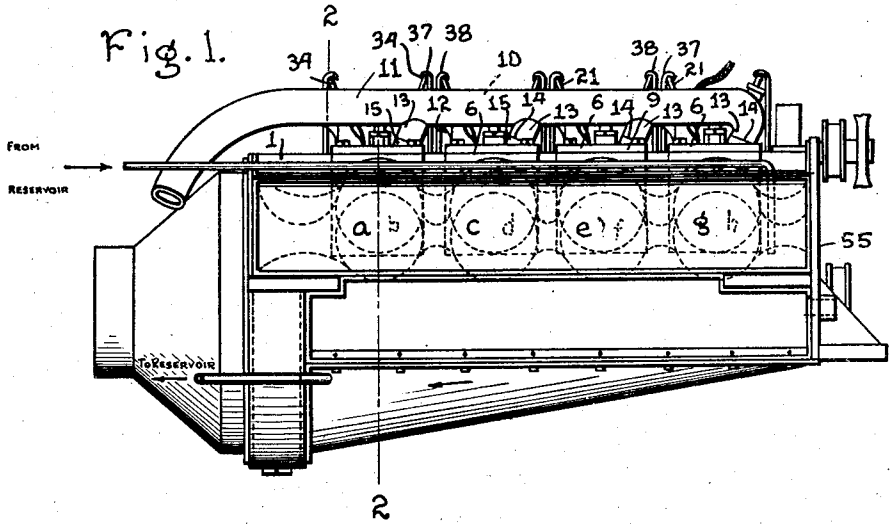
Feb. 22, 1927. 1,618,878

M. HENRY

INTAKE OR EXHAUST VALVE CONSTRUCTION FOR MULTIPLE CYLINDER COMBUSTION MOTORS

Original Filed Feb. 12, 1924 3 Sheets-Sheet 1

Fig. 1.



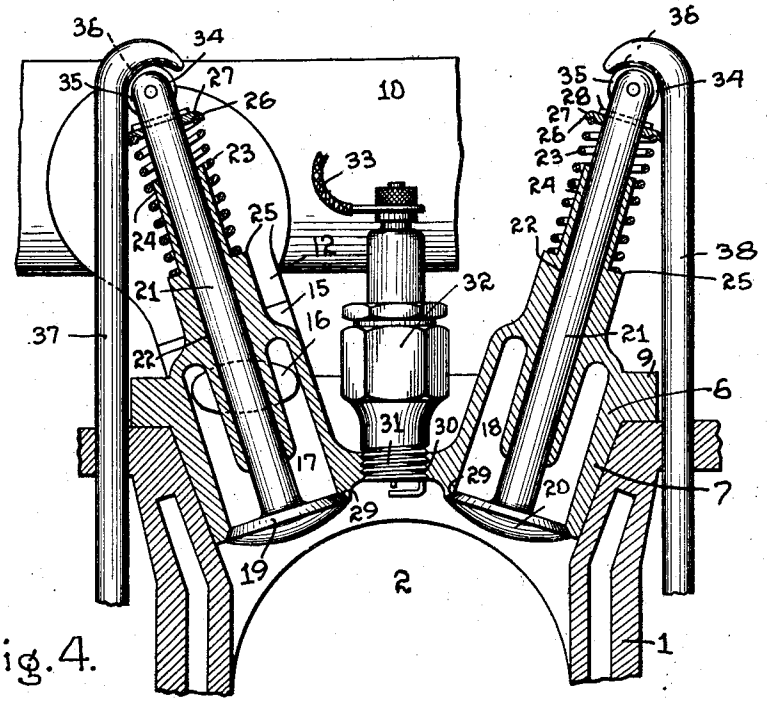


Fig. 4.

Inventor

MARTIN HENRY

By J. Thurman Talbert

Attorney

Feb. 22, 1927. 1,618,878

M. HENRY

INTAKE OR EXHAUST VALVE CONSTRUCTION FOR MULTIPLE CYLINDER COMBUSTION MOTORS

Original Filed Feb. 12, 1924 3 Sheets-Sheet 2

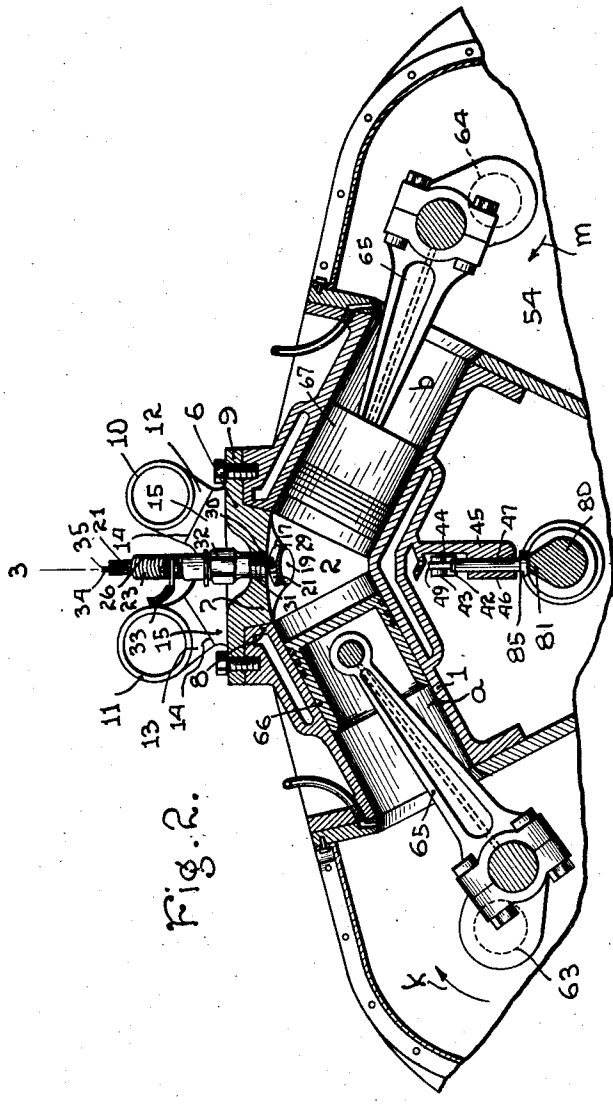


Fig. 2.

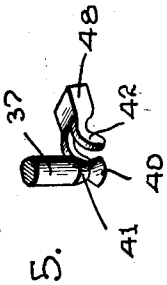


Fig. 5.

Inventor

MARTIN HENRY.

By Thomas Talbert.

Attorney

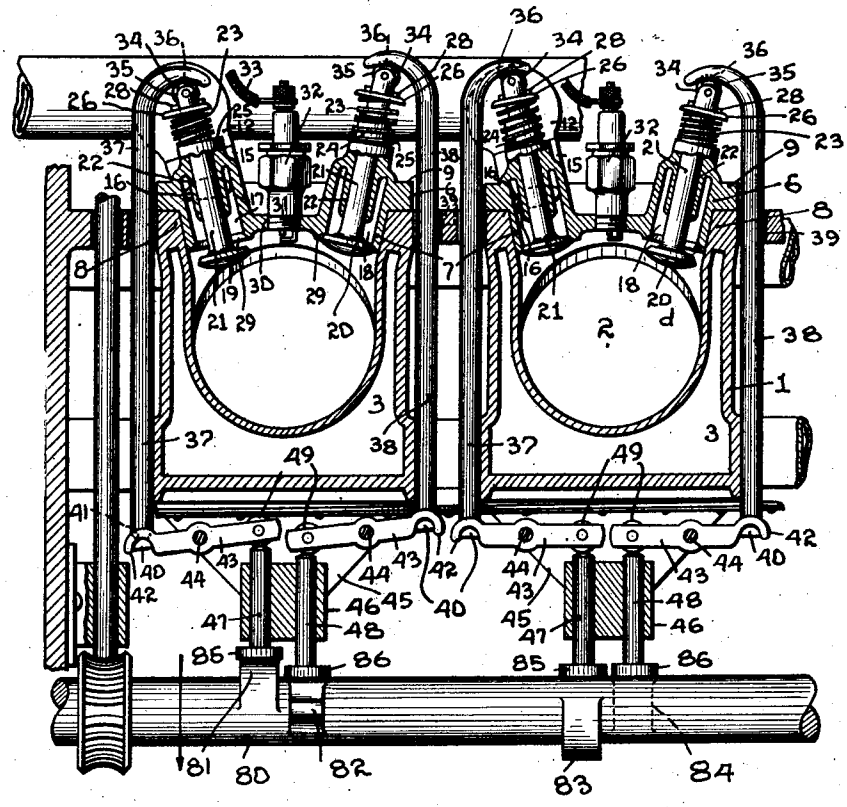
Feb. 22, 1927. 1,618,878

M. HENRY

INTAKE OR EXHAUST VALVE CONSTRUCTION FOR MULTIPLE CYLINDER COMBUSTION MOTORS

Original Filed Feb. 12, 1924 3 Sheets-Sheet 3

Fig. 3.



Inventor

MARTIN HENRY

By

Attorney

Patented Feb. 22, 1927. 1,618,878

UNITED STATES PATENT OFFICE.

MARTIN HENRY, OF VERDEN, OKLAHOMA.

INTAKE OR EXHAUST VALVE CONSTRUCTION FOR MULTIPLE-CYLINDER COMBUSTION MOTORS.

Original application filed February 12, 1924, Serial No. 692,343. Divided and this application filed December 22, 1924. Serial No. 757,519.

It is a purpose of the present invention to provide an improved intake or exhaust valve construction for use in connection with multiple cylinder combustion motors of the compression type, that is, a type wherein the cylinders are in series or sets, the pistons of the cylinders of each series or set operating identically, with the cylinders diverging in V-shaped arrangement, including a single combustion chamber between the cylinders of each set, whereby the pistons may travel downward through the cylinders in diverging directions.

Another purpose is to provide intake and exhaust valve constructions in conjunction with a cam shaft operative through the medium of operative connections with pistons of the cylinders, so as to actuate means which pull down upon members which, in turn, open the valves, there being spring means for automatically closing the valve when the members are allowed to recede for the purpose of intaking charges and exhausting the utilized gases.

A further purpose is to provide means operable to open the intake valve for each combustion chamber between the adjacent ends of the diverging cylinders of each series or set, so that upon the intake stroke a charge may be drawn into the combustion chamber and upon the exhaust stroke, the utilized gases may exit, the pistons of the cylinders operating in diverging directions to impart movement to a crank shaft which, in turn, operates the means for actuating said intake and exhaust valves.

Still another purpose is to provide intake and exhaust valve constructions for use in connection with the type of multiple cylinder combustion motor disclosed in the application for patent filed February 12, 1924, Serial No. 692,343, allowed September 16, 1924, which has matured into Patent No. 1,533,004, dated April 7, 1925, of which the present application is a division.

It is to be understood that the particulars herein given are in no way limitative and that, while still keeping within the scope of the invention, any desired modifications of detail and desired proportions may be made in the apparatus according to the circumstances.

The invention comprises further features and combinations of parts to be hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a view in side elevation of an improved multiple cylinder combustion motor showing the improved intake and exhaust valve as applied.

Figure 2 is a sectional view on line 2—2 of Figure 1.

Figure 3 is a sectional view on line 3—3 of Figure 2, showing at least two combustion chambers of the engine and the application of the improved intake and exhaust valves.

Figure 4 is an enlarged sectional view of the intake and exhaust valve constructions.

Figure 5 is an enlarged detail perspective view of the lower end of one of the sliding actuators and its connection with the cam shaft actuated oscillator.

Referring to the drawings, 1 designates the motor block which, in the present instance, is cast in one piece and provided with eight cylinders *a* and *b*, *c* and *d*, *e* and *f*, and *g* and *h*, although more or less may be employed. The cylinders *a* and *b* constitute one set or series, *c* and *d* another, *e* and *f* a third set or series, and *g* and *h* a fourth set or series. The cylinders of each set or series are divergent, approximating the V-type of engine, there being a combustion chamber 2 between the adjacent ends of the cylinders of each set.

The combustion chamber 2 is provided where the adjacent ends of the cylinders converge upwardly, as shown in Figure 2. Cylinder heads 6 are provided for closing the respective combustion chambers 2, each cylinder head acting to close the adjacent ends of the cylinders of each set. The exteriors of the cylinders where they are enlarged are rectangular in cross section, as disclosed clearly in Figure 3. The cylinder heads 6 have integral enlarged extensions or bosses 7 which are tapered and fit between the extension walls 8 (on which the flanged portions 9 of the cylinder heads rest) of the enlarged end portions of the cylinders. The cylinder heads are bolted in position.

10 and 11 are intake and exhaust manifolds, the lateral downward extensions 12 and 13 of which connect at 14 to the extensions 15 of the cylinder heads. The exten-

sions of the intake and exhaust manifolds and the extensions 15 have passages, those designated by the character 16 of the extensions 15 communicating with the valve passages 17 and 18 of the cylinder heads. Intake and exhaust valves 19 and 20 are provided, the stems 21 of which are mounted in guides 22 of the cylinder heads.

The stems 21 diverge upwardly and are under tension of the coil springs 23 which surround the reduced extension 24 of the bosses of the cylinder heads which have guides 22. The springs 23 are interposed between the shoulders 25 and the collars 26 which have depressed annular seats 27 for the ends of the springs, there being suitable transverse pins 28 against which the collars abut. The springs bear against the collars and hold the valves 19 and 20 in engagement with the seats 29.

Each cylinder head between the bosses through which the valve stems 21 are guided is countersunk and has a threaded opening 30 for the threaded end 31 of a conventional form of spark plug 32 which, in turn, includes suitable connections, as at 33, with a timing mechanism (not shown) of the ignition system (not shown).

The upper terminals of the valve stems are forked for the reception of rollers 34 which have annular ribs or flanges 35 which engage with the grooves 36 of the lateral ends of the valve actuators 37 and 38. These actuators are mounted in guides 39 between the rectangular portions of the cylinders, as shown clearly in Figure 3 of the drawings, and the lower terminals of the actuators 37 and 38 have hemi-spherical members 40.

These members 40 where they connect with the lower ends of the actuators merge into conical necks 41 to permit the forks 42 of the rocking levers to engage with the members 40. The levers 43 are fulcrumed at 44 on the extension webs 45 of the cylinders. The extension webs have lateral bosses 46 in which the pins 47 and 48 are guided. The levers 43 are arranged in pairs, one pair for each cylinder, and the adjacent ends of the levers of each pair are forked, as in Figure 5, for the reception and mounting of the rollers 49 which ride upon the upper ends of the pins 47 and 48.

It will be noted that when the pin 47 is moved upwardly through its guide, the lever is rocked, thereby causing a downward movement of the actuator 37, and due to the lateral terminal of the upper end of the actuator bearing upon the stem of the intake valve 19, the valve 19 opens and permits the intake of a charge to the combustion chamber 2. The exhaust valve operates in a similar manner, that is, when the pin 48 is moved upwardly, operating the actuator 38 through the medium of the lever which is connected to its lower end.

Crank shafts 63 and 64 are mounted in bearings of the casing of the motor and are operable in the direction of the arrows *k* and *m* (Figure 2) and the respective cranks of the shafts 63 and 64 are connected by connecting rods 65 with the pistons 66 and 67 which are operable in the cylinders shown more clearly in Figure 2.

Mounted in bearings of the motor block heads 54 and 55 is a cam shaft 80 which is provided with cams 81 and 82, 83 and 84. There are two cams for each set of cylinders, the cam 81 cooperating with the pin 47 to cause an intake of a charge into the combustion chamber while the cam 82 cooperates and raises the pin 48 to cause an exhaust of the utilized or burnt gases; in fact, the cams cooperate with disks 85 and 86 at the lower ends of the pins 47 and 48. On each revolution of the cam shaft, the cams 81 actuate the pins 47.

In the operation, and assuming the pistons 66 of cylinders *a* and *b* have about started on their downward strokes for an intake, with the cam shaft in a position whereby the cams 81 are disposed for raising the pins 47 and opening the intake valve 19, the charge enters the combustion chamber 2. After the pistons have completed their suction stroke, the combustion chamber having been filled with the charge, the cam 81 has moved from under the pin 47, that is, the pin for operating the intake valve 19 of the cylinders *a* and *b*, and the pistons return on their compression stroke, compressing the charge in the combustion chamber. Immediately following this compression stroke of the pistons of the cylinders *a* and *b*, the charge is fired, again moving the pistons away from each other in diverging directions and thereby imparting motion to the crank shafts 63 and 64. Upon the return strokes of the pistons, that is, after completing their firing strokes, they act to scavenge the cylinders and thereby cause an exhaust of the utilized or burnt gases. About the time the pistons proceed toward each other on their scavenger strokes, the cam 82 engages with and operates the pin 48 which causes a pulling movement of the actuator through the medium of the oscillatory lever, thereby depressing the stem of the exhaust valve 20 and permitting the escape of the utilized or burnt gases. Following the scavenger strokes of the pistons of the cylinders *a* and *b*, the cam 81 is again in position to actuate pin 47, thereby tilting the lever 43 and imparting a pulling action upon the actuator 37, again opening the intake valve 19 which results in the intake of a fresh charge.

As previously stated, the cylinders are designated *a* and *b*, *c* and *d*, *e* and *f*, and *g* and *h*. The cylinders *a* and *b* are a set of two, so are the other cylinders. Therefore,

the table of operations of the several cylinders with their cooperative intake and exhaust valves is as follows:

Cylinders *a* and *b*.—Intake—Compression—Firing—Exhaust.
Cylinders *c* and *d*.—Exhaust—Intake—Compression—Firing.
Cylinders *e* and *f*.—Firing—Exhaust—Intake—Compression.
Cylinders *g* and *h*.—Compression—Firing—Exhaust—Intake.

It will be noted that any suitable gearing between the crank shafts and the cam shafts may be employed, as in the application above mentioned and of which the present invention constitutes a divisional application, and upon every two complete revolutions of the crank shaft, the cam shaft rotates one revolution, in which case the cam 81 operates the pin 47 for opening the intake valve 19, and at the completion of every fourth half revolution of the crank shaft to permit of an intake into the combustion chamber between the pistons of the cylinders *a* and *b*.

The invention having been set forth, what is claimed is:

1. A valve gear for an internal combustion motor comprising a valve controlling communication with the motor cylinder, the valve having a stem arranged at a slight angle from the vertical and slidably mounted in a guide, an expansion spring yieldingly holding the valve in seated position, a roller rotatably mounted at the upper end of the valve stem, and a motor operated actuator mounted in vertical guides and provided at its upper end with an arcuate lateral extension overhanging and engaging said roller and interlocked with the same to preclude axial turning movement of the actuator and stem.

2. A valve gear for an internal combustion motor comprising a valve controlling communication with the motor cylinder, the valve having a stem arranged at a slight angle from the vertical and slidably mounted in a guide, an expansion spring yieldingly holding the valve is seated position, a roller rotatably mounted at the upper end of the valve stem, and a motor operated actuator mounted in vertical guides and provided at its upper end with an arcuate lateral extension overhanging and engaging said roller, the roller being provided with a peripheral rib and the lateral extension of the actuator having a groove in which said rib engages.

In testimony whereof he affixes his signature.

MARTIN HENRY.