W. W. WELLS.

EXPLOSIVE ENGINE.

APPLICATION FILED JUNE 17, 1910.

1,001,485.

Patented Aug. 22, 1911.

2 SHEETS—SHEET 1.

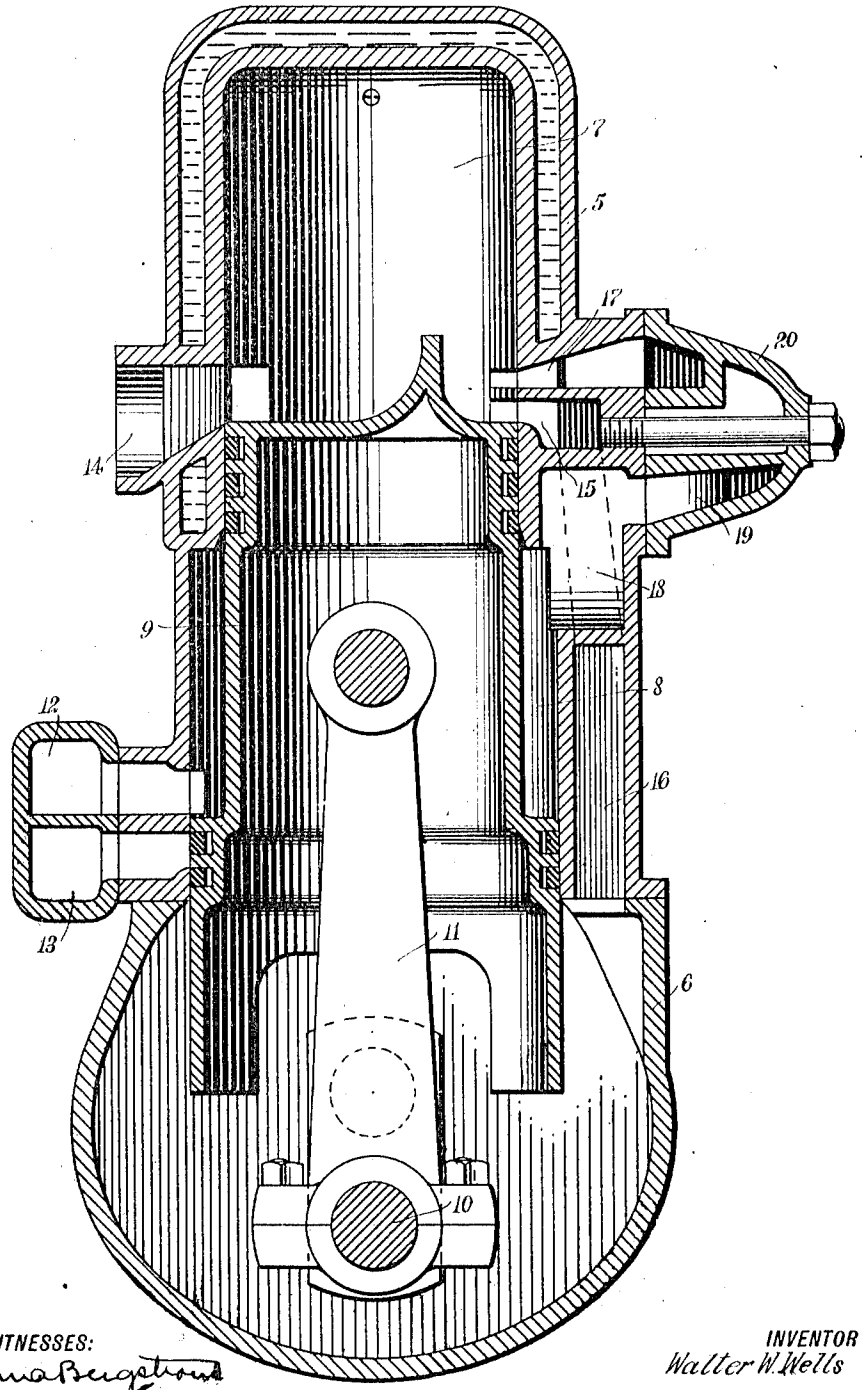

Fig. 1.

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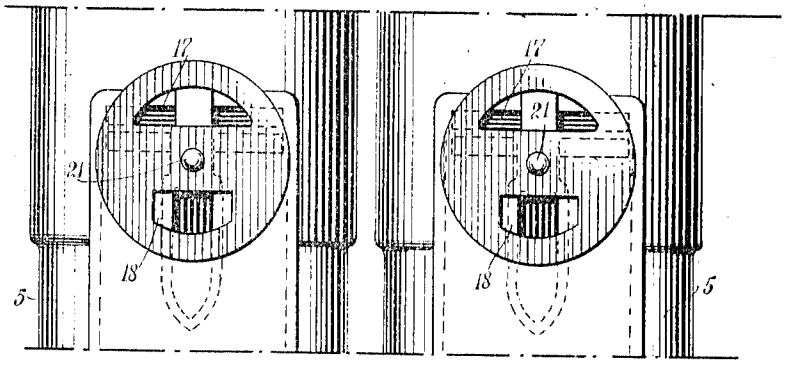

Fig. 2

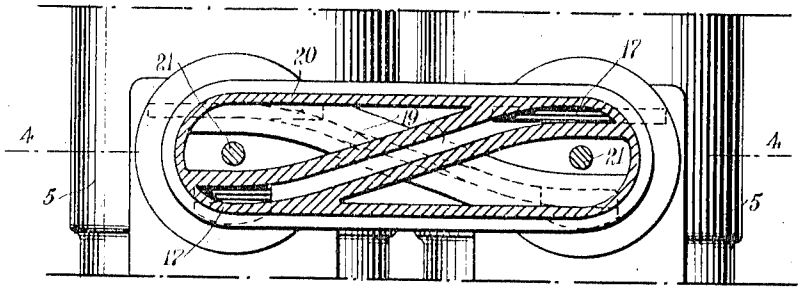

Fig. 3

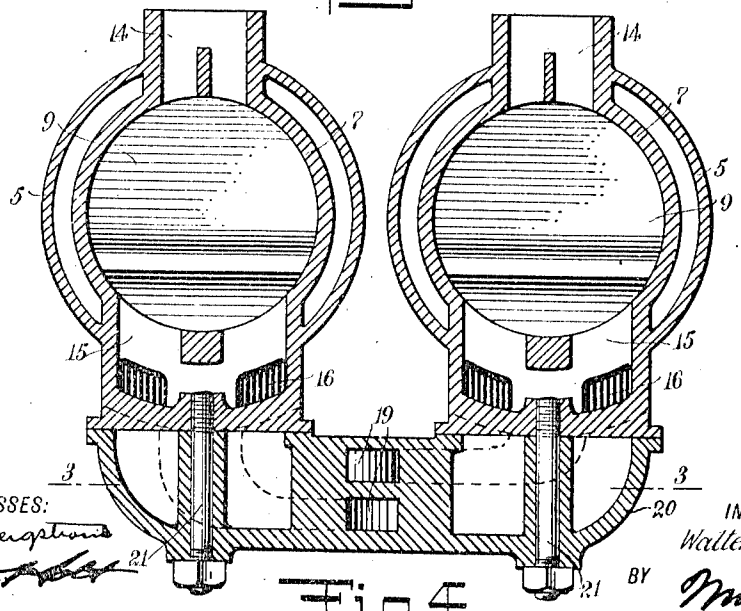

Fig. 4

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UNITED STATES PATENT OFFICE.

WALTER W. WELLS, OF CLYDE, OHIO.

EXPLOSIVE-ENGINE.

1,001,485. Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed June 17, 1910. Serial No. 567,369.

To all whom it may concern:

Be it known that I, WALTER W. WELLS, a citizen of the United States, and a resident of Clyde, in the county of Sandusky and State of Ohio, have invented a new and Improved Explosive-Engine, of which the following is a full, clear, and exact description.

The invention is an improvement in multiple-cylinder explosive engines, particularly engines in which the cylinders are arranged in pairs and are coöperative with each other in the introduction of scavenging air preparatory to the admission of the explosive charge.

The invention has in view an engine of this character of simple construction, in which the working pistons perform the offices of separately compressing the air and explosive mixture and controlling their admission to the explosion chamber without supplementary cylinders and pistons or valves for this purpose, each cylinder of the engine having an explosion chamber and an air compression chamber in which the single piston works, and each explosion chamber having separate inlets for the air and for the explosive mixture, and a separate exhaust outlet, with the inlets arranged to be uncovered by the piston in successive order, and with the air compression chamber of each cylinder connecting with the air inlet of the other cylinder, and the crank case of each cylinder connecting with the explosive mixture inlet of the same cylinder.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a central vertical section through one of the cylinders of an explosion engine constructed in accordance with my invention, the piston being shown in the position for the exhaust and admission of the explosive charge; Fig. 2 is a side view of the upper portion of the engine, with the port case for the scavenging air removed; Fig. 3 is a section on the line 3—3 of Fig. 4; and Fig. 4 is a section on the line 4—4 of Fig. 3.

For the purpose of illustrating the preferred character of my invention I have shown an engine of the two-cycle type having the cylinders 5, 5, arranged one in advance of the other, each cylinder having the customary crank case 6, and having an explosion chamber 7 and an air compression chamber 8, the air compression chamber being arranged adjacent to the crank case and relatively larger in diameter than the explosion chamber, thus forming what is commonly known as a differential area cylinder. Within each cylinder is a working differential area piston 9, fitting within the two chambers, the pistons of the two cylinders being connected to the cranks 10 in the usual manner, as by pitmen 11, which cranks are arranged in the respective crank cases and reversely positioned, the crank of one cylinder being at an angle of 180° to the crank of the other cylinder.

Connecting with the enlarged portion of the cylinder or air compression chamber, is an air inlet 12 and a gas inlet 13, the latter being arranged below the former and ordinarily leading from the carbureter, with the air inlet arranged to be uncovered at the terminus of the down stroke of the piston, and the gas inlet uncovered only upon the completion of the up stroke of the piston, thus alternately placing these inlets in respective communication with the air compression chamber 8 and crank case 6. The explosion chamber 7 is provided with the usual exhaust port 14, and the admission or inlet port 15, for the explosive charge, this port, as is the general practice, connecting with the crank case through a passage 16, extending between the walls of the cylinder. The explosive chamber is also provided with an air inlet port 17, which is arranged to be uncovered by the piston in its down or working stroke immediately before the uncovering of the inlet 15, the latter being in full communication with the explosion chamber when the piston has reached the limit of its down stroke, this being also true of the exhaust port 14, which is uncovered by the piston at or about the same time as the air admission port 17. The air compression chamber 8 of each cylinder communicates with the air admission inlet 17 of the opposite cylinder, for which purpose each air compression cylinder discharges at a point at or near the top, into a passage 18, between two branches of the passage 16, within the walls of the cylinder, the passage 18 connecting with one of the ports 19 of a port case 20, leading to the air inlet 17 of the other cylinder. The port case 20 is removably applied to the projecting port seats of

the cylinders, preferably by bolts or studs 21, which are centrally threaded into these seats and pass to the outside of the case between the ports 19. By reason of the same arrangement of the air and explosive charge inlets prevailing for both cylinders, the ports 19 extend from the lower portion of the case at one side to the upper portion of the case at the opposite side and intersect at the center of the case.

With the engine thus constructed, toward the end of the down or working stroke of one of the pistons, the air admission port 17 of the cylinder in which the piston is working is uncovered, allowing the air which has been compressed in the air compression chamber of the other cylinder to rush into the explosion chamber and sweep the burned gases out through the exhaust. Immediately after this takes place the inlet for the explosive charge is uncovered and the explosive mixture which has been compressed in the crank case of the same cylinder is admitted into the explosion chamber. At this period of the piston action, the air inlet 12 is uncovered, which allows the air at atmospheric pressure to freely pass into the air compression chamber 8. On the up or return stroke of the same piston, the charge is compressed in the usual way, and the air admitted to the air compression chamber compressed, and released into the explosion chamber of the other cylinder just before the piston of this cylinder completes its working stroke. In this manner each explosion chamber of the engine is thoroughly clarified in alternate order after each complete cycle.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In an explosive engine, the combination of two cylinders, each cylinder having an explosion chamber and an air compression chamber, a crank case in connection with each cylinder, a piston in each cylinder working in both its chambers, each explosion chamber having separate inlets for air and for the explosive mixture, and a separate exhaust outlet, the exhaust outlet of each explosion chamber controlled by its respective piston and the air inlet and explosive mixture inlet arranged to be uncovered by the piston in successive order, the air compression chamber of each cylinder connecting with the air inlet of the other cylinder, and the crank case of each cylinder connecting with the explosive mixture inlet of the same cylinder.

2. In an explosive engine, the combination of two cylinders, each cylinder having an explosion chamber and an air compression chamber, a piston in each cylinder working in both its chambers, each explosion chamber having separate inlets for air and for the explosive mixture, and a separate exhaust, the inlets arranged to be uncovered by the piston in successive order, and the exhaust outlet for each explosion chamber controllable by the piston of that chamber and arranged to be uncovered by the piston at the time the inlets are uncovered, and the air compression chamber of each cylinder connecting with the air inlet of the other cylinder.

3. In an explosive engine, the combination of two cylinders, each cylinder having an explosion chamber and an air compression chamber, a crank case in connection with each cylinder, a working piston in each cylinder, fitting within both the chambers, each explosion chamber having separate inlets for air and for the explosive mixture, and a separate exhaust outlet, the air inlets and explosive mixture inlet arranged to be uncovered by the piston in successive order, a second air inlet and a second explosive mixture inlet leading to each cylinder, with each second air inlet arranged to be uncovered by the piston when the latter is at its down stroke, and communicate with the air compression chamber, and each second explosive mixture inlet arranged to be uncovered by the piston when the latter is at its upper or compression stroke, and communicate with the crank case, the air compression chamber of each cylinder connecting with the first-named air inlet of the other cylinder, and the crank case of each cylinder connecting with the explosive mixture inlet of the same cylinder.

4. The combination of two differential area cylinders having differential area pistons, the piston of each cylinder forming in connection therewith an explosion and an air compression chamber, each cylinder having a crank case arranged adjacent to its air compression chamber and provided with separate air and explosive mixture inlets arranged to be respectively placed in communication with the air compression chamber and crank-case under the control of the piston, each explosion chamber having separate inlets for air and for the explosive mixture, and a separate exhaust outlet, a passage leading from the crank-case of each cylinder to the explosive mixture inlet of the same cylinder, a port case having crossed passages connecting with the respective air inlets of the cylinder, and a passage leading through the wall of each cylinder from its respective air compression chamber to the passage leading to the air inlet of the other cylinder.

5. The combination of two differential area cylinders having differential area pistons, the pistons of each cylinder forming in connection therewith an explosive and an air compression chamber, fuel compression chambers having fuel admission inlets, the

air compression chambers having air inlets, and ports for introducing the compressed air of each compression chamber of each cylinder into and to scavenge the explosion chamber of the opposite cylinder, with all of said inlets and ports controlled by the said pistons.

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

WALTER W. WELLS.

Witnesses:
JOSEPH R. WARNER,
JAS. S. BECKER.