

J. A. HEANY.
 SELF STARTING INTERNAL COMBUSTION ENGINE.
 APPLICATION FILED APR. 5, 1912.

Patented July 6, 1915.
 2 SHEETS—SHEET 1.

1,145,242.

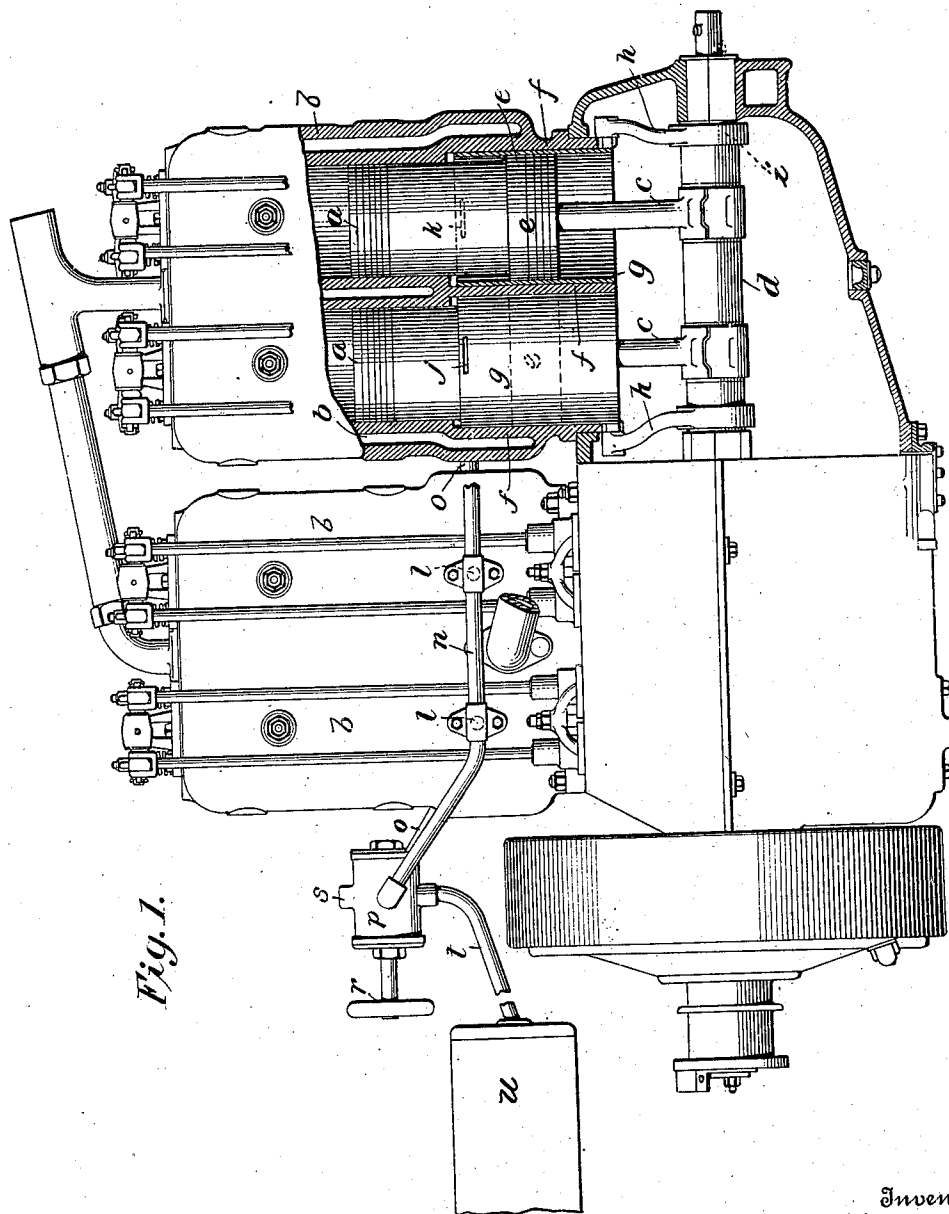


Fig. 1.

Witnesses

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Fig. 3.

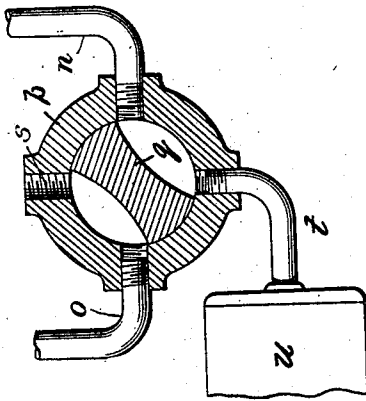


Fig. 5.

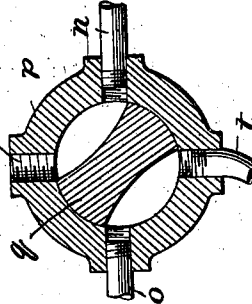


Fig. 4.

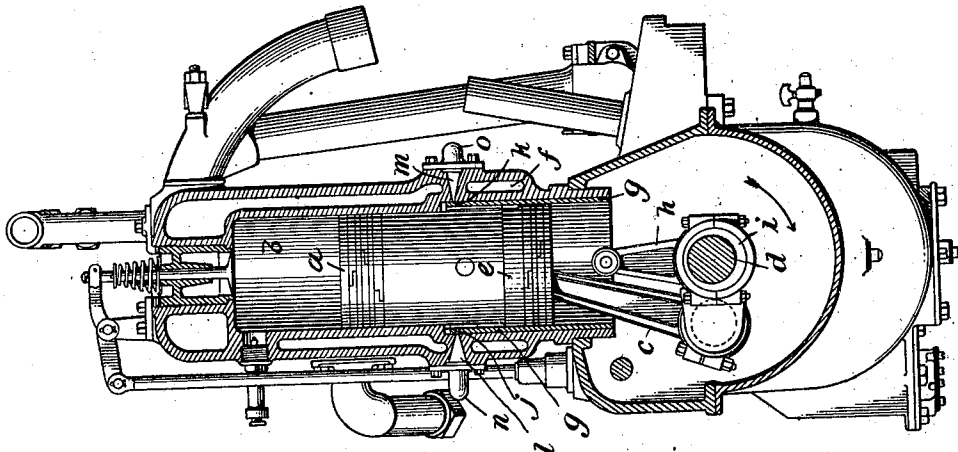
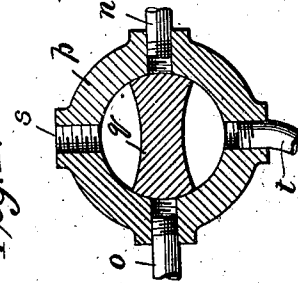


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN ALLEN HEANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

SELF-STARTING INTERNAL-COMBUSTION ENGINE.

1,145,242.

Specification of Letters Patent.

Patented July 6, 1915.

Application filed April 5, 1912. Serial No. 688,634.

To all whom it may concern:

Be it known that I, JOHN ALLEN HEANY, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Self-Starting Internal-Combustion Engines, of which the following is a full and clear specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation partly broken away; Fig. 2 is a vertical section; and, Figs. 3, 4 and 5 are detail transverse sections of the manually controlled valve device.

The object of this invention is to so construct the starting mechanism that it shall be built into the engine proper, thereby doing away with the unsightliness, unreliability, lack of durability, and liability to derangement which are necessarily incident to those starting mechanisms which are mere attachments to an engine.

I have illustrated my invention as applied to a well known type of engine (a four-cycle twin-cylinder engine) but it will be understood that the invention is applicable, with modifications as to details, to other types of engines.

In the drawings, *a* designates the usual working pistons, *b* the working cylinders, *c* the pitmen connecting the pistons to the main crank-shaft *d*, all constructed in substantially the usual manner. Each piston is extended toward the crank-shaft and provided with a supplemental piston *e* larger in diameter than the main piston and working in a supplemental cylinder *f* formed as a continuation of the main cylinder. Working between each supplemental piston and its cylinder is a valve-sleeve *g* which is adapted to be reciprocated by means of a valve-rod *h* connected to an eccentric *i* on the crank-shaft.

Each valve-sleeve *g* is provided at diametrically opposite points with ports *j* and *k* and these ports are adapted to register respectively with cylinder ports *l* and *m* located near the upper extremity of the supplemental cylinder. The ports *l* are all located on the same side of the cylinders and they all communicate with a pipe or manifold *n*, while ports *m* are all on the opposite sides of the cylinders of the engine and are all in constant communication with a similar pipe or manifold *o*.

The pipes *n* and *o* are at their ends con-

nected to ports formed in the opposite sides of a valve casing *p* within which is rotatably mounted a valve-plug *q* which is operable manually by suitable means, such as a hand-wheel *r*. Mid-way the pipes *n* and *o* the valve casing *p* is provided at one side with an atmosphere port *s* and at the other side with a port which is connected by means of a pipe *t* with an air-storage tank *u*.

It will be observed that while the engine is running under fuel power, the valve *q* will be adjusted as shown in Fig. 3, in which case the supplemental pistons will act as air pumps, drawing air in through port *s*, pipe *o*, ports *m*, and ports *k* and expelling the air through ports *j* and *l*, pipes *n* and *t*, and thence into the storage tank *u*. When the desired pressure in the tank is obtained, which pressure may be indicated by a pressure gage or audible alarm of any well known sort, the attendant turns the valve-plug *q* to the position shown in Fig. 4. In this position the pipes *o* and *n* are closed both to the atmosphere and to the storage tank, thus nullifying the pumping action. The engine will then continue to run against the pressure of the air which is entrapped in the supplemental cylinders and the connected ports and pipes, and this entrapping of the air in the cylinders serves to cushion the upward strokes of the working pistons, thereby materially decreasing the wear and noise of the operation of the engine.

With the desired pressure in the tank, to start the engine it is simply necessary to turn the valve plug *q* to the position shown in Fig. 5, in which position the pipe *n* will be open to the atmosphere and the pipe *o* will be placed in communication with the tank through the pipe *t*, whereupon the compressed air will be admitted to that cylinder or cylinders whose ports *k* are in register with ports *m*. This will cause the supplemental pistons and cylinders to act as a motor in starting the engine. Of course it will be understood that the cylinder arrangement of the engine and the arrangement of ports *k* and *m* will be such that at all times there will be at least one pair of ports *k* and *m* in register; in the twin-cylinder type of four-cycle engine I have shown there will at all times be at least two pairs of ports *k* and *m* in register so that upon the admission of compressed air into pipe *o* there will be at least two supplemental pistons available as motor pistons, thus assuring an effective

starting of the engine under the most adverse conditions.

It will be further observed that the valve or controlling means may be greatly varied without departing from the spirit of my invention. In its broad aspects, my invention contemplates the employment between the work piston and the crank-shaft of a supplemental piston of a larger diameter than the work piston, together with automatic valve means which shall operate equally well whether the supplemental piston shall be operating as a pump or as a motor piston, suitable manually-controlled means being provided for manually bringing about the conversion, and a suitable storage tank for the compressed air being provided.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. The combination with a multiple-cylinder internal combustion engine, having air-compressing means associated with each cylinder, of separate inlet and outlet ports associated with the compressing means, mechanically actuated valves operated from the engine controlling said ports, an air reservoir adapted to be placed in communication with said ports, piping connecting the reservoir with said ports, and a valve adapted to place the inlet port in communication with the reservoir and the outlet port in communication with the atmosphere for starting purposes, or to place the reservoir in communication with the outlet port and the inlet port in communication with the atmosphere for pumping purposes.

2. The combination with an internal combustion engine, embodying reciprocating work pistons, supplemental cylinders, sup-

plemental pistons working therein and having a diameter greater than the work pistons, said supplemental cylinders being provided with separate inlet and outlet ports, mechanically actuated valves operated from the engine and controlling said ports, an air reservoir adapted to be placed in communication with said ports, piping connecting the reservoir with said ports, and a valve adapted to place the inlet port in communication with the reservoir and the outlet port in communication with the atmosphere for starting purposes, or to place the reservoir in communication with the outlet port and the inlet port in communication with the atmosphere for pumping purposes.

3. The combination with a multiple-cylinder internal combustion engine, having air-compressing means associated with each cylinder, of separate inlet and outlet ports associated with the compressing means, mechanically actuated valves operated from the engine controlling said ports, an air reservoir adapted to be placed in communication with said ports, piping connecting the reservoir with said ports, and means adapted to place the inlet port in communication with the reservoir and the outlet port in communication with the atmosphere for starting purposes, or to place the reservoir in communication with the outlet port and the inlet port in communication with the atmosphere for pumping purposes.

In testimony whereof I hereunto affix my signature in the presence of witnesses.

JOHN ALLEN HEANY.

Witnesses:

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