G. R. ELLIOTT.

INTERNAL COMBUSTION ENGINE.

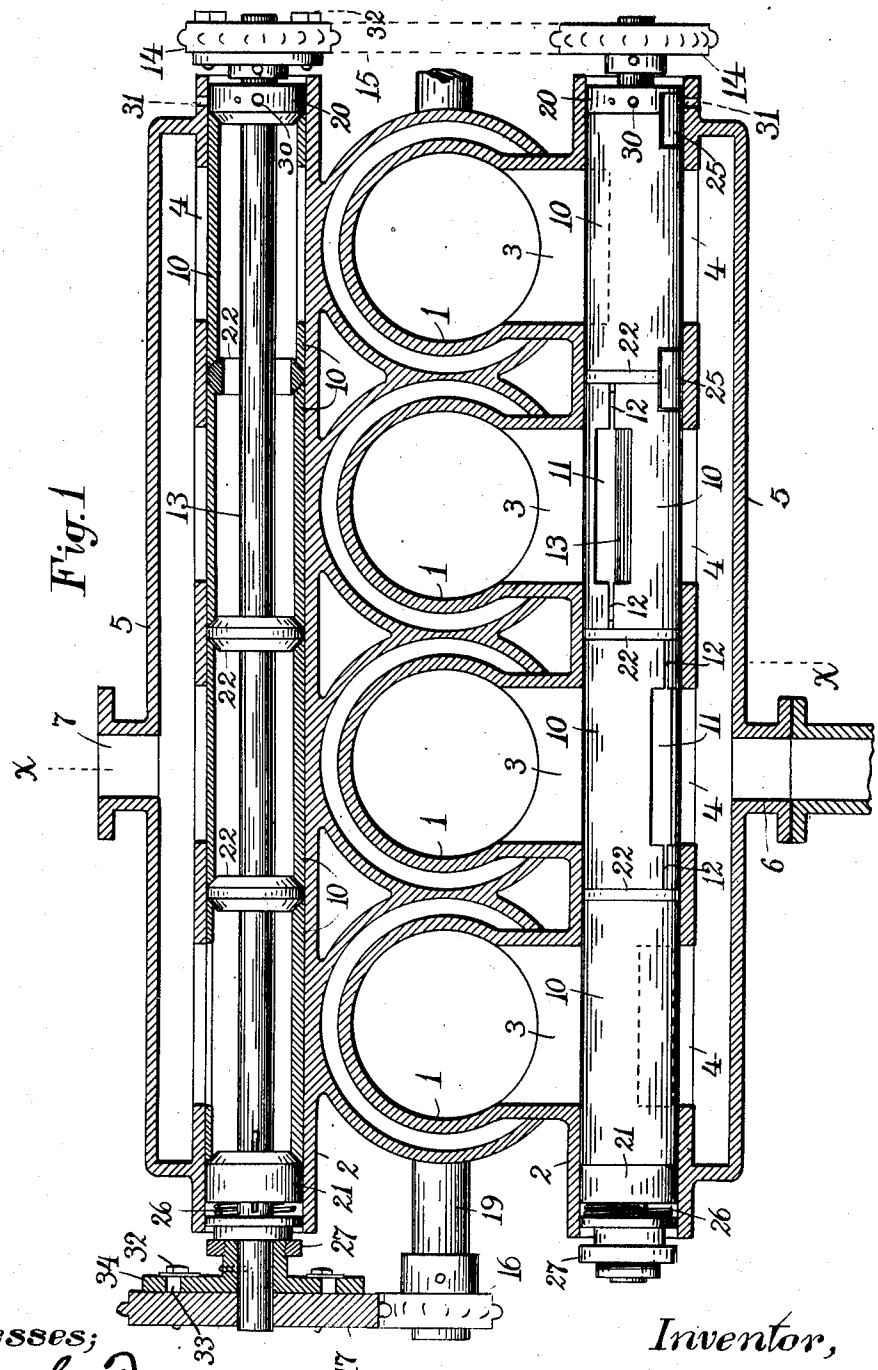
APPLICATION FILED AUG. 23, 1911.

1,043,816.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses;

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2 SHEETS—SHEET 2.

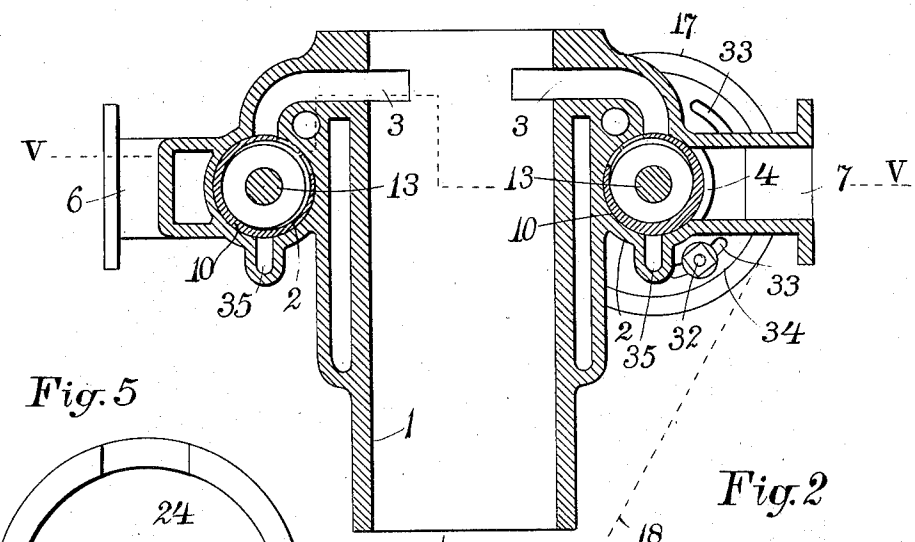


Fig. 2

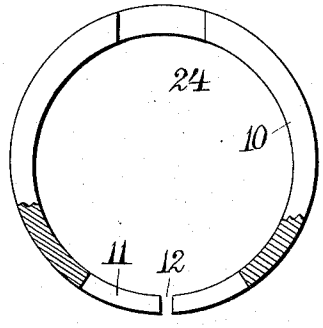
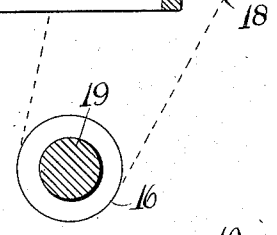


Fig. 5



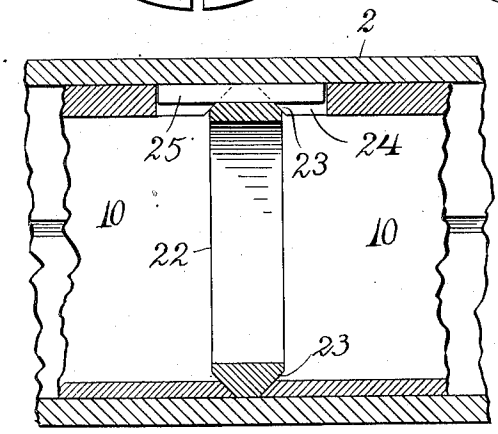


Fig. 3

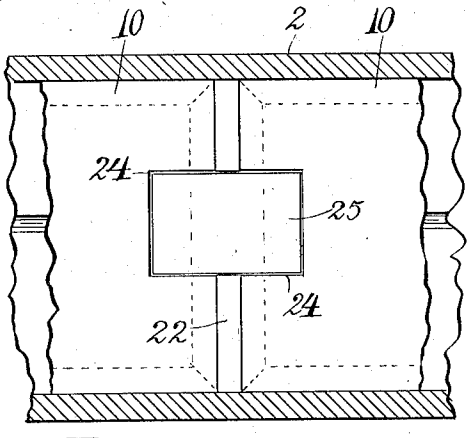


Fig. 4

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UNITED STATES PATENT OFFICE

GILBERT R. ELLIOTT, OF BOSTON, MASSACHUSETTS.

INTERNAL-COMBUSTION ENGINE.

1,043,816. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed August 23, 1911. Serial No. 645,582.

To all whom it may concern:

Be it known that I, GILBERT R. ELLIOTT, a subject of the King of Great Britain, and a resident of the city of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

The object of this invention is the construction of a rotary valve for internal combustion engines, which shall be capable of adjustment, both automatic and controlled, for taking up wear; which shall give quick wide-open and close of the valve-ports, and shall embody other improvements in details of construction hereinafter set forth.

In the drawings forming part of this specification, Figure 1 is a sectional plan view on the broken line V—V in Fig. 2, showing the main parts of a four-cylinder explosion engine embodying my improvements. Fig. 2 is a sectional view of the same on the broken line X—X in Fig. 1. Fig. 3 is a sectional detail view on a larger scale showing the method of causing the four expansible port cylinders to rotate as one. Fig. 4 is a view of the same showing the exterior of the adjacent ends of two of said cylinders. Fig. 5 is an end view of one of said cylinders, a part being broken away.

Referring to the drawings, the numeral 1 designates the engine cylinders of usual type, preferably cast as one and integral with two cylindrical valve-casings 2 one at each side of the row of cylinders, as shown in Figs. 1 and 2. Through the upper wall of each valve casing are four elongated ports 3 communicating with the cylinders 1, as shown in Fig. 2, the width of the same being illustrated in Fig. 1; and through the outer lateral wall of each casing are ports 4 of equal length as the ports 3. The ports 4 of each casing open into an elongated chamber 5, one of which is adapted to communicate with the hydrocarbon supply-pipe 6, and the other with a suitable exhaust 7.

Within each casing 2 are four port cylinders or shells 10 each formed with a port 11 equal in length to said ports 3, 4, and designed by their rotation to open and close the last named ports. These port cylinders are made to fit snugly within the casings 2 by making said cylinders slightly eccentric within, as shown in Fig. 5, and giving each a longitudinal slit 12 through its thinnest section; the cylinders being of a slightly larger normal diameter than the casings so that they have to be sprung together for insertion. As shown in Figs. 2 and 5, the ports 11 are twice as wide as the ports 3, and are bisected by the slit 12 in each instance.

For the rotation of the port cylinders 10, a shaft 13 is run centrally within each valve casing, and connected by means of sprockets and chain 14, 15 to rotate synchronously; while power is communicated to one of said shafts by sprockets and chain 16, 17 and 18 from the engine shaft 19. Near the ends of said shafts are collars 20, 21, the collars 20 being fixed thereon, while the collars 21 are keyed thereon but adapted to be moved along the shafts for a limited distance. About each said shaft between said collars are three annuli 22, as shown in Figs. 1 and 3. The lateral faces of these annuli and of said collars are formed with a bevel 23, as are also the ends of the port cylinders 10. When, now, the movable collars 21 are forced inward, said bevels will coact to expand the split port cylinders, and so to snugly fit the casings 2 whenever said parts become worn and non-fitting.

To compel the port cylinders to rotate with the shafts, each of said cylinders and the collars 20, 21 are formed with notches 24 adapted to receive the blocks 25, as shown in Figs. 3 and 4, and 1, each annulus being suitably recessed to permit the passage of a block. These blocks and notches form in effect a clutch by which all said parts must turn together, while still permitting longitudinal adjustments thereof.

To cause the wear of the port cylinders and casings to be automatically taken up, a spring 26 is located between each slidable collar 21 and its adjusting nut 27 (Fig. 1), so that said nuts being set up until said springs are materially compressed, sufficient force will be exerted thereby to maintain the expansion of the cylinders during a considerable range of wear.

As shown in Fig. 1, at the side disclosing the ports 3, the ports 11 are disposed "quartering" with respect one to the next so as to present themselves at the proper intervals for a four cylinder, four cycle engine.

To enable the valve parts to be removed for repairs, cleansing and the like, and then returned in proper manner, as well as to enable them to be accurately positioned originally, each collar 20 is formed with an

indentation or hole 30 arranged to be in line with a hole 31 in the casing when the ports of the port cylinders are correctly positioned relative to the casing ports; and the sprocket gears 14 and 17 are adapted to be adjustable angularly with respect to their shafts. It being so arranged that the valve ports are in their proper positions when the holes 31 are in radial alinement with the indentations 30 and the piston nearest the sprocket 16, for instance, is in its lowermost position. Then when said parts are being put together, what is first to be done is to turn the shaft 19 until said piston is in said position, then loosen the nuts 32 and turn the valve directly connected therewith until its said indentation and hole are in register. The bolts 32 of the sprocket gear 14 are next loosened and the other valve revolved until its said indentation and hole are in register. Said bolts or nuts being then tightened up, the pins or other tools, which are preferably employed for determining such registering, are removed, and the engine is ready for use. If desired said holes 31 may be normally filled by plugs or screws. Such angular adjustment is permitted by having said gears rotative on their shafts and having them held by means of bolts 32 passing through slots 33, to the collars 34 fixed on the shafts.

It should be noted that the intake to an engine cylinder, as well as the exhaust therefrom, must pass through two ports 11 to reach the casing ports; in doing this it moves lengthwise of the port cylinders 10, the members 22 being made annular to permit the same.

For the lubrication of the valve parts, the casings 2 are each formed with a channel 35, as shown in Fig. 2, in the lower point thereof, and preferably extending nearly the whole length thereof. These channels being filled with lubricant, enough thereof is communicated to the cylinders 10 and annuli 22 to reduce wear to a minimum.

It is evident that this engine and its valves are simple to construct and consequently inexpensive to manufacture, the wear is slight, and what little wear there is can be easily taken up and all leakage prevented.

What I claim as my invention and for which I desire a patent, is as follows, to wit;—

1. An internal combustion engine comprising a plurality of engine cylinders, a cylindrical valve casing having a port communicating with each of said cylinders, and a cylindrical shell having ports corresponding with said engine ports, said shell having but a single port coacting with the port of each cylinder, said shell having means for its rotation and being so disposed that the means of communication with any one cylinder will be through the latter's port, the coacting port of said shell, thence axially along the latter and through the port of said shell associated with one of the other cylinders out to the exhaust.

2. An internal combustion engine comprising a plurality of engine cylinders, a cylindrical valve casing having a port communicating with each of said cylinders, an equal number of adjacent split shells fitted to said casing, the shells being separate one from another and adapted to be rotated in unison, no two of said shells having their splits in the same longitudinal line.

3. The combination with the cylinders of a multi-cylinder internal combustion engine, of cylindrical valve casings having ports communicating with the engine cylinders, split cylindrical shells fitted to said casings, said shells having their ends beveled and the shells being also formed with ports, and means adapted to be pressed into engagement with said beveled ends and to thereby forcibly expand the shells.

4. The combination with the cylinders of a multi-cylinder internal combustion engine, of cylindrical valve casings having ports communicating with the engine cylinders, split cylindrical shells fitted to said casings, said shells having their ends beveled and the shells being also formed with ports, terminally conical members adapted to engage said beveled ends, the member at one end of each valve being held against axial displacement relative to the adjacent shell, and a spring adapted for pressing inward the member at the opposite end of each valve.

5. The combination with the cylinders of a multi-cylinder internal combustion engine, of cylindrical valve casings having ports communicating with the engine cylinders, synchronously rotated cylindrical shells fitted to each casing, each shell having its ends beveled and itself longitudinally split, annuli beveled to fit the ends of said shells, one annulus being between each two adjacent shells, and means for pressing shells toward each other, each shell having a port therein.

6. The combination with the cylinders of a multi-cylinder internal combustion engine, of cylindrical valve casings having ports communicating with the engine cylinders, a shaft in each casing, means for rotating said shafts, a fixed collar on each shaft, an adjustable collar on each shaft, cylindrical shells fitted within said casings, each shell being slit to render it expansible and having a port, and annuli located in said casing between the ends of the said shells, said shells, annuli and collars being beveled.

7. The combination with the cylinders of a multi-cylinder internal combustion engine, of cylindrical valve casings having

ports communicating with the engine cylinders, a chamber beside each casing having ports to the latter, an intake pipe to one of said chambers and an exhaust to the other, and cylindrical rotary shells having ports fitted within said casings, said ports being disposed to cause the gas to pass through any one of the ports of the said shell and thence longitudinally along the shell to another port thereof.

In testimony that I claim the foregoing invention, I have hereunto set my hand.

GILBERT R. ELLIOTT.

Witnesses:

A. B. UPHAM,

ALEX. I. PECKHAM.