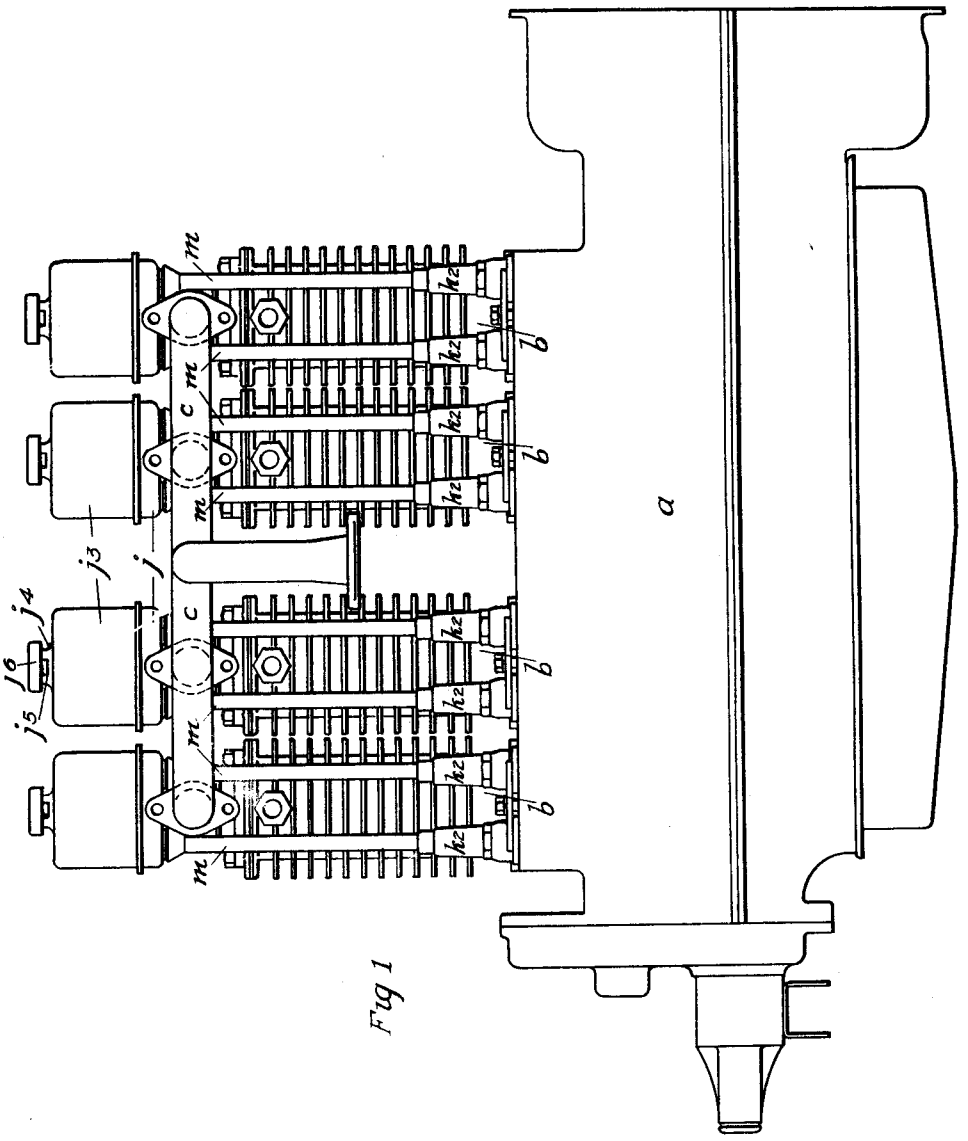


Fig 1

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R. C. CHESNUTT

VALVE

Filed March 11, 1922 3 Sheets-Sheet 2

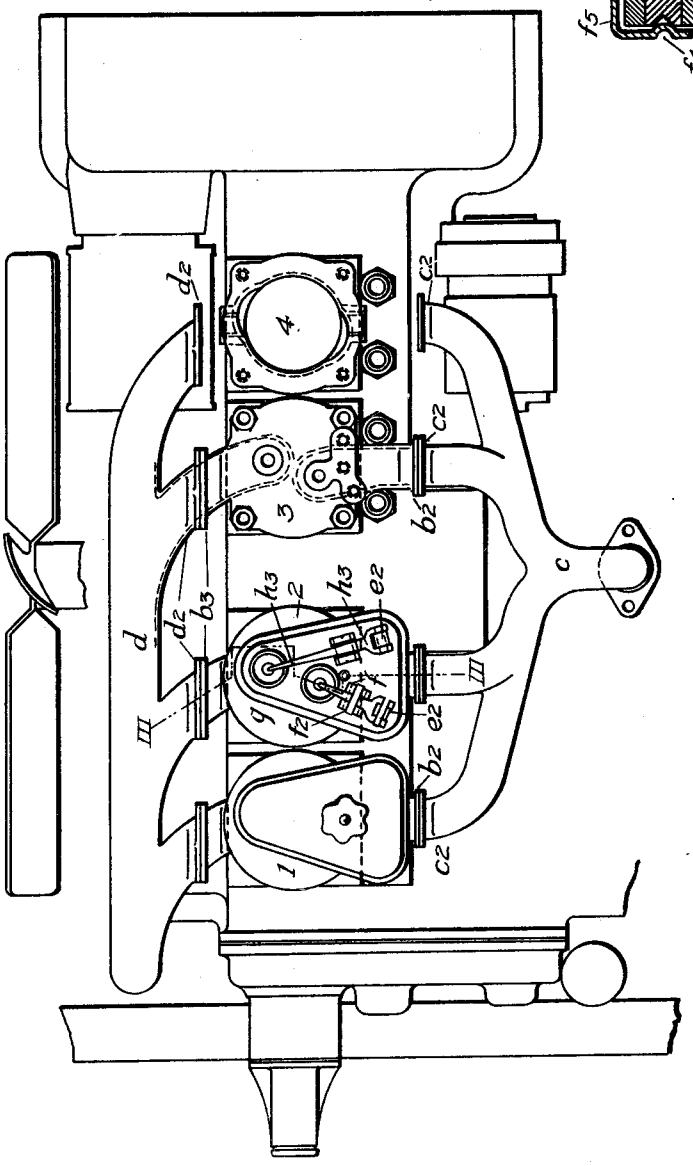


Fig 2

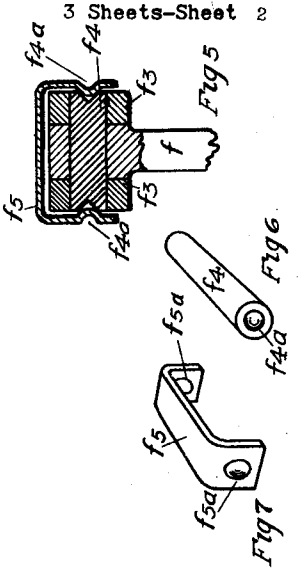


Fig 5

Fig 6

Fig 7

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R. C. CHESNUTT

VALVE

Filed March 11, 1922 3 Sheets-Sheet 3

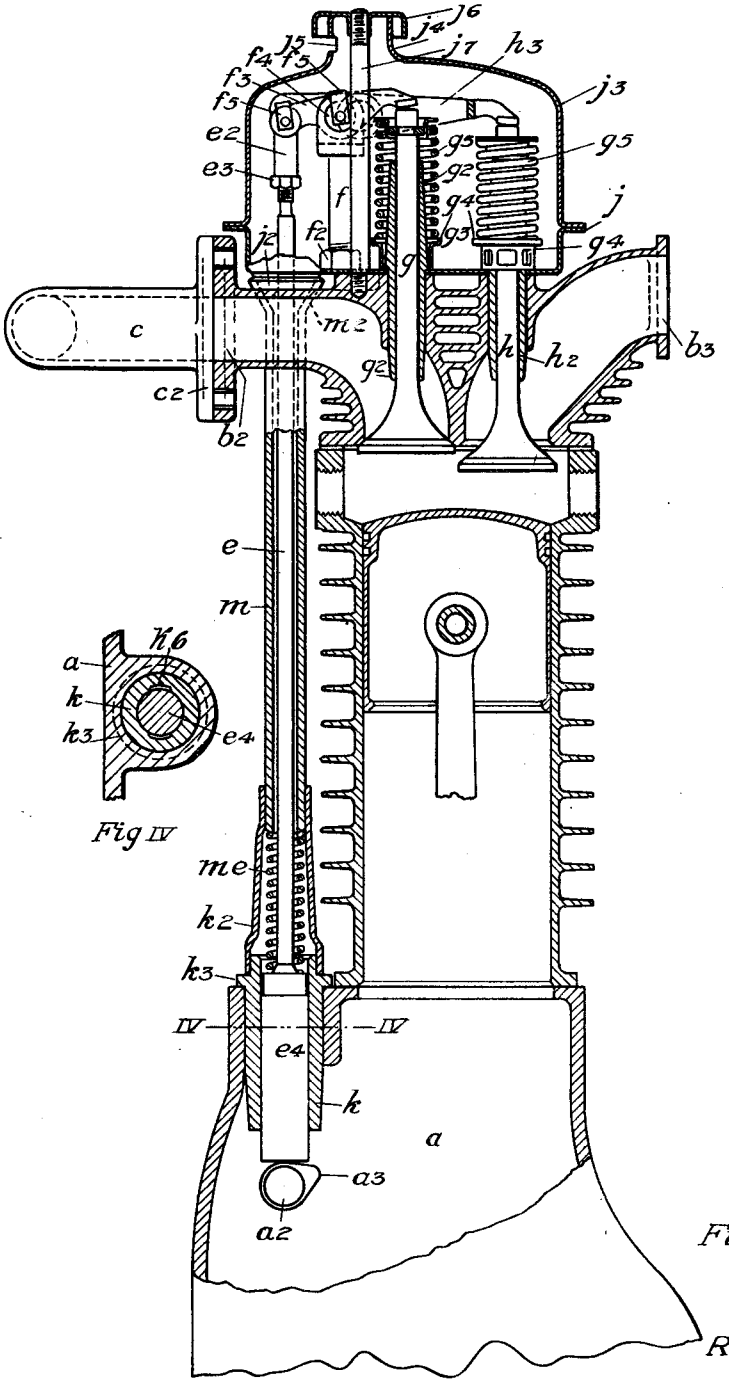


Fig IV

Fig III

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Patented Mar. 10, 1925. 1,529,240

UNITED STATES PATENT OFFICE.

RALPH C. CHESNUTT, OF ALLENTOWN, PENNSYLVANIA.

VALVE.

Application filed March 11, 1922. Serial No. 542,888.

To all whom it may concern:

Be it known that I, RALPH C. CHESNUTT, a citizen of the United States, residing at Allentown, county of Lehigh, State of Pennsylvania, have invented a certain new and useful Improvement in Valves, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to internal combustion engines, and an object of my improvement is to provide an improved arrangement of the valves and related parts that shall secure improved lubrication, facility of assembling and disassembling, and other advantages, among which is that in that kind of multicylinder engine in which the intake valves are located upon one side of a plane through the axis of the cylinders and the exhaust valves upon the other side of said plane, all the valves shall be actuated from one cam shaft.

In the accompanying drawings:

Figure 1 is a side elevation of a four-cylinder engine embodying my invention.

Fig. 2 is a plan view of the same, parts being removed to show the construction more clearly. That is to say, cylinder No. 4 has the cylinder head removed; cylinder No. 3, the valves and valve casing are removed; cylinder No. 2 has the cover to the valve casing removed; and in cylinder No. 1, all the parts are present and assembled.

Fig. 3 is a section on the line III—III, Fig 2.

Fig. 4 is a detail section on the line IV—IV, Fig. 3.

Fig. 5 is a detail section illustrating in section the construction at the pivot of the rocker arm.

Fig. 6 is a perspective of the pivot pin for the rocker arm.

Fig. 7 is a perspective view of the spring-securing clip.

a is the crank case. b, b, b, b are the cylinders of a four-cylinder internal combustion engine. c is the intake manifold, and d is the exhaust manifold. b^2 is a securing flange at the entrance to the intake passage. This flange is located in vertical plane. b^3 is a securing flange at the opening from the exhaust passage which is also located in a vertical plane c^2 is a securing flange on the inlet manifold adapted to be secured to the flange b^2 with their contiguous faces in a vertical plane. d^2 is a flange similar to c^2 adapted to be similarly secured to the flange b^3 upon the exhaust manifold d. By thus securing the flanges the brass securing bolts may be removed adjacent to one cylinder and the cylinder head taken off without disturbing the other connections, as illustrated with reference to cylinder No. 4 in Fig. 2.

f^3 is a rocker arm. g is the intake valve stem extending upward through the upper end of the cylinder head. f is a standard secured at its lower end to the cylinder head and extending upward and at its upper end affording a pivotal support for the rocker arm f^3. The inner end of the rocker arm f^3 bears upon the upper end of the valve stem g. At the outer end of said rocker arm is pivotally secured the connecting piece e^2 of the valve actuating rod e. The upper end of the rod e is screwed into a threaded cavity in the connecting piece e^2 and is provided with a nut e^3 which is set up against the lower end of the connecting piece e^2 to prevent the accidental rotation of said rod.

The rocker arm f^3 is pivoted in the upper end of the standard f by the floating pin f^4 having conical cavities f^{4a} in its ends. f^5 is a spring clip which extends over the upper end of the rocker arm f^3 and its actuating rods e, e^2 and has downwardly-extending limbs provided with lugs f^{5a} adapted to engage in the conical cavities f^{4a} and the end of the floating pin f^4 and hold said pin in place. g^2 is a valve stem guide extending through an opening in the upper end of the cylinder head in which the valve stem g reciprocates. g^4 is a ferrule having foraminous walls surrounding the valve guide g^2. g^5 is a spring, the lower end of which bears against the upper end of the ferrule g^4 and the upper end against a cap secured to the upper end of the valve stem g. Said spring g^5 acts to close the intake valve.

h^3 is a similar rocker arm to that above described adapted to actuate the valve stem h of the exhaust valve and similarly pivoted in and supported by a standard altogether similar to the standard f. There is a ferrule g^4 and spring g^5 upon the exhaust valve entirely similar to that described for the intake valve.

By reference to Fig. 2, it will be seen that the exhaust and intake valves are located

upon opposite sides of a vertical plane through the centers of the cylinders. These rocker arms are set at an angle to the transverse lines through the centers of the cylinders, as shown most distinctly in Fig. 2; so that the ends to be engaged by the cam rods extend to the same side of the engine and in a line with each other parallel to the cam shaft, where they are each secured to an actuating rod e, e^2. These rods are of the same construction and extend vertically downward parallel one to the other to a point above the cam shaft a^2 where they may be actuated by the usual cams a^3.

j is a valve rocker casing having a lower horizontal wall extending over the upper surface of the cylinder head and having a wall extending vertically upward from the periphery of said horizontal wall. j^2 is an opening in the lower wall of said casing having conical downwardly extending converging walls (Fig. 3) in position to permit the passage of an actuating rod e, e^2. j^3 is a cover for the valve rocker case having its upper end closed except for a small opening through an upwardly extending nipple j^4. j^5 indicates an aperture in the wall of the nipple j^4. j^7 is a vertical rod secured in the cylinder head and extending vertically upward into and coaxial with the nipple j^4. j^6 is a nut so constructed that it shall engage screw threads at the upper end of the rod j^7 and shall bear against and close the upper end of the nipple j^4. By screwing up on the nut j^6, the cover j^3 is fastened upon the casing j. The apertures j^5 through the wall of the nipple j^4 affords a breathing passage through the enclosure of the rocker arms.

k is a tubular guide piece fitted in an aperture in the upper wall of the crank casing a and having a flange k^3 bearing on the upper surface of said wall. e^4 is the enlarged lower end of the rod e. This fits and is adapted to reciprocate in the guide k and extends downward with its lower end adjacent to the cam rod a^2 in position to be actuated by the usual cam a^3. k^2 is a tube engaging the upper end of the guide k and forming an upward extension thereof. m is a tube surrounding the rod e and having a conical upper end m^2, the interior walls of which are adapted to engage against the outer walls of the conical opening j^2 of the rocker arm casing j. $m\ e$ is a spring bearing at one end against the upper end of the enlargement e^4 of the rod e and at its upper end against the lower ends of the tube m. The spring $m\ e$ acts to retract the rod e and forces the tube m upward holding its conical upper end m^2 in firm engagement with the walls of the conical opening j^2.

The casing j is secured against the upper end of the cylinder head by a nut f^2 on the standard f and by a similar nut on the standard h and also by the flange g^3 on the valve stem guide g^2 and a similar flange on the guides for the exhaust stem h. The ferrules g^4 with their ventilating walls serve as a heat-insulating means to prevent the overheating of the springs g^5.

Referring to Fig. 4, the walls of the guide k are grooved, as shown at k^6, k^6, so as to form a connecting passage between the interior of the crank case a and the tubular extension k^2, tube m and the interior of the rocker arm casing. Through these passages a lubricant, in the form of spray or mist, passes from the crank case to the rocker arm casing and a breathing passage is afforded for the crank case.

In the above-described construction, a cylinder head may be removed, the actuating rods e, e^2 being disconnected from the rocker arm and the head being disconnected from the manifolds, as above described. The connecting pieces e^2 passing through the conical apertures j^2 and the valves and other valve actuating parts remaining in their assembled position. Thus the cylinder head may be easily removed and replaced. The rod e is held in position by the engagement of its ends and the action of the spring $m\ e$. It is not necessary to unscrew any part in separating other parts from the tube m.

What I claim is:

1. In an internal combustion engine, a crank case, a casing enclosing the valve operating mechanism, a valve actuating rod extending from the casing into the crank case, a tube surrounding said rod, said tube having a lower enlarged separate portion, and an upper reduced portion received at one end into said enlarged portion and held upwardly against said casing by a spring surrounding said rod, said spring disposed within said enlarged portion.

2. In an internal combustion engine, a crank case, a casing enclosing the valve operating mechanism, a valve actuating rod extending from the casing into the crank case, a tubular guide for the rod carried by the crank case, a tube surrounding said rod comprising an enlarged portion engaging said guide and an upper reduced portion received at the lower end into said enlarged portion, and a spring surrounding said rod within said enlarged portion bearing at one end against the rod and at the other end against the end of the reduced portion of the tube.

3. In an internal combustion engine, a crank case, a casing enclosing the valve operating mechanism, a valve actuating rod extending from the casing into the crank case, a tube surrounding said rod, a spring surrounding said rod one end of which

spring engages the rod the opposite end of the spring engaging the tube.

4. In combination, in an internal combustion engine, a crank case, a casing enclosing the valve actuating mechanism, a valve actuating rod extending from said casing into said crank case, said casing having a conical annular portion surrounding said rod, a tube surrounding said rod and affording a conduit passage between said crank case and said casing, one end of said tube having a flaring portion removably engaging the conical annular portion of the casing, a spring surrounding said rod having one end engaging the rod and the other end engaging the tube to hold it into close engagement with the casing.

5. In an internal combustion engine, a casing enclosing the valve operating mechanism, a valve operating rod extending through the casing, said casing having an annular conical wall portion surrounding said rod, a tube surrounding said rod having a flaring end engaging the conical wall portion of the casing, a cam shaft to actuate said rod, a spring surrounding said rod one end engaging the rod to hold the same toward the cam shaft the opposite end engaging the tube to hold the same toward the casing.

6. In combination, in an internal combustion engine, a crank case, a casing enclosing the valve-actuating mechanism, a valve-actuating rod extending from said casing into said valve case, a tube surrounding said rod and affording a conduit passage between said valve case and said casing, one end of said tube having its wall removably engaging against the wall of said casing, a spring having one end engaging against said rod and the other end engaging against the wall of said tube to force the latter into close engagement with the wall of said casing.

7. In an apparatus of the kind described, a casing for the valve-actuating mechanism having an opening with conical walls, a tube having a conical end engaging against said conical walls, an actuating rod passing through said tube and opening and a spring acting against said rod and against said tube to hold its conical end in engagement with the conical wall of said opening.

In testimony whereof, I sign this specification.

RALPH C. CHESNUTT.