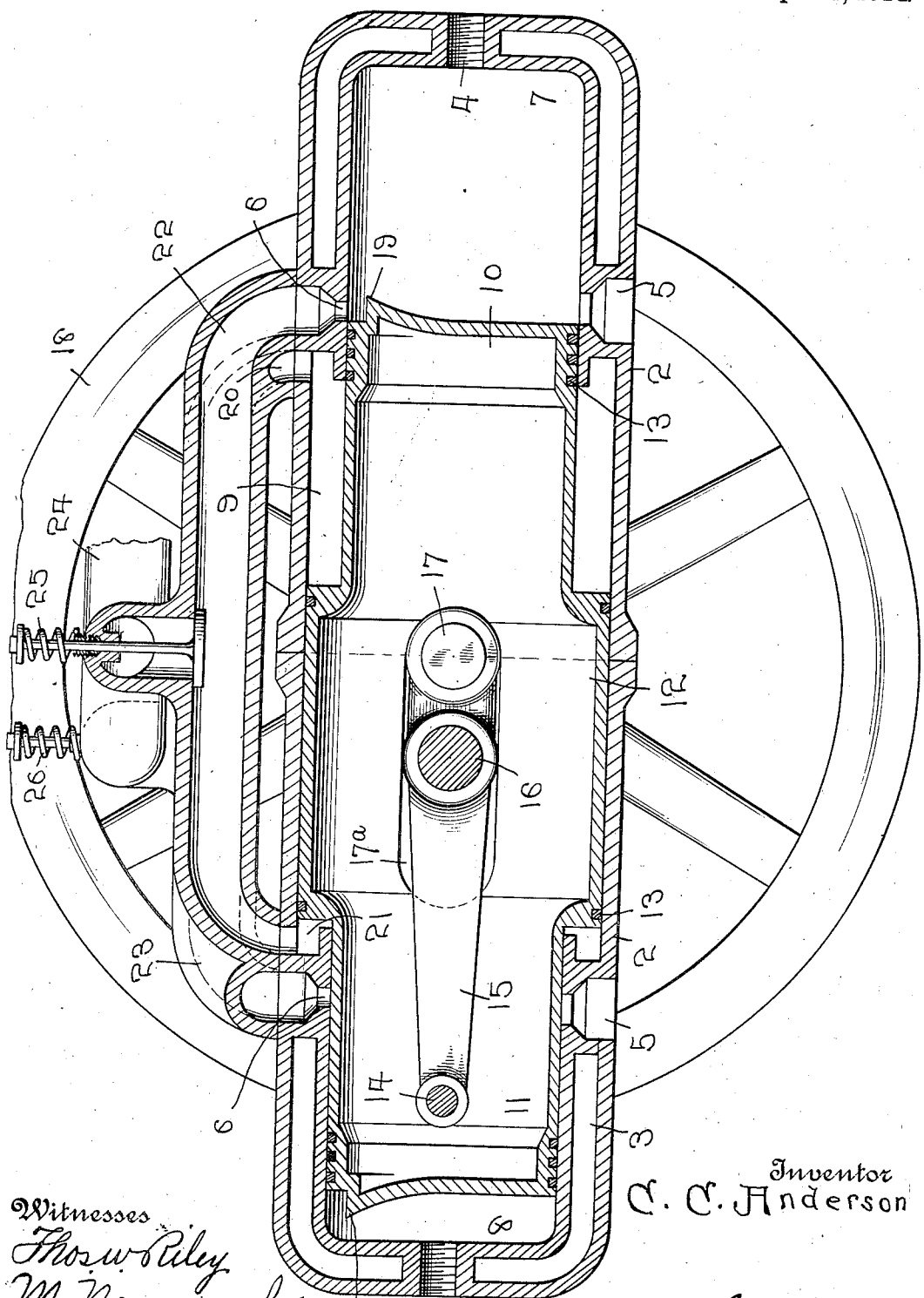
C. C. ANDERSON.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 8, 1912.

1,094,398.

Patented Apr. 21, 1914.



Witnesses
Thos. W. Riley
M. Newcomb

Inventor
C. C. Anderson

By W. J. Fitz Gerald & Co. Attorney

UNITED STATES PATENT OFFICE.

CHARLES C. ANDERSON, OF ST. JOSEPH, MISSOURI.

INTERNAL-COMBUSTION ENGINE.

1,094,398. Specification of Letters Patent. Patented Apr. 21, 1914.

Application filed August 8, 1912. Serial No. 714,000.

To all whom it may concern:

Be it known that I, CHARLES C. ANDERSON, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby 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 new and useful improvements in reciprocating engines of the explosive type.

The prime object of my invention is to provide an improved engine of the explosive type having multiple lineally arranged pistons comprising a single structure, the central portion of which is enlarged and adapted to be used in supplying an explosive mixture to the piston cylinders.

With this object in view, the invention consists in the improved construction, arrangement, and combination of parts of an engine of this type which will be fully described hereinafter and afterward specifically claimed.

In the drawing which illustrates an approved embodiment of my invention I have shown a sectional view taken on a plane passing vertically and longitudinally through the engine the spark plugs being omitted.

In embodying my invention in practice, I employ a cylinder of peculiar construction formed of a pair of castings 2, which when assembled have a piston compartment at either end and an enlarged central compartment for the compression piston of the engine. In forming the castings a space 3 is left in the wall around the end cylinders so that the same may be cooled by water in the usual manner, and the ends of said castings have openings 4 therethrough, which are in communication with the cylinders and interiorly screw threaded for the reception of the usual or any preferred type of spark plug (not shown). Each of the castings is provided with an enlarged outlet port 5, through which the exhaust from the cylinders is adapted to pass, and an inlet port 6, of standard predetermined dimensions, the arrangement of said ports being hereinafter made clearly apparent. The castings 2 are preferably provided with flanges around their open ends, which are bolted or otherwise secured together, and, when so assembled, form a casing having piston cylinders 7 and 8 arranged in alinement and at opposite ends of the casing and an enlarged central compression chamber 9. A single casting having pistons 10 and 11 at its opposite ends and an enlarged piston 12 at its central portion is mounted in the casing so that said pistons 10, 11 and 12 are adapted to work in the cylinders 7 and 8, and the compression chamber 9, respectively. Said pistons are provided with one or more packing rings 13 of the usual or any preferred construction. The piston 11 is provided with a cross head pin 14, upon which is secured one end of the crank arm 15, the other end of said arm being pivotally secured upon the crank 16 of the main shaft 17 of my engine, said shaft 17 also having mounted thereon a fly-wheel 18. The side walls of the enlarged piston 12 are slotted, as indicated at 17^a in the drawing, so that the shaft 17 may be extended therethrough and the pistons moved back and forth without interfering with said shaft. It will be understood that the enlarged piston 12 is of slightly greater length than the power stroke of the combined pistons so that the slot 17^a will not be in communication with the compression chamber. The pistons 10 and 11 are also provided with outwardly directed flanges 19 adjacent the inlet port 6, so that the gaseous fuel, when directed into the piston chambers in a manner hereinafter set forth, will be directed into the outer part of said chambers to help clear the same from the products of combustion derived from the preceding charge of gas.

Ports 20 and 21 are formed in the castings 2 at the ends of the compression chamber 9. The inlet port 6 for the cylinder 7 is connected by the by-pass 22 to the port 21, while the inlet port of the cylinder 8 is connected by a by-pass 23 to the port 20. By-passes 22 and 23 shown in dotted lines are connected at any desired point with the inlet manifold 24, which is in communication with the usual or any preferred type of carbureter (not shown) and I prefer to employ check valves 25 and 26, respectively, between said inlet manifold and said by-passes.

In actual practice with this motor and motors of this class it has been found to be extremely desirable to make the whole

structure as short as possible, thus shortening the pistons and cylinders, and it is likewise desirable to admit the charge to the cylinder at a predetermined and given pressure. With this desirable shortened piston structure, I reduce the length of the pumping cylinder to a point where the pressure would be too high unless provided for by furnishing room for expansion, which I provide by increasing the area of the by-pass. Furthermore, the dimensions of the ports in this class of motors have much to do with flexibility, economy, power and speed of the motor, and as a consequence these ports must be of fixed relative predetermined dimensions. A by-pass of the same diametrical dimension as the ports would therefore, not afford sufficient room to provide the correct pressure at which gas is admitted to the explosion chamber. The by-passes being limited in length by the shortened structure are therefore provided with increased diameters while the ports remain of standard predetermined dimension, the change in diameter from the port to by-pass and vice versa being made gradual to afford easy passage for the gases.

When the parts of the engine are in the position indicated and it is desired to start the same, the shaft is turned in any suitable manner and the gaseous fuel, which has been sucked by the left hand stroke of piston 12 into the by-pass 23 and the portion of the compression chamber adjacent the piston 10, by way of the check valve 26, will be compressed in said by-pass by the right hand stroke of the piston 12 and forced through the port 20. When the piston 11 has moved to the right until it uncovers the port 6, the gaseous fuel from by-pass 23 will immediately pass into the cylinder 8 and, upon the next half revolution of the crank shaft, the piston 11 will move to the position shown in the drawings to compress said gas, whereupon the gas is ignited in the usual manner and the explosion thereof will start the engine.

It will be understood that when the pistons are first moved to compress the gas into the by-pass 23, the opposite end of the enlarged piston 12 will suck gas from the inlet manifold by way of check valve 25 into the by-pass 22 and the portion of the compression chamber adjacent the piston cylinder 8 and when said piston 11 is first moved back to the position indicated in the drawings to compress the gas in the piston cylinder 8, the gas in the by-pass 22 will escape into the piston cylinder 7 so as to be compressed upon the explosion stroke of the piston 11 and be likewise ignited upon the completion of said stroke.

One of the greatest disadvantages of the usual type of 2-cycle engine, having compression in its crank case, is the fact that the amount of gas supplied to the cylinder is equal to the displacement of its piston, which is considerably less than the capacity of the cylinders. A further disadvantage is the fact that the bearings of such an engine must be closely watched, as they must fit extremely close to the crank shaft to prevent the escape of the gaseous fuel.

By my construction I am able to secure an improved engine in which the explosive stroke of one of the pistons is also the intake stroke of the opposite piston and upon the explosive stroke of either piston the next charge of gas therefor is placed under compression so as to be quickly delivered thereto when the piston passes its intake port.

In practice I design the compression chamber so that the charge of gaseous fuel taken thereinto is equal in volume to the capacity of the cylinders 8 and 9 so that the cylinders will be completely cleared of the products of combustion from the previously exploded charge of gas and the maximum power be obtained from each cylinder. It will also be seen that I have provided a double cylinder engine having but three movable parts, the piston, crank arm, and the crank shaft.

The simplicity and economy of the construction described will be evident at a glance. The three pistons 10, 11 and 12 are a single casting which gives great strength and stability, permits the use of but a single crank and pitman, and assures accurate and reliable coöperation between the pistons, all of which are absolutely compelled to operate simultaneously, there being no tendency to looseness of parts or uneven coöperation which would be occasioned by the wear of the separate parts where the engine pistons were separate and two cranks necessary. The vital advantages of the peculiar form and dimensions of the by-passes have already been set forth. The pumping piston 12 being solid, and of a single piece also assists in preserving the regularity of movement and coöperation of both ends thereof, thus assuring the proper supplying, compression and exhaustion of gases and avoiding rattling and lost motion which would otherwise occur. The by-passes are formed integral with each other and, as shown in the drawing, are spaced from the cylinder so as to provide an air space therebetween.

Having thus fully described my invention what I claim as new is:

An engine of the class described comprising three cylinders arranged in alinement, the middle one forming a compression chamber of greater diameter than the end cylinders which latter form explosion chambers, a single casting in said cylinders comprising a pair of engine pistons adapted

to work in the explosion chambers and a compression or pumping piston working in the compression chamber, and by-passes integral with each other and spaced from the cylinder and connecting the ends of said compression chamber with the oppositely disposed explosion chambers by ports of less diameter than the by-passes, said by-passes gradually increasing in area from said ports to form expansion chambers, and all of said ports being in longitudinal alinement with each other.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES C. ANDERSON.

Witnesses:
HERBERT R. LEWIS,
MAXWELL J. HANDLER.