A. WINTON & H. B. ANDERSON.

MULTIPLE CYLINDER TWO-CYCLE EXPLOSIVE ENGINE.

APPLICATION FILED JAN. 24, 1908.

1,101,895. Patented June 30, 1914.

4 SHEETS—SHEET 1.

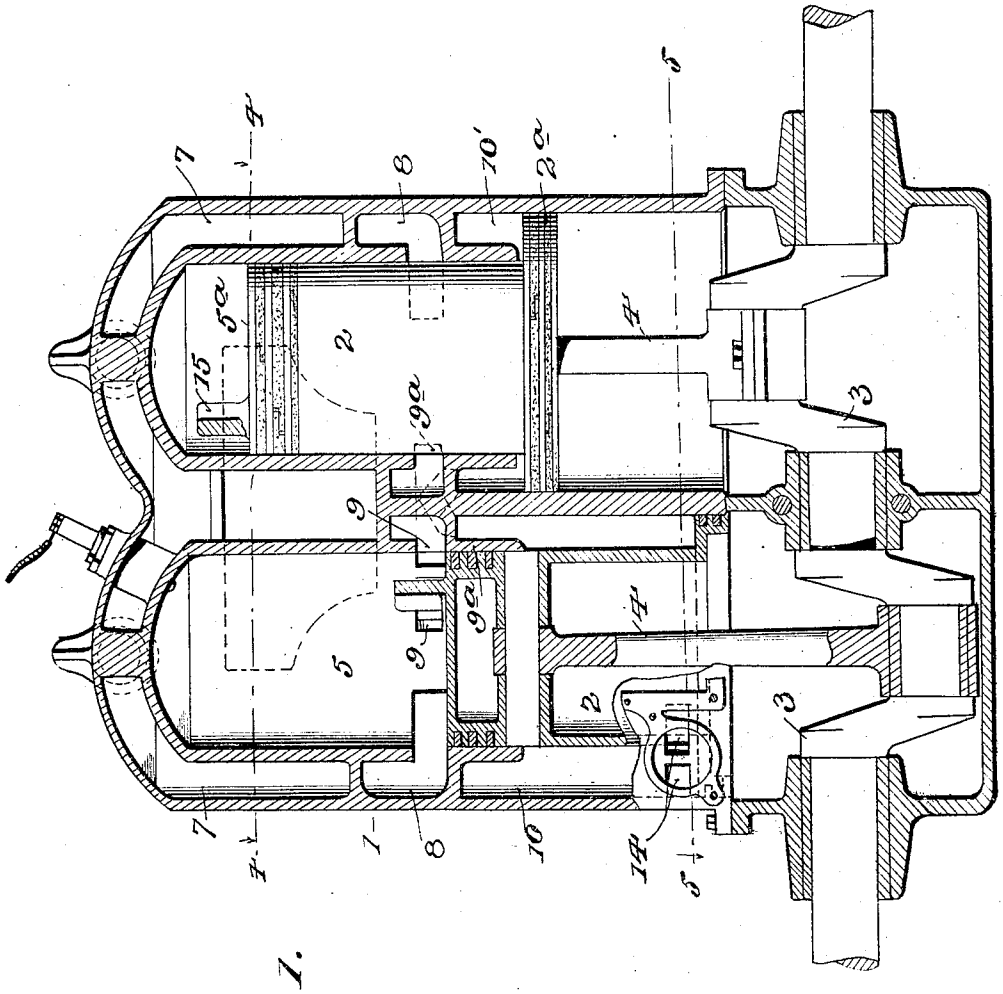

Fig. 1.

Witnesses

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Fig. 2.

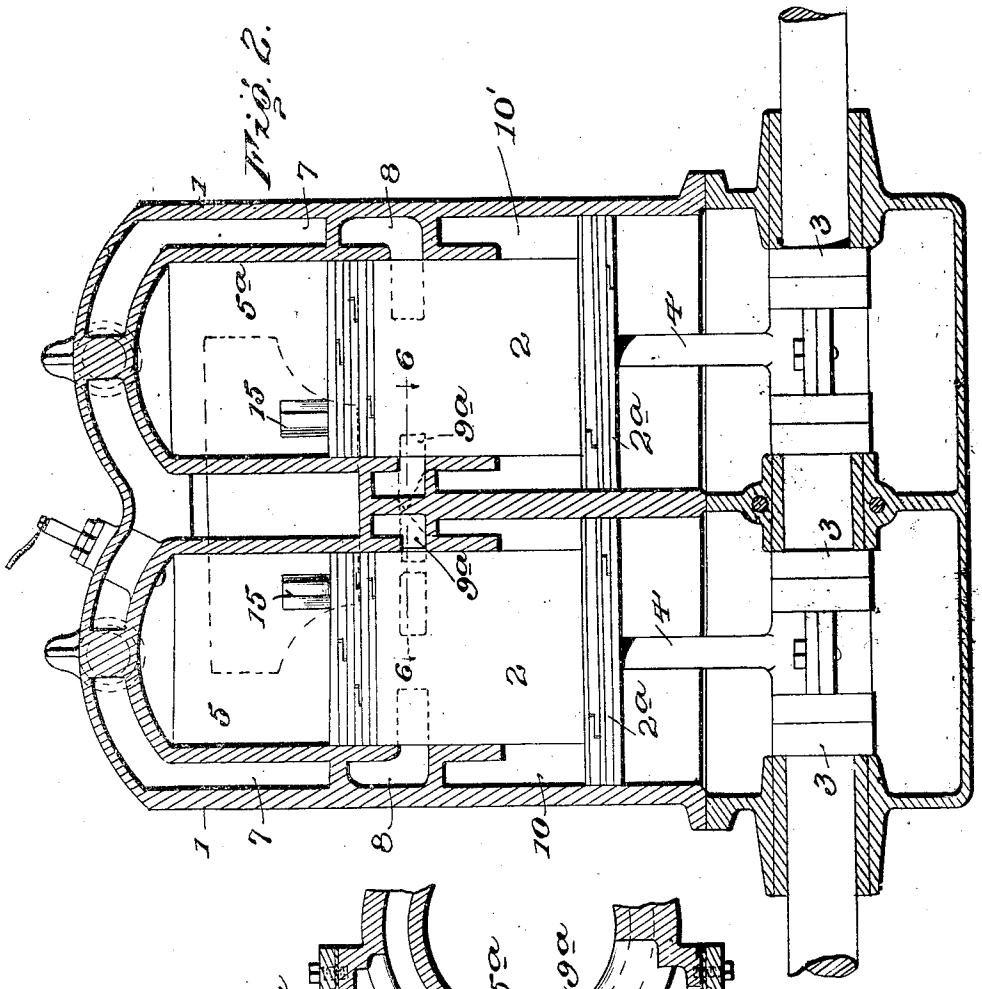
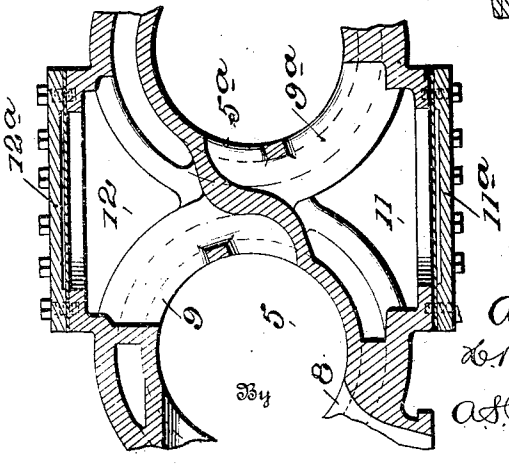


Fig. 6.



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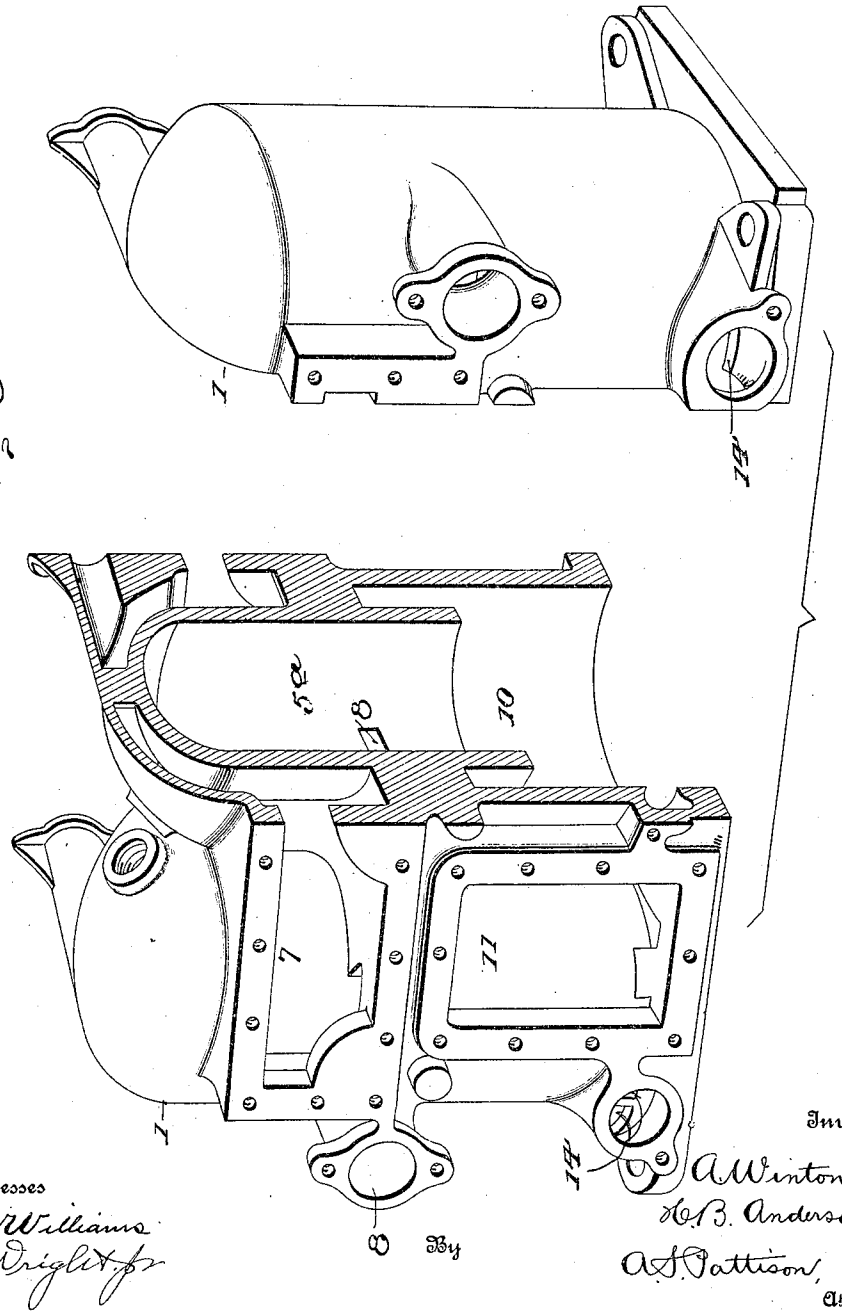
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

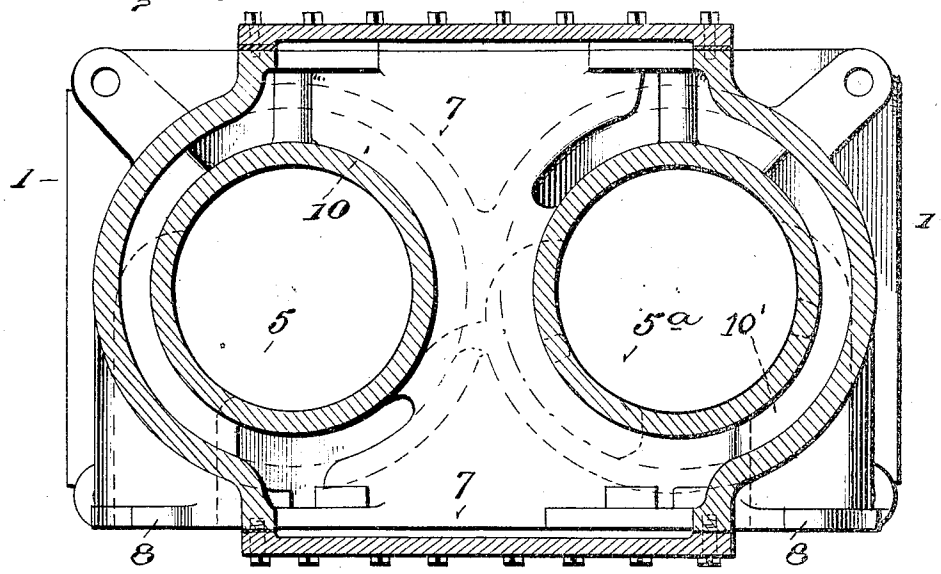
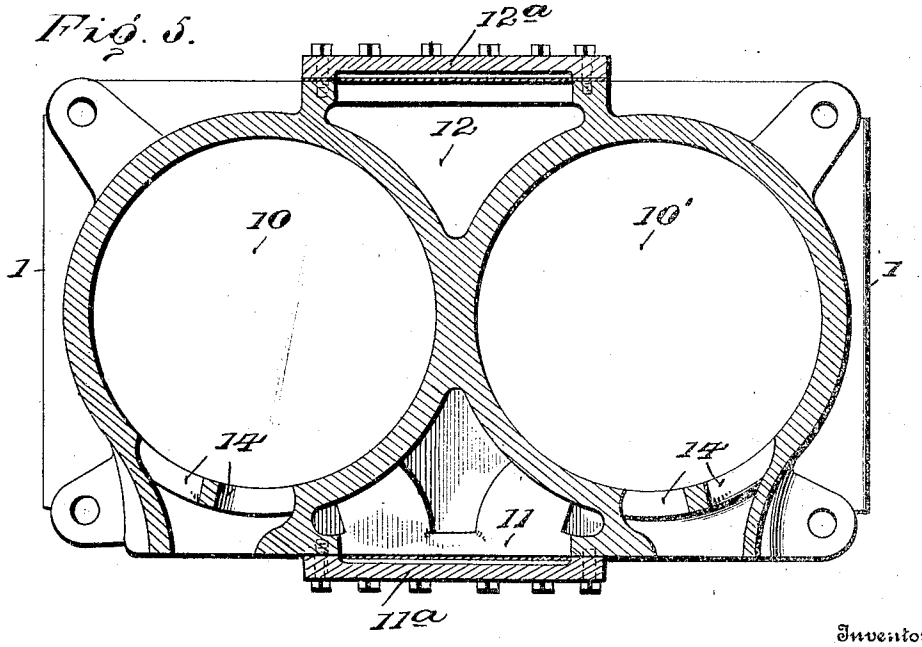


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-CYLINDER TWO-CYCLE EXPLOSIVE-ENGINE.

1,101,895. Specification of Letters Patent. Patented June 30, 1914.

Application filed January 24, 1908. Serial No. 412,504.

To all whom it may concern:

Be it known that we, ALEXANDER WINTON and HAROLD B. ANDERSON, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Multiple-Cylinder Two-Cycle Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in multiple cylinder two-cycle explosive engines, the improvement being such that a valveless twin two-cycle explosive engine is procured with all of its consequent advantages.

In carrying out this invention, there is provided a primary compressing cylinder for each explosion cylinder, and the end of the piston opposite the explosion end works in the primary compressing cylinder for the purpose of drawing in the charge through the carbureter, and forcing the charge into the explosion chamber of the other cylinder. The construction is such, furthermore, that there is provided for each primary compressing cylinder, a separate external chamber in communication therewith through large ports for the purpose of obtaining sufficient volume for the primary compression space, for the purpose of providing an increased volume of less density fed to the explosion cylinders with its consequent scavenging advantages.

In the accompanying drawings, Figure 1, is a central longitudinal view of our improved twin two-cycle explosive engine, one piston being shown elevated, and the other depressed. Fig. 2, is a similar view, the pistons being shown midway their strokes. Fig. 3, is a perspective view with one of the cylinders cut in two longitudinally and separated, showing in section the water jacket and the chambers in communication with the primary compressing cylinders. Fig. 4, is a longitudinal sectional view through the water chamber and taken on the line 4—4 of Fig. 1. Fig. 5, is a similar view on the line 5—5 of Fig. 1. Fig. 6, is a cross-sectional view on the line 6—6 of Fig. 2.

The invention as here illustrated, is applied to vertically-arranged cylinders, though the position of the cylinders may be varied without affecting the invention involved.

Referring now to the drawings, 1—1 indicate the two explosion cylinders, which are preferably located side by side, as here shown.

2 indicates the explosion pistons located in said cylinders, 3 the engine crank shaft, and 4 the pitmen which connect the pistons to the said crank shaft. Surrounding the explosion ends 5 and 5^a of the explosion cylinders, is the usual water-jacket or space 7, which is so well understood in this art that further description is unnecessary.

In carrying out our present invention, the pistons 2 serve to open and close the exhaust outlet passages 8 and the explosion cylinder inlets 9 and 9^a. It will be observed that the exhaust passages 8 are in a plane above or beyond the plane of the inlet passages 9, so that the exhaust will be opened in advance of the inlet. When the piston is in the downward limit of its movement, the exhaust passage 8 is open and also the inlet passage 9, as shown at the left-hand side of Fig. 1. As shown at the right-hand side of said figure, when the piston moves up both of these passage-ways are closed.

The explosion cylinder 5 is provided with a combined explosive supply or primary compressing cylinder 10, which is in communication with the explosion cylinder 5^a through a chamber 11, and the inlet passages 9^a (shown in dotted lines, Figs. 1 and 2). As shown in the same figures in dotted lines, the combined explosive supply or primary compression cylinder 10′ is in communication with the explosive cylinder 5 through the chamber 12 and the passage-ways 9^a. These passage-ways extend in opposite directions and span the space between the two cylinders, as shown in dotted lines in Figs. 1 and 2, but as shown in Fig. 6, these passage-ways do not communicate with each other.

Each of the pistons 2 is provided with a piston 2^a which fits respectively in the primary compression cylinders 10 and 12, and these pistons are formed by laterally-extending flanges on the outer ends of the pistons 2, as shown. It will be observed that these supply or primary compression cylinders are formed by bores of greater diameter than the diameter of the explosion cylinders, and that the pistons 2 form the inner walls of these compression cylinders. Each compression cylinder is provided at its outer end with a carbureter inlet 14 through which the

explosive compound from the carbureter is drawn into the primary compression cylinders. Attention is directed to the fact that the pistons 2^a also serve to open and close the carbureter inlets to the said primary compression cylinders. Each piston 2 is provided with a deflector 15 for the purpose of deflecting the charge fed into the explosion cylinder to the top end thereof, and thereby more effectively driving out the products of combustion.

For the purpose of convenience in having access to the chambers 11 and 12, they are preferably provided with removable covers 11^a and 12^a, and this is also for the purpose of enabling the cylinders to be cast, as will be readily understood by those skilled in the art of casting.

By reference to Fig. 5, it will be observed that these chambers 11 and 12, which are located respectively between and communicate with the primary compression cylinders 10 and 10′, and with the explosion cylinders 5 and 5^a, are located between the two cylinders, or in other words, in the space formed by the curved walls of the cylinders.

The operation of our improved twin two-cycle explosion engine is as follows:—The downward movement of the two respective pistons causes a vacuum to be formed in the primary compression cylinder, and its connected chamber 11 or 12 (as the case may be), so that when the piston 2^a passes below the carbureter inlet opening 14 (as shown at the left-hand side of Fig. 1) the explosive charge will rush in through this opening, entraining air through the carbureter, which makes the explosive mixture and fills the primary compression chamber and its connected intermediate chamber. When the pistons are in this position, as shown in Fig. 1, the inlet 9^a to the explosion cylinder 5^a is closed by its piston 2. The upward movement of the piston 2^a at the left of Fig. 1 will compress the explosive charge in the cylinder 10 and its chamber 12. As soon as the piston 2 of the explosion chamber 5^a passes below the inlet passage 9^a, the compressed charge rushes into the explosion chamber 5^a which scavenges the explosion chamber of the products of combustion, and also fills it with the explosive charge to be compressed in the explosive cylinder by the upward movement of the piston 2 therein in the usual way, after which the charge is exploded in a manner which is well understood by those skilled in the art, and will need no description here.

The object of the intermediate chambers 11 and 12 located between the primary compression cylinders 10 and 10′, and the inlets 9 and 9^a is to provide an increased volume of supply of less density in the primary compressing cylinders, so that a larger volume of less highly compressed charge is fed to the explosive cylinders so that the cylinders will be thoroughly scavenged and still contain a full charge of the explosive mixture to be compressed by the upward movement of the piston. It is found that this arrangement is exceedingly effective for the above-mentioned purposes, and it avoids the leakage which occurs around the crank-shaft when the explosive charge is drawn into the crank-case, which is the usual practice in two-cycle engines. It also provides a very effective way of providing a predetermined volume without being handicapped by the necessary requirements of the size and dimensions of a crank case.

We desire it to be understood that while we here show what we now consider the preferred arrangement and construction of parts, these may be varied without departing from the spirit and scope of our invention.

In carrying out our invention, we are not limited to the use of two cylinders, as here shown, for illustrating our improvement, but the number of cylinders may be increased, so long as one piston or cylinder is constructed to deliver the explosive charge to another cylinder in the series, and the parts combined to coöperate substantially as herein described.

Having thus described this invention, what is claimed and desired to be secured by Letters Patent, is:—

1. An improved two-cycle engine comprising two explosive cylinders arranged side by side, each cylinder having a primary compression cylinder located between it and the crank-shaft and of a larger circumference than the circumference of the explosive cylinder, pistons for the explosive cylinders having their lower ends provided with enlarged compression pistons, within the compression cylinders, each explosive cylinder provided with exhaust and inlet ports controlled by the pistons, each compression cylinder having a carbureter inlet at its outer end and controlled by the compression pistons, and plates secured to the sides of the cylinders and spanning the space between the cylinders and said plates, and forming two separate chambers not in communication, and each chamber having a communication with the compression end of one cylinder and the explosive end of the other cylinder.

2. An improved two-cycle engine, comprising a plurality of explosive cylinders side by side, each cylinder having a primary compressing end located adjacent the crank-shaft, and of a larger circumference than that of the explosive end of the cylinder, a piston for each explosive cylinder having its inner end provided with an enlarged compression piston, within the compression end of the cylinder, exhaust and inlet ports con-

trolled by the explosive pistons, plates secured to the sides of the cylinder and spanning the space between the cylinders and forming two enlarged separate chambers not in communication with each other but each chamber in direct communication with the compression end of one of the cylinders, and each chamber having a direct communication with the explosive end of the other cylinder by an opening in the wall of the cylinder, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

ALEXANDER WINTON.
HAROLD B. ANDERSON.

Witnesses:
O. F. BAUGHMAN,
AMOS S. NEWTON.