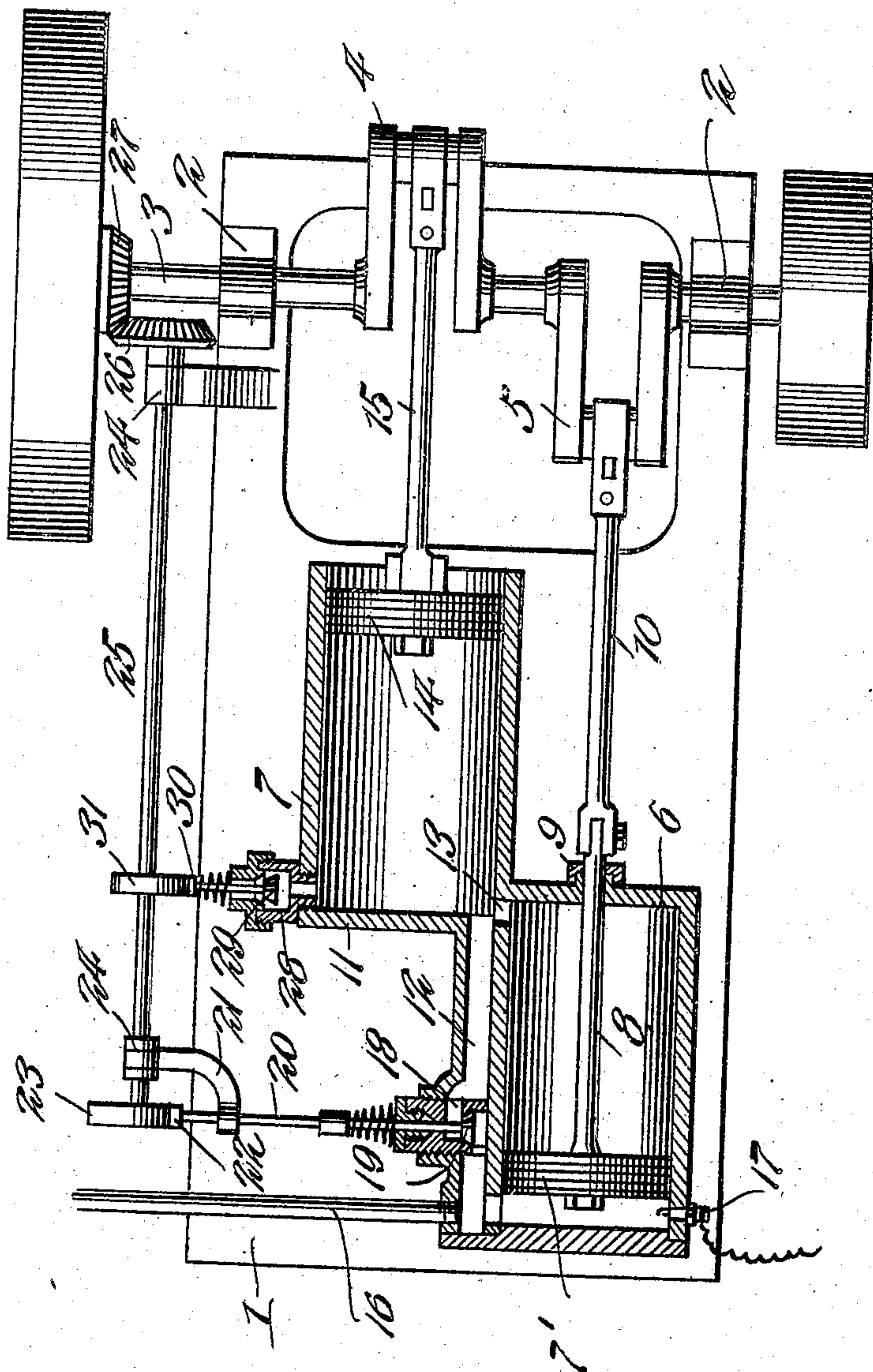


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EXPLOSIVE ENGINE.  
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919,980.

Patented Apr. 27, 1909.



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# UNITED STATES PATENT OFFICE.

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## EXPLOSIVE-ENGINE.

No. 919,980.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed March 4, 1908. Serial No. 419,233.

*To all whom it may concern:*

Be it known that I, MARTIN TSCHIMPERLE, a citizen of the United States, residing at Victoria, in the county of Carver and State of Minnesota, have invented a new and useful Improvement in Explosive-Engines, of which the following is a specification.

This invention relates to compound explosive or other engines of the four cycle type, and relates more particularly to an engine of that class in which the motive fluid is imparted through a suitable port from the main cylinder, after the fluid has acted upon the piston within the main cylinder, to the auxiliary or lower pressure cylinder to act on the piston therein, as well as acting upon the rear face of the piston within the main cylinder to assist the return stroke of the piston.

Another object of the invention is to provide the port of the main cylinder communicating with the auxiliary cylinder, with a suitable valve, and the auxiliary cylinder with an exhaust port controlled by a valve, both of said valves being operated by suitable cams, both of which are operated in timed relation in regard to the stroke of the pistons.

With these objects in view the invention resides in the novel construction and arrangement of parts, hereinafter fully described and claimed.

In the accompanying drawing, the figure represents a top plan view of the engine, the main and auxiliary cylinders and valves therefor being shown in section.

In the accompanying drawing the numeral 1 designates the bed of my improved engine, upon which is positioned bearings 2, adapted for the reception of a crank shaft 3. In the present instance the crank shaft is of the double throw type and has crank arms 4 and 5 arranged at 180° apart. On the bed 1 are main and auxiliary cylinders 6 and 7. The main or high pressure cylinder 6 has both of its ends closed by suitable heads, and reciprocating therein is a piston 7. The piston rod 8 passes through one of the heads of the cylinder 6, at which point is a stuffing box 9, and between the outer end of the piston rod and the crank 5 is a connecting rod 10. The cylinder 7 is open at its forward end, while its opposite end is closed by a head 11. The main cylinder 6 is provided with a suitable passage 12, communicating with the head 11 of the cylinder 7, and a port 13 is provided between the cylinders 6 and 7 adjacent the

head 11 and the forward head of the cylinder 6. The piston 14 within the auxiliary cylinder 7 is directly connected with the crank 4 by means of a connecting rod 15. The motive fluid is admitted to the main cylinder from a carbureter or other suitable source through a pipe 16, and when the engine moves to operate exclusively a spark plug 17 or other ignition device is provided. The passage 12 is provided with a valve seat 18, adapted for the reception of a suitable spring pressed valve 19, normally adapted to remain seated and close the communication between the main and auxiliary cylinders.

The valve stem 20 is mounted within a suitable bearing 21, provided upon the bed of the engine, and has its free end provided with a suitable bearing face 22, adapted for engagement with a cam 23, extending longitudinally of the bed 1, and mounted within suitable bearings 24, also provided upon the bed. This longitudinally extending shaft 25, is provided with a suitable beveled gear 26, adapted for meshing with a similar gear 27 secured upon the crank shaft 3. The auxiliary chamber 7 is provided with an exhaust port 28, positioned adjacent the head 11. The port 28 is provided with a suitable valved seat adapted for the reception of a spring pressed valve 29. The stem of the valve 29 is provided with a bearing face 30, adapted for engagement with a cam 31, positioned upon the shaft 25.

The operation of the engine will be briefly described as follows: When the parts are in the position shown in the drawing, the charge of compressed explosive mixture at the rear side of the piston 7' is ignited by the spark plug 17 so as to impart a forward impulse to the piston. At the end of the forward stroke the cam 23 operates the valve 19 so as to open the passage 12 between the main and auxiliary cylinders. The partially expanded gases are thus admitted to the auxiliary cylinder to act on the piston 14, which is at that moment at the inner end of its stroke so as to receive the full impact of the remaining energy in the gases, and at the same time the gases will enter the cylinder 6 through the port 13 and act upon the front side of the piston 7 to assist in the return stroke of the piston which compresses an additional charge for the next stroke. The gases having forced the piston 14 toward the open end of the cylinder 7, the cam 31 operates to unseat the valve 29, thus allowing the dead gases



within the cylinders 6 and 7 to escape to the outer air.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims.

Having thus fully described the invention, what is claimed as new is:—

An engine comprising a base and having a pair of cylinders integrally connected together and one in advance and to the side of the other, the rear or main cylinder having both of its ends closed, the auxiliary having its forward end open, the main cylinder being provided with a passage adjacent its outer

wall communicating with the auxiliary cylinder, a motive fluid inlet for this passage and a port adjacent this inlet communicating with the main cylinder, a valve seat within the passage, a spring pressed valve for this seat normally closing the passage between the fluid inlet and the auxiliary cylinder, the main cylinder having a port opposite the fluid inlet port communicating with the passage and with the auxiliary cylinder, a valve seat upon the outer wall of the auxiliary cylinder, a spring actuated valve for this seat, pistons within the cylinders, a crank shaft upon the base connecting said pistons, and means depending upon the rotation of the crank shaft for operating the valves of the main and the auxiliary cylinder in timed relation with each other.

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

MARTIN TSCHIMPERLE.

Witnesses:

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