A. & R. LAFONTAINE.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 28, 1911.

1,019,495.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.

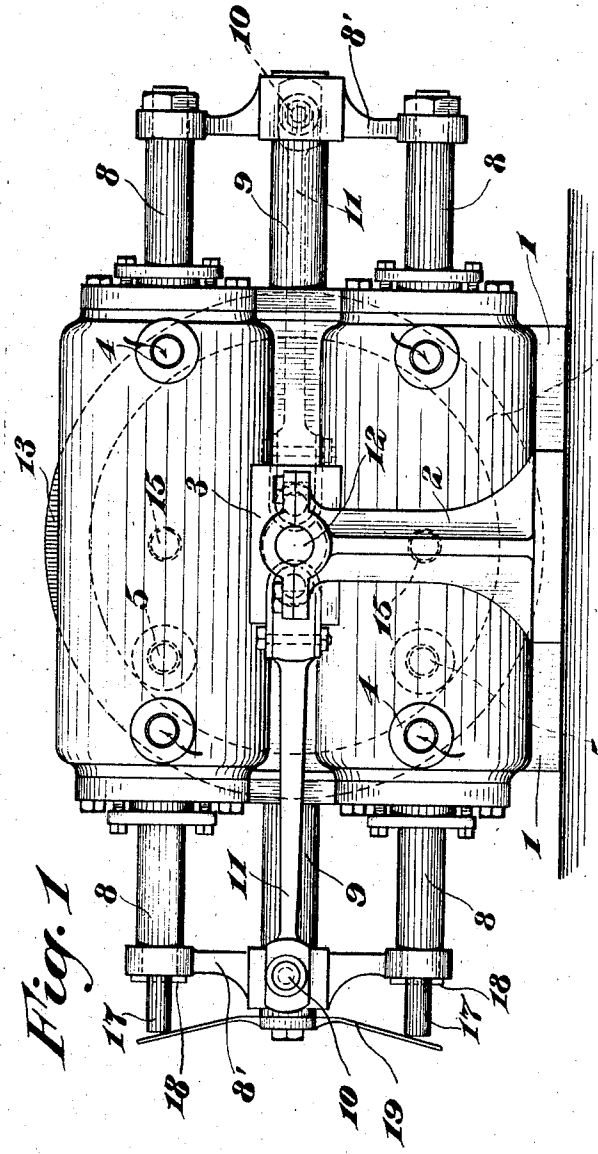

Fig. 1

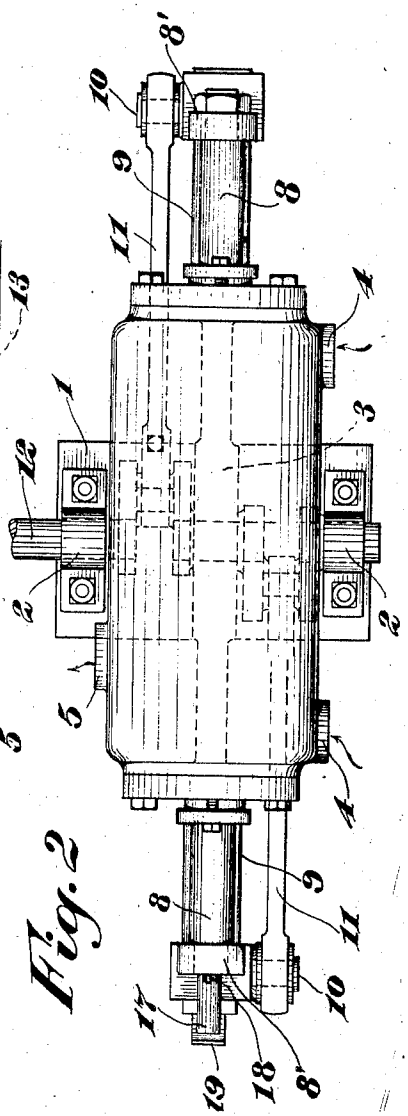

Fig. 2

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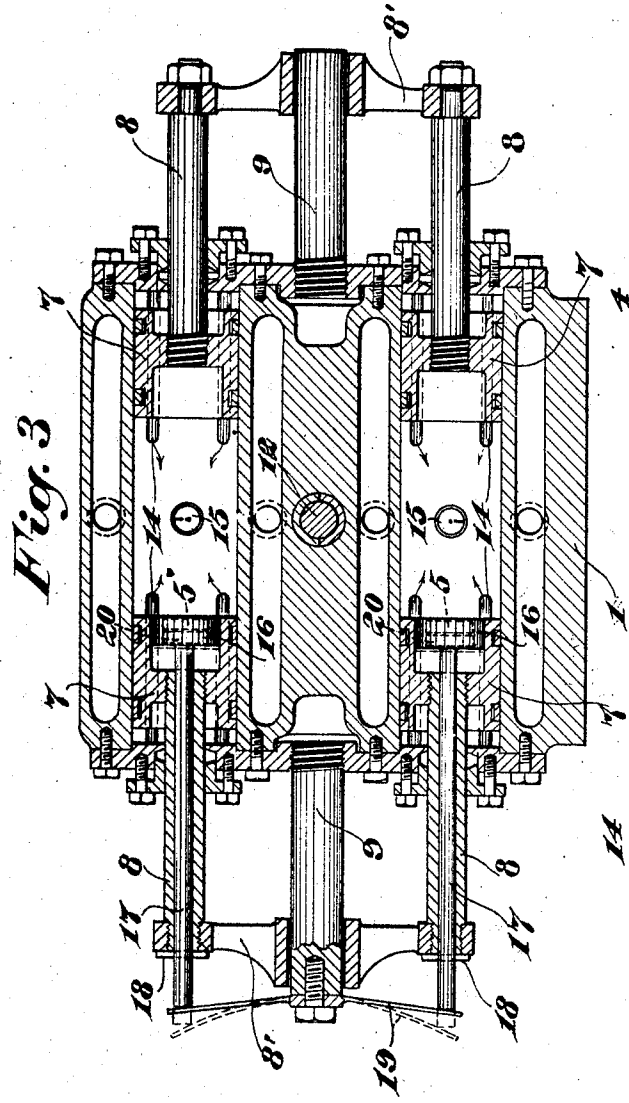

Fig. 3

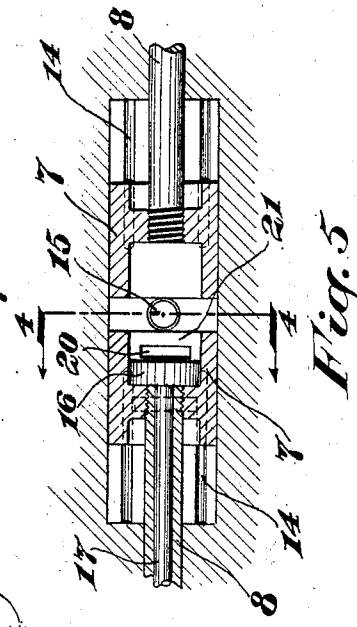

Fig. 5

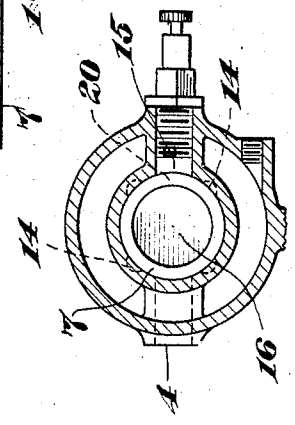

Fig. 4

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UNITED STATES PATENT OFFICE.

ALONZO LAFONTAINE AND ROSARIO LAFONTAINE, OF ST. STANISLAS, QUEBEC, CANADA.

INTERNAL COMBUSTION ENGINE.

1,019,495. Specification of Letters Patent. Patented Mar. 5, 1912.

Application filed August 28, 1911. Serial No. 646,335.

To all whom it may concern:

Be it known that we, ALONZO LAFONTAINE and ROSARIO LAFONTAINE, both subjects of the King of Great Britain, and residing at St. Stanislas, in the county of Champlain, Province of Quebec, Canada, have invented certain new and useful Improvements in Internal-Combustion Engines; and we do hereby declare that the following is 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.

The invention to be hereinafter described relates to internal combustion engines.

In order to more clearly disclose the construction, operation, and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings like reference characters designate the same parts.

In the drawings: Figure 1 is a side elevation of the invention; Fig. 2 is a top plan view of the same; Fig. 3 is a central, vertical, longitudinal, cross section; Fig. 4 is a central, vertical, cross section at right angles to Fig. 3, through one of the cylinders; and Fig. 5 is a fragmentary sectional view showing one set of pistons at the completion of the compression stroke.

One object of the invention is to greatly simplify the valve construction and the valve operating parts; another object is to provide means for mounting the fly wheel shaft entirely outside of the engine cylinder; and another object is to provide a simply constructed, compact, efficient, and economical engine with the fewest possible number of working parts.

Referring to the drawings in detail, 1 indicates any desired form or construction of a suitable base from which extend the uprights or side arms 2 in which is mounted the lateral spacing and supporting block 3 in the upper concave face of which rests the upper cylinder of the engine. On the base of the machine is a second cylinder, an exact duplicate of the upper cylinder. Preferably, each cylinder is jacketed or provided with a surrounding spaced wall. Each cylinder receives motive fluid through inlet openings or ports 4 through the side walls of the cylinder and close to the opposite ends thereof. The exhaust passes from the cylinder through an outlet or exhaust port 5, a short distance from one end of each cylinder. The motive fluid is delivered to the cylinder between the cylinder heads or ends and the rear or adjacent face of a longitudinally reciprocable piston head 7, carried by the sliding piston rod 8. The corresponding rods of the two cylinders are connected in pairs by yokes 8′ which are slidably mounted on guide bars 9 extending from the end plates or caps of the cylinders. Each of these sliding yokes, in turn, is provided with a wrist pin 10 on which is journaled one end of a pitman 11. The opposite end of the pitman is journaled on one crank of the shaft 12 of the usual fly wheel 13. This crank shaft, as clearly shown in Fig. 1, is journaled in the block 3 and uprights 2—entirely outside of either cylinder. From the feed ports or openings 4 the motive fluid passes along the ducts or grooves 14 in the interior walls of the cylinders until it gets by the pistons 7. Then it rushes into the space between the pistons. As the pistons advance toward each other, the inner ends of grooves or ducts 14 will be closed or cut off by them and the charge will be compressed. As the pistons reach their inward limit and the charge is at its maximum compression, it will be exploded by the spark from plug 15. The explosion drives the pistons apart and toward their initial positions at the opposite ends of the cylinders. Slidably mounted in one of each pair of the pistons is a block or disk 16 carried by a bar 17 slidably mounted in a tubular bore extending through the piston rod of that particular piston. Each bar 17 has only a limited sliding movement determined by the position of a stop pin 18 passed through the projecting portion of the bar and engaging the end of the corresponding piston rod, after each exhaust, as shown in Fig. 3. It is held in this position by a leaf spring 19 or the like secured at its center to one end of the guide bar 9 and arranged so that its opposite ends will be engaged by the ends of the rods 17 just prior to exhausting, forcing the spring, temporarily, to the dotted line position, the full line position being restored again immediately upon completion of the exhaust.

Each of the blocks or disks 16, when in the full line position of Fig. 3, is adapted

to close an exhaust port 20 in the corresponding piston 7. When in the full line position of Fig. 7, the port 20 is left uncovered. The uncovering of the port 20 is due to the compression of the motive fluid before its explosion, and to its expansion at and after explosion. The port 20 is adapted to be alined with a similar port or exhaust passage extending through the cylinder wall, such alinement occurring at the instant that the piston 7 reaches its rearward limit. It will be remembered that the block or disk 7 is in the position shown in full line in Fig. 5, at this time. The expansive force of the exploded charge will be sufficient to hold the blocks in this position and overcome the power of the spring 19 until the exhaust rushes out through the exhaust port 20 and the alined exhaust port in the cylinder. As soon as the exhaust takes place, the spring is free to act and the blocks or disks 16 will be driven inward to cover the port 20. At the instant that the block 16 closes the exhaust port 20, the inner ends of the ducts or grooves 14 will be uncovered by the continued rearward movement of the pistons 7, at both ends of the cylinders, thus admitting a fresh charge. That part 21 of the piston, lying between the exhaust port 20 and the inner end of the piston, is so proportioned as to completely cover the inner ends of the ducts or grooves 14 during the short time that any part of the exhaust port 20 is in alinement with the exhaust port leading through the cylinder wall. By such a construction, the valve mechanism controlling the feed and exhaust, is reduced to the simplest possible and is arranged with great compactness. At the same time, there is practically no vibration, as has been clearly proved by actual operation.

It is obvious that the invention may be readily applied either to a single cylinder engine or to an engine of practically any number of cylinders. Likewise, two or more cylinders may be used with only a single piston in each and these pistons may be arranged to work alternately in opposite directions or in the same direction. Or, again, a single cylinder with a single piston therein may be used.

Only one preferred application of the invention has been shown in the present drawings, in order to clearly disclose the same.

It is thought that the operation and use of the invention will be clear from the preceding detailed description.

Changes may be made in the construction, arrangement, and disposition of the several parts of the invention without in any way departing from the field and scope of the same and it is meant to include all such within this application wherein only a preferred form has been disclosed.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In combination, an engine cylinder provided with an exhaust port, a piston slidably mounted in said cylinder and provided with an exhaust port adapted to be alined with the port in said cylinder, a block slidably mounted in said piston and adapted to close the port therein, and means for moving said block to operative position.

2. In combination, an engine cylinder provided with an exhaust port, a piston slidably mounted in said cylinder and provided with an exhaust port adapted to be alined with the port in said cylinder, a hollow piston rod connected to said piston, a bar slidably mounted therein, a block carried by said bar and adapted to cover the port in said piston, and means adapted to engage the aforesaid bar and actuate said block.

3. In combination, an engine cylinder provided with an exhaust port, a piston slidably mounted in said cylinder and provided with an exhaust port adapted to be alined with the port in said cylinder, a hollow piston rod connected to said piston, a bar slidably mounted therein, a block carried by said bar and adapted to cover the port in said piston, and means for yieldingly engaging said bar and actuating said block as the aforesaid piston approaches the limit of its outward movement.

4. In combination, an engine cylinder provided with an exhaust port and delivery ducts, a piston slidably mounted therein and provided with an exhaust passage adapted to be alined with the port in said cylinder, said piston being also provided with a part adapted to cover and close the inner ends of said delivery ducts during such alinement, a disk mounted in said piston and adapted to close the port therein, and means for actuating said disk.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

ALONZO LAFONTAINE.
ROSARIO LAFONTAINE.

Witnesses:
PHILIPPE TOUTTIER,
T. HENRI A. GERMAIN.