

A. STEVENS.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED FEB. 12, 1920.

1,372,572.

Patented Mar. 22, 1921.

2 SHEETS—SHEET 1.

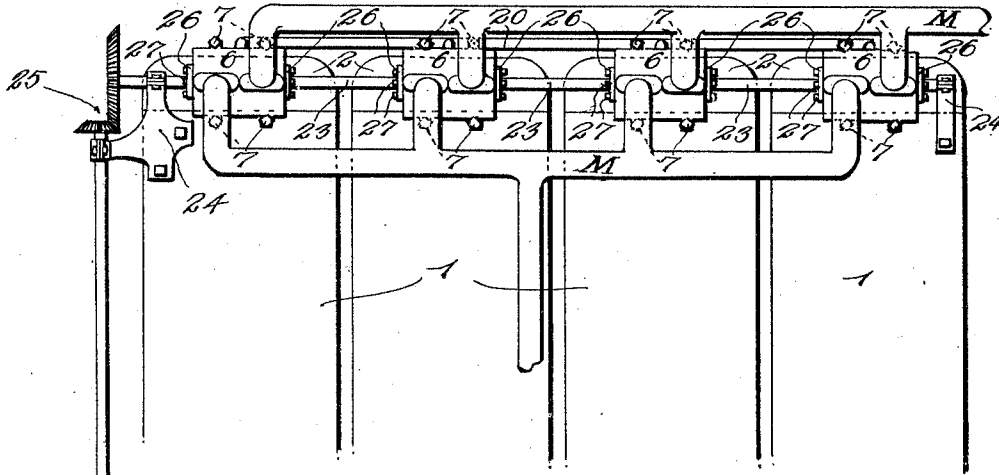


FIG. 1.

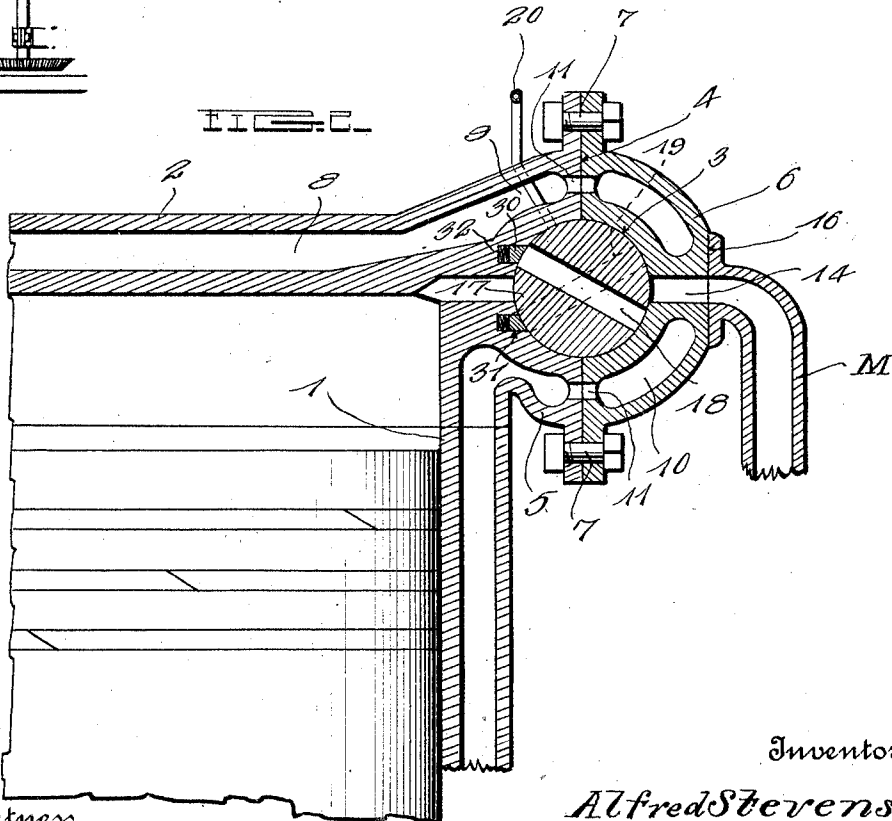


FIG. 2.

Witness

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2 SHEETS—SHEET 2.

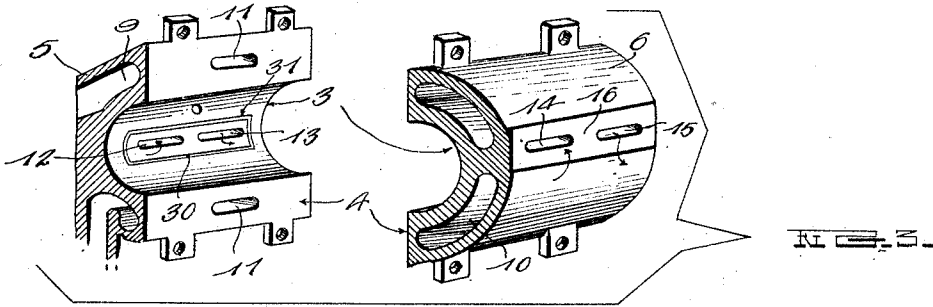
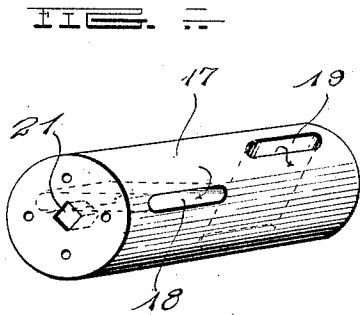
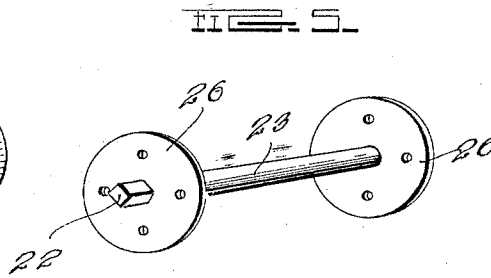
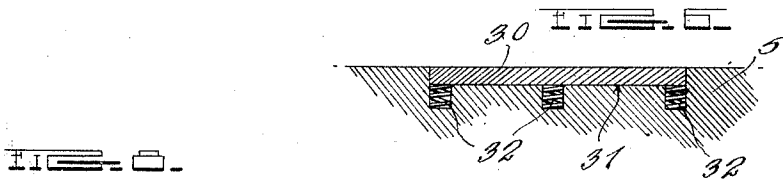
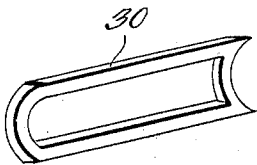
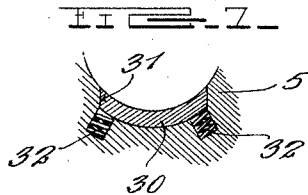


FIG. 6.



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UNITED STATES PATENT OFFICE.

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TO EDMUND J. HEWIT, OF ASHTABULA, OHIO.

INTERNAL-COMBUSTION ENGINE.

1,372,572.

Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed February 12, 1920. Serial No. 358,210.

To all whom it may concern:

Be it known that I, ALFRED STEVENS, a citizen of the United States, residing at Ashtabula, in the county of Ashtabula and State of Ohio, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in internal combustion engines of the type provided with rotary valves, and my principal object is to provide a multiple cylinder engine of this character in which the cylinder head or heads may be removed for making repairs, without the necessity of disassembling the entire valve mechanism.

Another object is to provide a separate rotary valve for each cylinder and to detachably connect the several valves by short shafts, so that in case one valve should need renewing, it is not necessary to install a complete set of valves.

Yet another object is to provide an engine of the type set forth which will be simple and inexpensive, yet highly efficient and durable, and a great deal more practical than internal combustion engines heretofore equipped with rotary valves.

With the foregoing in view, the invention resides in the novel construction and arrangement of parts hereinafter described and claimed, the descriptive matter being supplemented by the accompanying drawings.

Figure 1 is a side elevation of an engine constructed in accordance with my invention.

Fig. 2 is a vertical transverse section cutting through one of the valves and its casing.

Fig. 3 is a disassembled sectional perspective of one of the valve casings.

Fig. 4 is a perspective view of one of the valves.

Fig. 5 is a perspective view of one of the valve shafts.

Figs. 6 and 7 are respectively longitudinal and transverse sections cut through one side and one end of one of the packing rings.

Fig. 8 is a perspective view of one of the packing rings.

In the drawings above briefly described, the numerals 1 designate the cylinders of the

engine, each of which is provided with a detachable cylinder head 2, each head being entirely disconnected from the other heads, so that any head may be removed for making repairs, without molesting the others. In some instances a single casting may form the heads of all cylinders if desired.

Each cylinder head 2 is provided with a valve casing 3 having preferably a cylindrical bore, and each casing is split longitudinally at 4 to provide a fixed section 5 cast integrally with the cylinder 2, and a detachable outer section 6 which may be secured in place by bolts or the like 7. Each cylinder head is provided with a water jacket 8 which communicates with the usual water jacket of the engine cylinder, and said jacket 8 preferably extends around the fixed section 5 of the valve casing as shown at 9. The section 6 of each casing 3 is preferably jacketed at 10 and communication is established between this jacket and the jacket 8, by means of suitable ports 11 through the contacting parts of the casing sections 5 and 6.

From the interior of each casing 3, intake and exhaust ports 12 and 13 extend into the adjacent cylinder 1, and in alinement with these ports, are corresponding ports 14 and 15, formed in the removable casing section 6, which section is preferably flattened at 16 for attaching the usual intake and exhaust manifolds M. The passage of the intake and exhaust gases through the several ports is controlled by a plurality of preferably cylindrical rotary valves 17 which are provided at longitudinally spaced points with diametrical intake and exhaust ports 18 and 19 angularly offset in the manner shown. All of the valves are detachably connected and instead of traveling at half the speed of the engine shaft as usual, they are geared to run at one-fourth the speed of the shaft, thus greatly reducing wear and requiring less lubricating oil. The oil required may be supplied through suitable tubes 20.

I have shown the opposite ends of the several valves 17 provided with flat sided sockets 21, and the squared ends 22 of a plurality of short shafts 23 are snugly yet removably received in said sockets, the innermost shafts being supported in suitable bearings 24, adjacent one of which the driving mechanism 25 may be located. Near their ends, the shafts 23 are provided with

disks 26 either integral therewith or otherwise rigidly joined thereto, and these disks are secured to the ends of the valves 17, by cap-screws or the like 27.

By connecting the several valves by the shafts 23, it is possible to renew any defective valve without the necessity of renewing the remaining valves, thus effecting a great saving over the usual types of rotary valves, in which one solid body controls the intake and exhaust for all cylinders.

To establish a pressure-tight connection between the inner side of each valve casing 3 and its respective valve 17, I provide each of said casings with a one-piece continuous packing ring 30 which is inset in a continuous groove 31 formed in the inner section 5 of the casing 3, around the ports 12 and 13. The rings 30 are radially movable into tight contact with valves 17, and coil springs 32 are seated in sockets in the bottoms of the grooves 31, for yieldably forcing said rings into fluid-tight engagement with the valves. By this arrangement, there is no possibility whatever of any compression leaking from the cylinders.

The operation of the valves is properly synchronized with the engine shaft and at the proper intervals said valves operate to admit fuel into the engine cylinders and expel the exhaust gases therefrom, and since the valves in question travel at only half the speed of most rotary valves, their life is greatly lengthened and the valve casings will not be worn as rapidly as would otherwise occur. I wish it understood however that although it is advantageous to drive the valves in the manner set forth, they might well be driven at other speeds if desired, in which instance a rearrangement of ports would be necessary.

I attach great importance to the fact that each valve casing 3 is in two sections, with its inner section carried permanently by the adjacent removable cylinder head, while its outer section is secured to the intake and exhaust manifolds in any preferred manner. This arrangement has several advantages. If any cylinder head must be removed, for instance to repair a piston or a crack in the cylinder head, the outer section 6 of the casing need not be molested, but may merely be disconnected from the inner section by removing the bolts 7. If a damaged cylinder head must be replaced, it is not essential that the outer valve casing section 6 be also discarded, and if a new cylinder is required, the old head and valve casing may be used in connection with the new part. These are highly important advantages since they reduce the rotary valve engine to a much more practical form, lacking a number of disadvantages heretofore existing.

From the foregoing, taken in connection with the accompanying drawings, it will be seen that I have provided an extremely simple and efficient valve mechanism and that such mechanism constitutes a highly important improvement in internal combustion engines. Among other advantages, more power is derived by delivering the force of the explosions directly down on the piston, no lateral valve chamber being employed, as in engines of the present day types. Since probably the best results may be obtained from the details disclosed, they may well be followed, but within the scope of the invention as claimed, numerous minor changes may well be made.

I claim:

1. An internal combustion engine comprising a plurality of cylinders having independently removable cylinder heads provided with intake and exhaust ports, a plurality of aligned valve casings at one side of said heads consisting of fixed inner sections carried by and removable with the heads and outer sections secured to the intake and exhaust manifolds, the two sections being detachably secured together, and rotary valve means in said casings having intake and exhaust ports coacting with those aforesaid.

2. An internal combustion engine comprising a plurality of cylinders having independently removable cylinder heads, a plurality of aligned valve casings at one side of said heads consisting of fixed inner sections carried by the heads and outer sections secured to the intake and exhaust manifolds, the two sections being detachably secured together, independent rotary valves in said valve casings, and short shafts extending between said valves and detachably connected thereto, the valves and casings being provided with coacting intake and exhaust ports.

3. An internal combustion engine comprising a plurality of cylinders having independently removable cylinder heads, a plurality of aligned valve casings at one side of said heads consisting of fixed inner sections carried by the heads and outer sections secured to the intake and exhaust manifolds, the two sections being detachably secured together, a plurality of independent rotary valves in said valve casings, the ends of said valves having polysided sockets, short shafts between the valves having ends snugly yet removably received in said sockets, disks integral with said shafts, and means to detachably secure said disks to the ends of the valves; said valves and the valve casings having coacting intake and exhaust ports.

In testimony whereof I have hereunto set my hand.

ALFRED STEVENS.