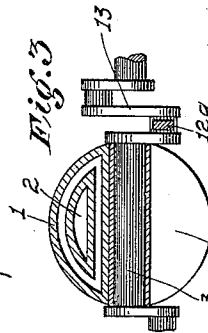
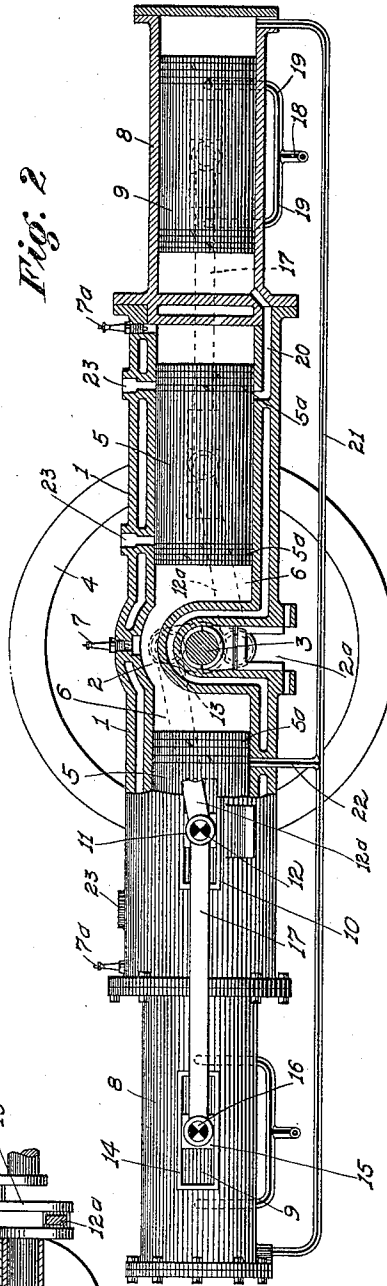
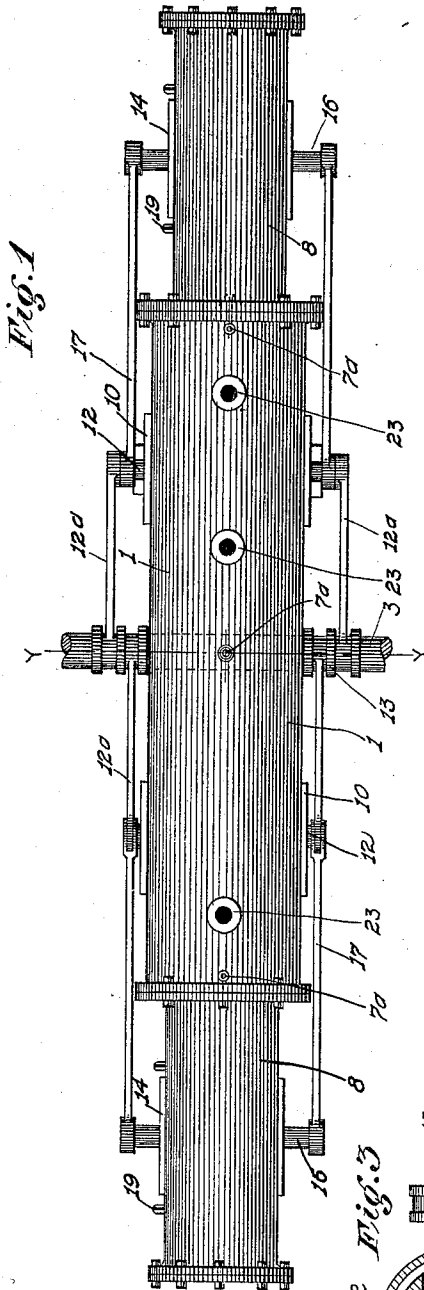


J. SHAW.  
EXPLOSIVE MOTOR.

APPLICATION FILED AUG. 12, 1911.

1,044,089.

Patented Nov. 12, 1912.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JAMES SHAW, OF SACRAMENTO, CALIFORNIA.

## EXPLOSIVE-MOTOR.

1,044,089.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed August 12, 1911. Serial No. 643,673.

*To all whom it may concern:*

Be it known that I, JAMES SHAW, a citizen of the United States, residing at Sacramento, in the county of Sacramento, State of California, have invented certain new and useful Improvements in Explosive-Motors; and I do declare the following to be a full, clear, and exact description of the same, 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 to the characters of reference marked thereon, which form a part of this application.

My invention relates to improvements in internal combustion engines and explosive motors using gas or carbureted air for fuel and its object is to produce an engine of this character which will have two cylinders connected by pipes, ducts or other suitable passages, in which cylinders will operate two opposed pistons forming two chambers where one impulse or explosion will be given to both pistons at one time and also the invention embodies further structure which will permit a simultaneous impulse or explosion to be given to each of said pistons at their outer ends in a simultaneous manner, the invention also embodying a compression means for compressing the explosive medium for the purpose of supplying the operating cylinders with the necessary explosive mixture and of forcing out the products of combustion.

A further object of the invention is to produce an engine which will give a maximum of power to a minimum of mechanism. It is also one which will be exceedingly inexpensive and simple and yet very effective in operation for the purposes for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

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

Figure 1 is a top plan view of the complete engine. Fig. 2 is a side elevation partly in section, showing the internal mechanism of the engine. Fig. 3 is a sectional view taken on a line Y—Y of Fig. 1.

Referring now more particularly to the characters of reference on the drawings, I first provide two operating cylinders 1—1

which may be cast in one body and provided with a central pipe, duct or other suitable passages 2, there being formed a recess 2<sup>a</sup> for the reception of a driven shaft 3 of the engine on which are mounted fly wheels 4. This shaft 3 may be journaled in boxes at each side of the engine or a suitable journal mechanism may be mounted within the recess 2<sup>a</sup> as may be found most desirable. Disposed within the cylinders 1 are two opposed pistons 5 have packing rings 5<sup>a</sup> at each end for the usual purposes. Between the pistons 5 are chambers 6 connected by the passage 2 in which chambers is formed one compressed charge, as hereinafter set forth, which, when ignited, forces or impels the said pistons in opposite directions and the pistons being connected on oppositely disposed cranks, as shown hereafter, this, by aid of the momentum of the fly wheel, gives the crank shaft 3 the necessary rotary motion. Mounted at each end of the cylinders 1 are auxiliary cylinders 8 having operating pistons 9 disposed therein. In the sides of the cylinders 1 are guide slots 10 disposed centrally on each side of the neutral position of the piston 5, there being cross heads 11 operating in said guides and connected with the pistons 5 by means of cross pins 12, such pins 12 being connected by rods 12<sup>a</sup> with oppositely disposed cranks 13 on the shaft 3, referred to above. Similarly in the sides of the cylinders 8 are guide slots 14 in which operate cross heads 15 connected with the pistons 9 by means of cross pins 16, such pins being connected with the pins 12 by means of rods 17. I further provide pipes 18 adapted to communicate with carbureters, there being one pipe for each of the cylinders 8, such pipe 18 having branches 19 communicating with the cylinder 8 at spaced points adapted to open into said cylinders 8 at their inner ends when the pistons 9 are in their outer positions and into the outer ends of said cylinders 8 when the pistons 9 are in their inner positions during operation. Thus when the pistons 9 are in their outer positions, which is at the same time that the pistons 5 are in their outer positions, the suction of the pistons 9 takes into the inner ends of the cylinders 8 the explosive medium through one of the branches 19 and then when the pistons 9 move to their inner positions, the pistons 5 moving likewise to their inner positions, this mixture is compressed in the inner ends

of the cylinders 8 and passes through passages 20 into the outer ends of the cylinders 1, these passages 20 having been opened by reason of the pistons 5 moving clear of the opening of said passages into said cylinders 1. Then when the pistons 5 again move outward they close the passages 20 and compress the mixture in the outer ends of cylinders 1 and the same is then exploded by means of suitable ignition structure. Vice versa, when the pistons 9 move to their inner positions, the explosive mixture is taken into their outer ends and then when the said pistons 9 move out again they compress this mixture and drive it through a pipe 21 to a pipe 22 communicating with the central chambers 6, this pipe 22 having been opened by reason of one of the pistons 5 moving away from it with its outward motion. Then with the inward motion of one of the pistons 5, this pipe 22 is closed and the mixture compressed within the cylinders 1 and passage 2 by both of the pistons 5, and when exploded by suitable ignition this gives an impulse against both of said pistons 5 with the one explosion.

The cylinders 1 are provided with exhaust ports 23 to permit the exhaust of the products of the combustion of each explosion, these ports being opened or closed as is required by the position of the pistons 5.

The numerals 7 and 7<sup>a</sup> designate the spark plugs inserted at the proper points in the motor.

While I have shown the pipe structure 18 and 19 for the purpose of intaking the explosive mixture into the cylinders 8, still of course, any structure or mechanism found suitable as an equivalent of this may be used in actual practice.

From the foregoing description it will readily appear that I have produced such a device as substantially fulfils the object of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention.

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

1. An engine of the character described comprising two main cylinders connected by passageways, an auxiliary cylinder connected at the outer end of each of said cylinders, a passage communicating from the inner end of each of said auxiliary cylinders

to the adjacent outer end of each of said main cylinders, means communicating from the outer end of each of said auxiliary cylinders to the inner end of one of said main cylinders, a piston operating in each of said main cylinders and forming gates for said communicating means, a pipe having branches communicating with each of said auxiliary cylinders, a piston in each of said auxiliary cylinders, means connecting said pistons in said main cylinders with said pistons in said auxiliary cylinders, an ignition means disposed centrally in the passageway connecting said main cylinders, an ignition means disposed at each outer end of said main cylinders, a driven shaft, and means connecting the pistons in said main cylinders with said driven shaft outside of said cylinders, said main cylinders being provided with exhaust passages, as described.

2. A motor of the character described comprising two main cylinders consisting of one cylindrical member having a central recess in its under side adapted to receive a crank shaft, the walls of such recess dividing said cylindrical member into said two main cylinders and forming a small passageway therebetween, an auxiliary cylinder connected at the outer end of each of said cylinders, a passage communicating from the inner end of each of said auxiliary cylinders to the adjacent outer end of each of said main cylinders, means communicating from the outer end of each of said auxiliary cylinders to the inner end of one of said main cylinders, a piston operating in each of said main cylinders and forming gates for said communicating means, a pipe having branches communicating with each of said auxiliary cylinders, a piston in each of said auxiliary cylinders, means connecting said pistons in said cylinders with said pistons in said auxiliary cylinders, an ignition means disposed centrally in the passageway connecting said main cylinders, an ignition means disposed at each outer end of said main cylinders, a driven shaft, and means connecting the pistons in said main cylinders with said driven shaft outside of said cylinders, said main cylinders being provided with exhaust passages, as described.

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

JAMES SHAW.

Witnesses:

JOSHUA B. WEBSTER,  
PERCY S. WEBSTER.