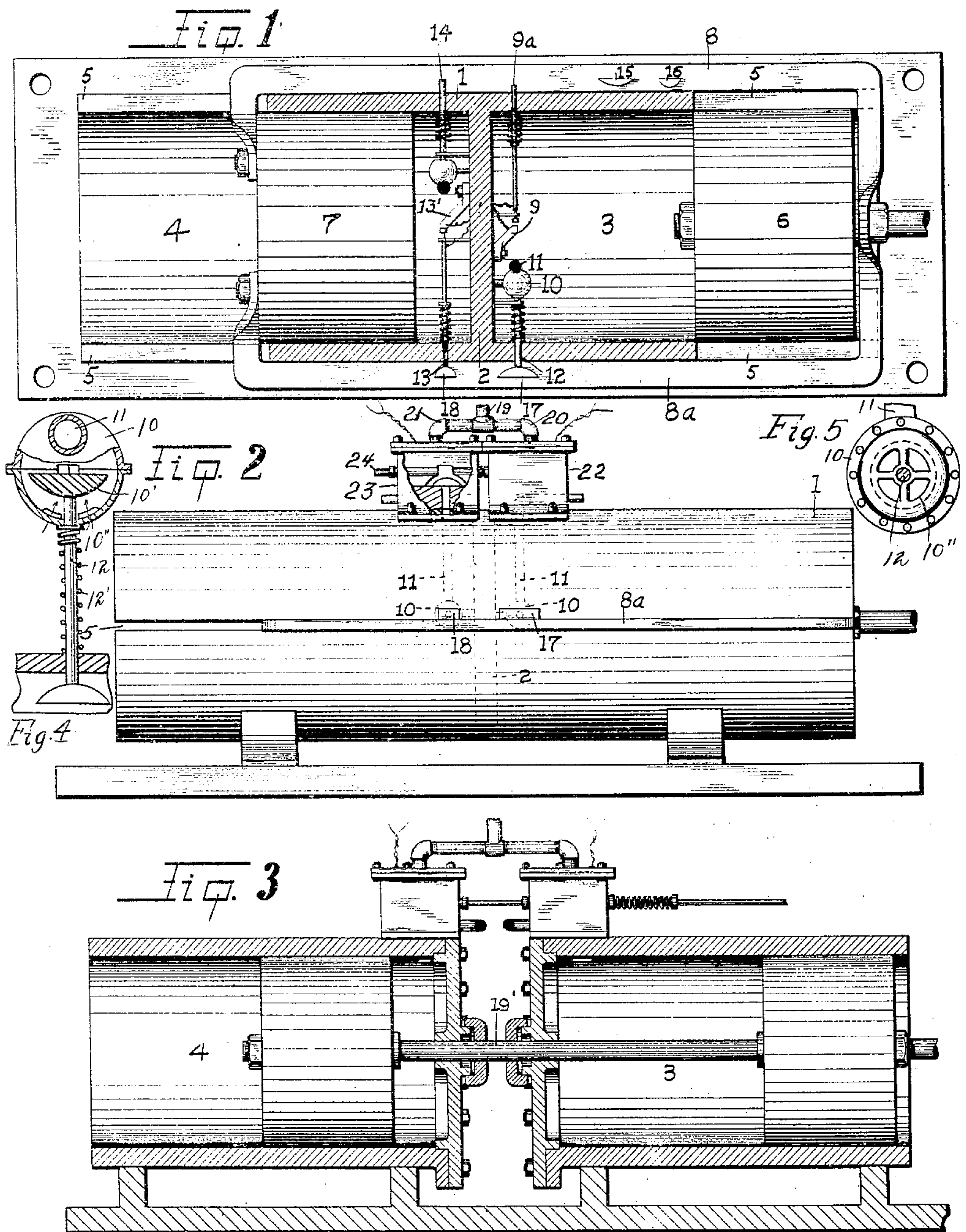


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W. L. MORROW.  
DOUBLE CYLINDER FOR GAS ENGINES.

APPLICATION FILED FEB. 27, 1905.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## DOUBLE CYLINDER FOR GAS-ENGINES.

No. 832,268.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed February 27, 1905. Serial No. 247,433.

*To all whom it may concern:*

Be it known that I, WILLIAM L. MORROW, a citizen of the United States, residing at Stockton, in the county of San Joaquin and State of California, have invented certain new and useful Improvements in Double Cylinders for Gas-Engines; and I do 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, reference being had to the accompanying drawings, and the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in gas or gasoline engines, and particularly to the cylinders thereof; and my object is to produce a double cylinder such as will perform the work for which it is designed without the danger of explosion at the wrong time and also one which will do the work easily and effectually in less time and with less expense of energy than in the old-style engines. This object I accomplish by the peculiar and simple construction and adaptation of parts herein fully described, and particularly pointed out in the claims appended.

In the accompanying drawings similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal section of my improved cylinder. Fig. 2 is a side elevation of same. Fig. 3 is a longitudinal section of a modification thereof. Fig. 4 is a detail sectional view showing one of the exhaust-valves, and Fig. 5 is a bottom view of the same.

1 designates the main cylinder-shell open at both ends and provided with a solid partition-wall 2, which divides the cylinder into two distinct chambers 3 and 4. At each end of said cylinder and on both sides are slots 5, lying parallel to each other at diametrically opposite points of the cylinder.

6 is a piston working in the chamber 3, and 7 is a similar piston working in the chamber 4.

8 8<sup>a</sup> are rods connected to the pistons 6 and 7 and extending through the slots 5 and along the sides of the cylinder 1, said rods extending across the end of the piston 6 and having inwardly-bent integral ends attached to the piston 7.

9 is the stationary member of a spark-igniter located within the chamber 3 and provided with a rod 9<sup>a</sup>, extending out through

the side of the cylinder-shell 1 just above the rod 8.

10 is an exhaust-valve within the chamber 3, connected with an exhaust-pipe 11 and provided with a rod 12, projecting through the side of the cylinder-shell 1 just above the rod 8<sup>a</sup>.

13 is a rod adapted to make contact with the stationary member 13' of a spark-igniter within the chamber 4, similar to the one within the chamber 3, and 14 is a rod connected to an exhaust-valve within the chamber 4, similar to that in the chamber 3. The rod 13 extends through the shell 1 opposite to the side through which the rod 9<sup>a</sup> extends or on the same side as the rod 12, and the rod 14 is on the same side as the rod 9<sup>a</sup>, or, in other words, the igniter of one chamber and the exhaust of the other are on one side, and vice versa.

15 and 16 are small upwardly-projecting lugs on the rod 8, said lugs having their inner surfaces slightly curved. 17 and 18 are similar lugs on the rod 8<sup>a</sup>. Said lugs are a distance apart equal to the distance between the igniter-rods and the exhaust-rods.

The main inlet-pipe is designated 19 and divided into two branches 20 21, which lead, respectively, into two valve-boxes 22 23, the former being mounted on the chamber 3 and the latter being mounted on the chamber 4. These valve-boxes 22 and 23 contain valves that control the inlet of the explosive mixture from the main inlet-pipe 19 into the chambers 3 and 4, and the movement of the valves within the valve-boxes 22 and 23 is effected by means of a valve-rod 24, that is connected to any suitable movable part of the engine. The exhaust-valve shown in Figs. 4 and 5 is composed of a spherical casing 10, into which the exhaust-pipe 11 leads, and within the casing 10 is arranged a convex valve 10', that governs ports 10'' in the bottom of the said casing 10. The valve 10' is carried on the rod 12, and the said rod is surrounded by a spiral spring 12', that tends to hold the valve in closed position.

The operation is as follows: After the machine is started the explosive mixture is admitted alternately into the chambers 3 and 4 by the movement of the valves in the valve-boxes 22 and 23, and as the rods 8 8<sup>a</sup> are moved lengthwise the lug 18 comes in contact with the rod 13, which causes the spark in the chamber 4 to explode the explosive



mixture, which action drives the piston outward, and simultaneously the lug 17 comes in contact with the rod 12, which causes the exhaust within the chamber 3 to work, and the piston 7, being connected to the piston 6 by means of the rods 8 8<sup>a</sup>, pulls said last-named piston inward. When the said piston has completed its stroke, the lug 15 touches the exhaust-rod 14 and the lug 16 touches the rod 9<sup>a</sup>, which causes an explosion in the chamber 3, and the piston 6 is forced outward and the piston 7 is pulled inward. Thus it will be seen that there is an alternating explosion and exhaust in the chambers 3 and 4, and thus I have produced a double cylinder for a gas-engine which after it is regulated will drive two pistons, thus making the engine just twice as powerful as the old style of engines. The rods 8 and 8<sup>a</sup>, working in the slots 5, hold the pistons 6 and 7 steady and prevent any untrue movement. In the double cylinders where one piston is used the flash or flame of the explosion of one chamber sometimes escapes past the rings on the piston and causes an explosion in the other chamber at the wrong time, thus disabling the engine.

Fig. 3 shows a modification of my invention where the two chambers 3 and 4 are distinct members and the rod 19' takes the place of the rods 8 8<sup>a</sup>.

I have now entered into a detailed description of the construction and relative arrangement of parts embraced in the present and preferred embodiment of my invention. I do not wish, however, to be understood as confining myself to such specific detail, as such changes and modifications may be made in practice as fairly fall within the scope of my claims.

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

1. In a device of the kind described, the combination with a stationary main cylinder open at both ends, a solid partition-wall in the center of said cylinder dividing the same into two distinct chambers, a movable piston mounted in each chamber, piston-rods rigidly connected to both pistons and extending along the outside of the cylinder, a plurality of lugs carried by each said rod, a stationary

contact arranged in each chamber, a slidable contact-rod extending from each chamber through the side of the cylinder, an exhaust-valve casing located in each chamber, a valve-rod extending from each chamber through the wall of the cylinder, a valve carried by each said valve-rod, said slidable contact-rods and said valve-rods being adapted to contact with said lugs whereby the rods will be moved to perform their respective functions by the longitudinal movement of the piston-rods.

2. The combination in a gas-engine of a main cylinder, a partition dividing said cylinder into two distinct chambers, a piston arranged in each of said chambers, rods secured to each of the pistons and extending along the sides of the cylinder, a stationary electric contact located in each chamber, a movable contact-rod extending through the wall of each chamber, said contact-rods projecting at opposite sides of the cylinder and a lug carried by each said piston-rod, each lug being adapted to contact with one of said contact-rods.

3. In a device of the kind described, the combination of a cylinder, a partition-wall dividing said cylinder into two distinct chambers, a piston mounted in each of said chambers, piston-rods connected to both said pistons and extending along the sides of the cylinder, a sparking device arranged in each cylinder and comprising a stationary contact and a movable contact, said movable contacts extending through the wall of the cylinder on opposite sides thereof, an exhaust device arranged in each of said cylinders, said exhaust device comprising a valve and a valve-rod, the said valve-rods extending through the walls of the cylinder at opposite sides thereof and a plurality of lugs carried by each piston-rod, the lugs on each side being adapted to simultaneously contact with the contact-rod and the valve-rod, on the same side of the cylinder as set forth.

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

WILLIAM L. MORROW.

Witnesses:

PERCY S. WEBSTER,  
JOSHUA B. WEBSTER.