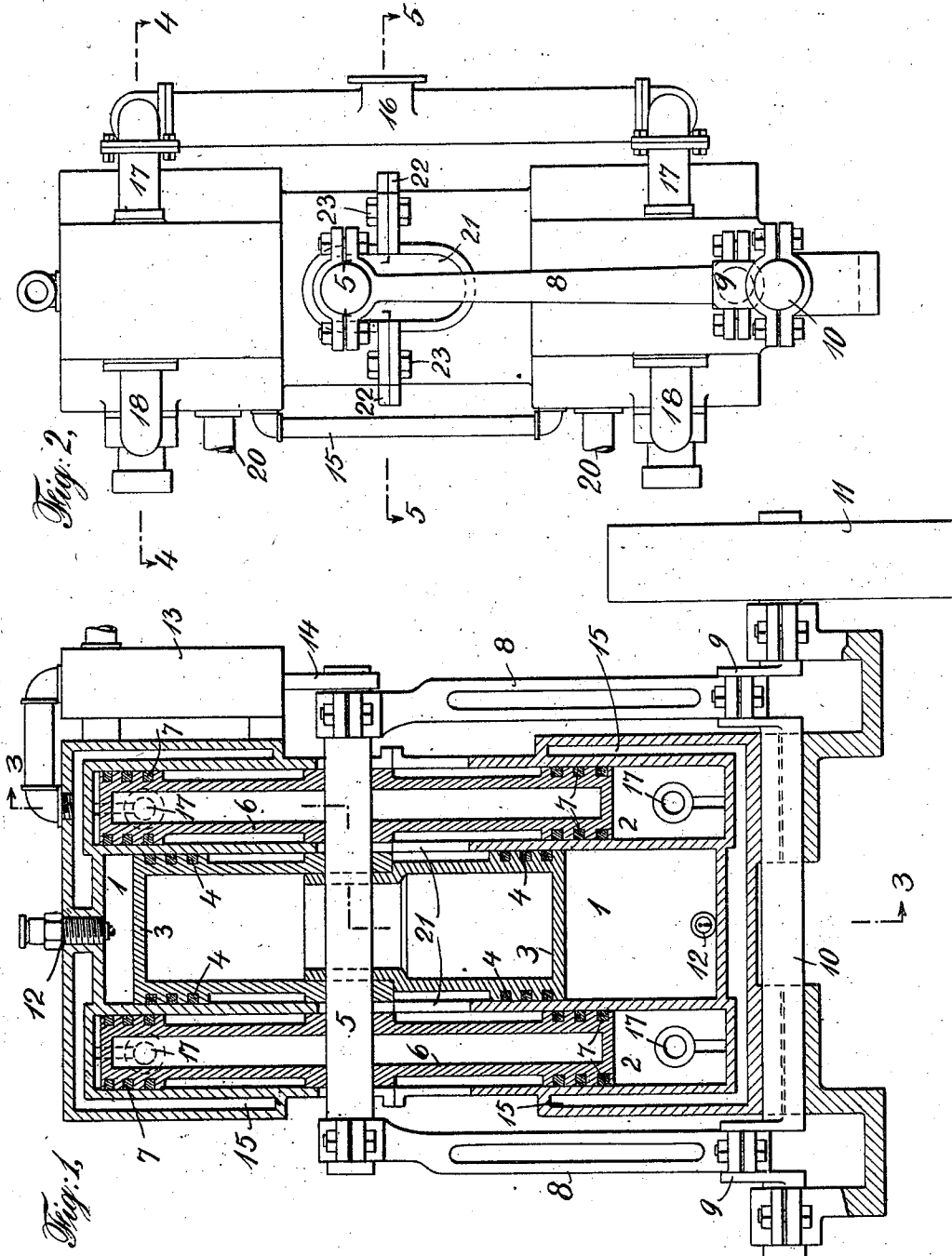


G. McDOWELL.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED FEB. 13, 1909.

950,297.

Patented Feb. 22, 1910.

2 SHEETS—SHEET 1.



Witnesses:
Max B. A. Doring,
Vincent Scully

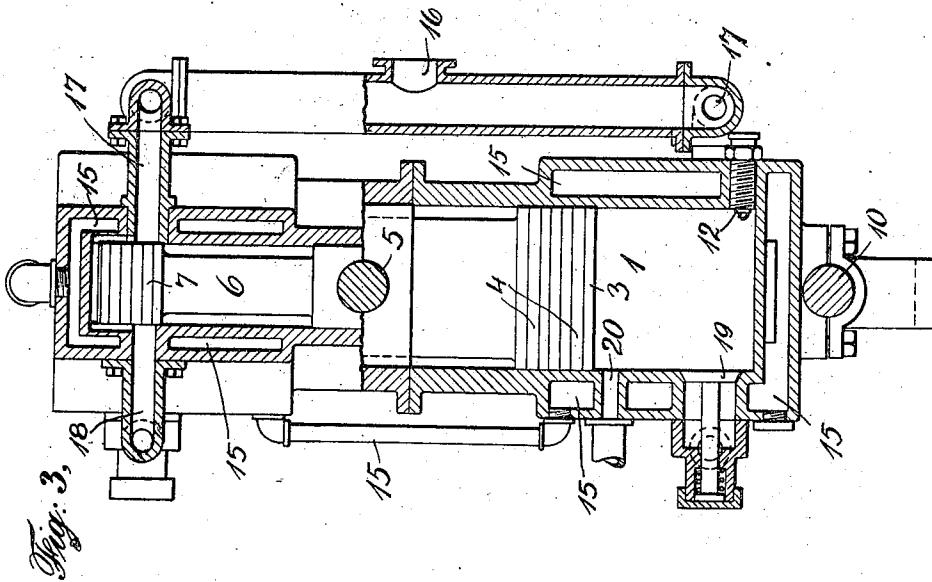
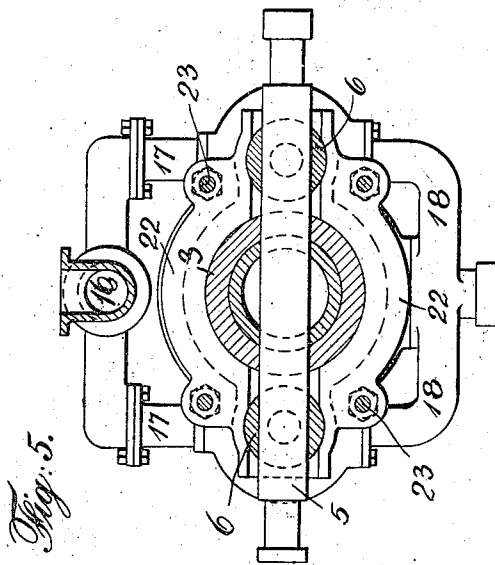
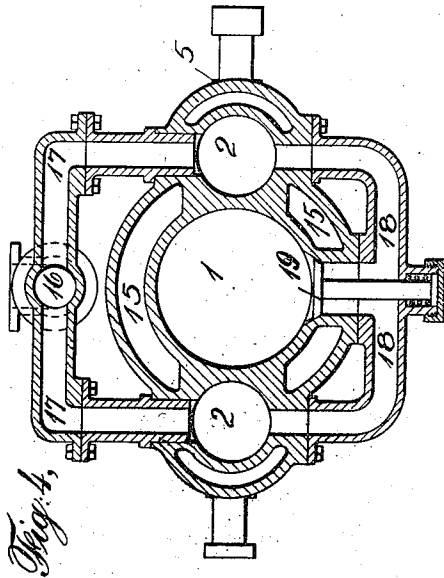
George Mc Dowell Inventor
By his Attorney Phillips Abbott

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UNITED STATES PATENT OFFICE.

GEORGE McDOWELL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO HERBERT G. LATIMER, OF BROOKLYN, NEW YORK.

INTERNAL-COMBUSTION ENGINE.

950,297.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed February 13, 1909. Serial No. 477,719.

To all whom it may concern:

Be it known that I, GEORGE McDOWELL, a citizen of the United States, residing at No. 350 Bay Ridge avenue, in the borough of Brooklyn, city of New York, State of New York, have invented certain new and useful Improvements in Internal-Combustion Engines, certain phases of the invention being adapted also to use in steam, hot-air, and other engines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a horizontal section view of an engine embodying the invention. Fig. 2, illustrates an elevation of that which is shown in Fig. 1, the pump being omitted. Fig. 3, illustrates a vertical longitudinal sectional view taken on the line 3—3 of Fig. 1. Fig. 4, illustrates a transverse vertical sectional view taken on the line 4—4 of Fig. 2 looking in the direction of the arrows. Fig. 5, illustrates a view partly in-section taken on the line 5—5 of Fig. 2, looking in the direction of the arrows.

The especially important features of this invention are these: The power cylinder in which the compression, ignition and explosion of the charge of fuel take place is provided with a double ended piston and with laterally disposed fuel injection cylinders each provided with a double acting piston whereby the fuel is injected into the power generating cylinder at appropriate times. All of the cylinders are closed at the ends opposed to the pistons, and are open at their other ends, that is to say, there are no openings in the cylinders in the working sections thereof except the necessary intake and the exhaust or ejection ports.

The wrist pin connects with all the pistons at their central parts and is provided with suitable connecting rods which engage with cranks on the engine shaft.

Referring to the drawings 1, represents the power cylinder; 2, 2, the fuel injection cylinders; the cylinder 1 is provided with a double ended piston 3, 3, each end of which is provided with suitable packing 4, 4. I prefer to make the piston in two parts as shown, knuckled together at the wrist pin, 5, in a manner well known, so that its opposite ends may have independent movement. Each of the injection cylinders 2, 2, is provided with a plunger or piston 6, 6, suitably packed at each end as shown at 7; the wrist

pin 5, passes through all the pistons at their central parts as shown; 8, 8, are connecting rods extending from the wrist pins to cranks 9, 9, on the engine shaft 10; 11 is a fly wheel on the shaft; 12 are spark plugs of any suitable construction located at the ends of the power cylinder.

13 (see Fig. 1) is a pump actuated by pump rod 14 driven by the wrist pin 5, whereby water is forced to circulate through a water jacket 15 for cooling the engine in a manner well known.

The fuel from any suitable source of supply, is drawn in to the injection cylinders by the suction movement of the pistons 6, 6, through the supply pipe 16 which is provided with a check valve not shown and branch pipes 17 (see Figs. 4 and 5) and upon the return or ejecting movement of these pistons the charge is forced through pipes 18, and check valves 19 into the power cylinder 1. The exhaust from the latter is secured through ports 20 (see Fig. 3) one at each end of the cylinder which are uncovered by the pistons respectively after they have completed about four fifths of their power stroke. The parts are timed in such manner that these operations take place in proper succession as is now well understood. The wrist pin in its to and fro transit passes through an open space 21 made in the cylinder castings. I prefer to cast all three cylinders in two equal parts each provided with a flange 22. Whereby they can be bolted securely together by bolts 23 (see Figs. 2 and 5). The injection pistons are longer than the power piston consequently there is some compression of the charge in the injection cylinders before the power piston has uncovered the exhaust ports consequently, when this takes place the charge is injected into the power cylinder with some violence and this aids the ejection therefrom of the spent charge.

It will be noted that the invention is adapted to practically all forms of internal combustion engine and that so far as the piston and cylinder construction is concerned it is likewise adapted to steam, hot air and similar engines.

Among the advantages secured by me are the following: (a) There are no openings of any kind except the inlet and exhaust ports in the working parts of the cylinders, consequently, reduced liability of leakage. (b)

The construction is such that the engine receives a power impulse at the end of each piston movement. (c) The wrist pin is guided and supported by the two injection pistons this secures stability and perfect alinement of the parts. (d) The construction is simple and strong—by simply removing the bolts 23, and the pipe connections the whole mechanism comes apart, and by taking the caps off from the connecting rods the wrist pin can be driven right through all the pistons and thus all the piston mechanism be taken out for repair or cleaning.

It will be obvious to those who are familiar with such matters that the details of construction described and illustrated herein may be widely departed from and yet the features of the invention be utilized. For example it is not essential that there be two injection cylinders because one only will operate successfully, nor that the cylinders be double-ended, because if they be single-ended the engine will also operate. Also instead of having a continuous wrist pin running through the central parts of the pistons, the pistons themselves may be so constructed as to properly engage with each other and work together suitable devices being supplied whereby the connecting rod or rods may engage with the power piston. In short the engine described and illustrated by me is one form only in which the essentials of the invention may be embodied.

I claim—

1. An engine having a stationary power cylinder provided with an inlet valve and an exhaust port, a piston therefor, a supplemental cylinder which compresses the charge and injects it into the power cylinder, a piston for the supplemental cylinder, a wrist pin which engages with both pistons outside of their respective cylinders at substantially midway of their length and which is supported and guided by the pistons alone, means connecting the wrist pin with the crank-shaft of the engine, means for supplying an explosive mixture to the supplemental cylinder and a passage way directly connecting the interior of the supplemental cylinder with the interior of the power cylinder.

2. An engine having a stationary double-ended power cylinder provided with inlet valves and exhaust ports, a double-ended piston therefor, a double-ended supplemental cylinder which compresses the charge and injects it into the power cylinder, a double-ended piston for the supplemental cylinder, a wrist pin which engages with both pistons outside of their respective cylinders at substantially mid-way of their length, and which is supported and guided by the pistons alone, means connecting the wrist pin with the crank-shaft of the engine, means for supplying an explosive mixture to both

ends of the supplemental cylinder, and passageways directly connecting the two ends of the supplemental cylinder with the interior of the two ends of the power cylinder.

3. An engine having a stationary power cylinder provided with an inlet valve and an exhaust port, a piston therefor, two laterally disposed supplemental cylinders which compress the charge and inject it into the power cylinder, pistons for the supplemental cylinders, a wrist pin which engages with all of the pistons outside of their respective cylinders at substantially mid way of their length and which is supported and guided by the pistons alone, means connecting the wrist pin with the crank shaft of the engine, means for supplying an explosive mixture to both of the supplemental cylinders, and passage ways which directly connect the interior of the supplemental cylinders with the interior of the power cylinder.

4. An engine having a stationary double-ended power cylinder, a double-ended piston therefor, double-ended laterally disposed supplemental cylinders which compress the charge and inject it into the opposite ends of the power cylinders, all of said supplemental cylinders being arranged in the same plane and each having a double-ended piston, a wrist pin which engages with all of the pistons about mid-way of their length and which is supported and guided by them alone, means connecting the wrist pin with the crank-shaft of the engine, means for supplying an explosive mixture to both ends of the supplemental cylinders, and passageways directly connecting the interior of both ends of the supplemental cylinders with the interior of both ends of the power cylinder.

5. An engine having a stationary double-ended power cylinder the ends whereof are closed, a double-ended piston therefor, the piston being made in two independently movable parts, a wrist pin passing through the meeting ends of the two parts of the piston and which holds them in position, the cylinder having an open space in its wall about mid-way of its length through which the wrist pin reciprocates, and means for supplying an explosive mixture under pressure to the opposite ends of the cylinder.

6. An engine having a stationary power cylinder, laterally disposed supplemental cylinders constructed and arranged to compress the charge and inject it into the power cylinder, the whole cast in two substantially equal parts, all the cylinders being closed at their ends and all provided with an open space through their walls about mid-way of their length, double-ended pistons for each of the cylinders, a wrist pin which passes through the open spaces in the walls of the several cylinders and engages directly with the several pistons about midway of their length and which is supported and guided

by the pistons alone, means for supplying
an explosive mixture to both ends of the
supplemental cylinders, passageways for
conveying the compressed charge direct from
5 the interior of the supplemental cylinders
to the interior of the power cylinder and
means connecting the wrist pin with the
crank shaft of the engine.

In witness whereof, I have signed my
name to this specification in the presence of 10
two subscribing witnesses.

GEORGE McDOWELL.

Witnesses:

EDWIN F. VALENTINE,
VINCENT SCULLY.