H. R. SIEVERKROPP.

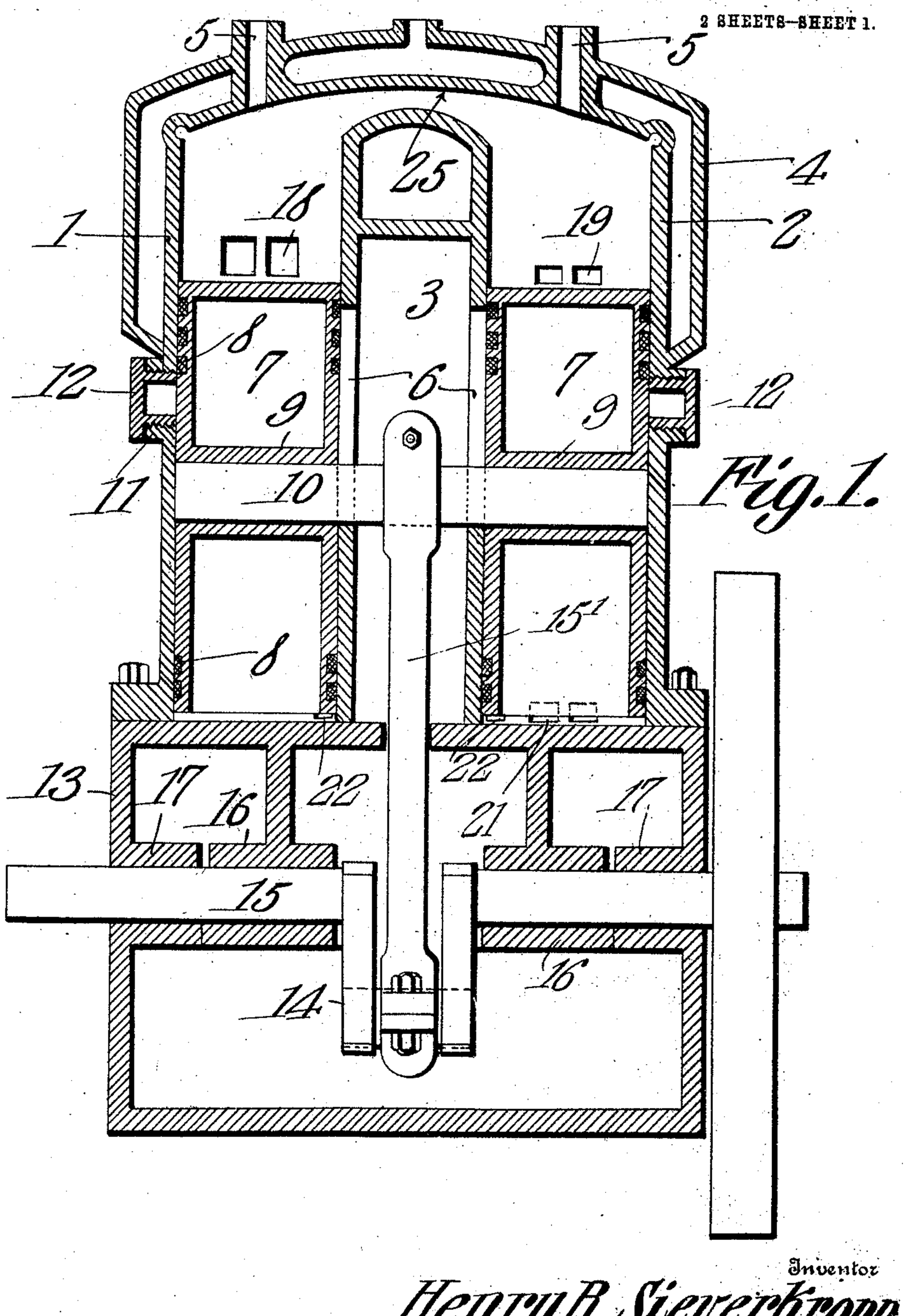
TWO-CYCLE EXPLOSION ENGINE.

APPLICATION FILED OCT. 11, 1909.

979,040.

Patented Dec. 20, 1910.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

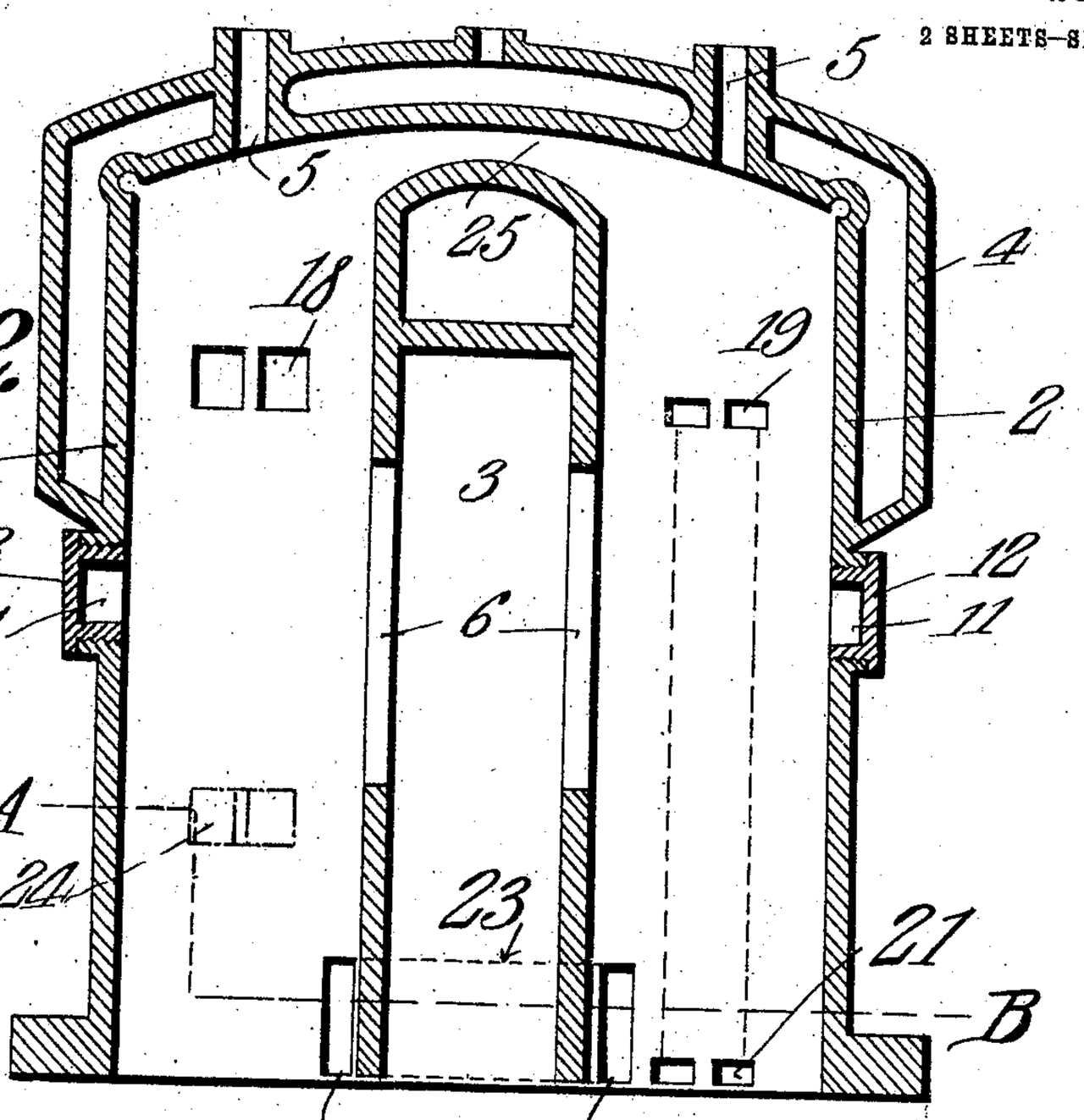
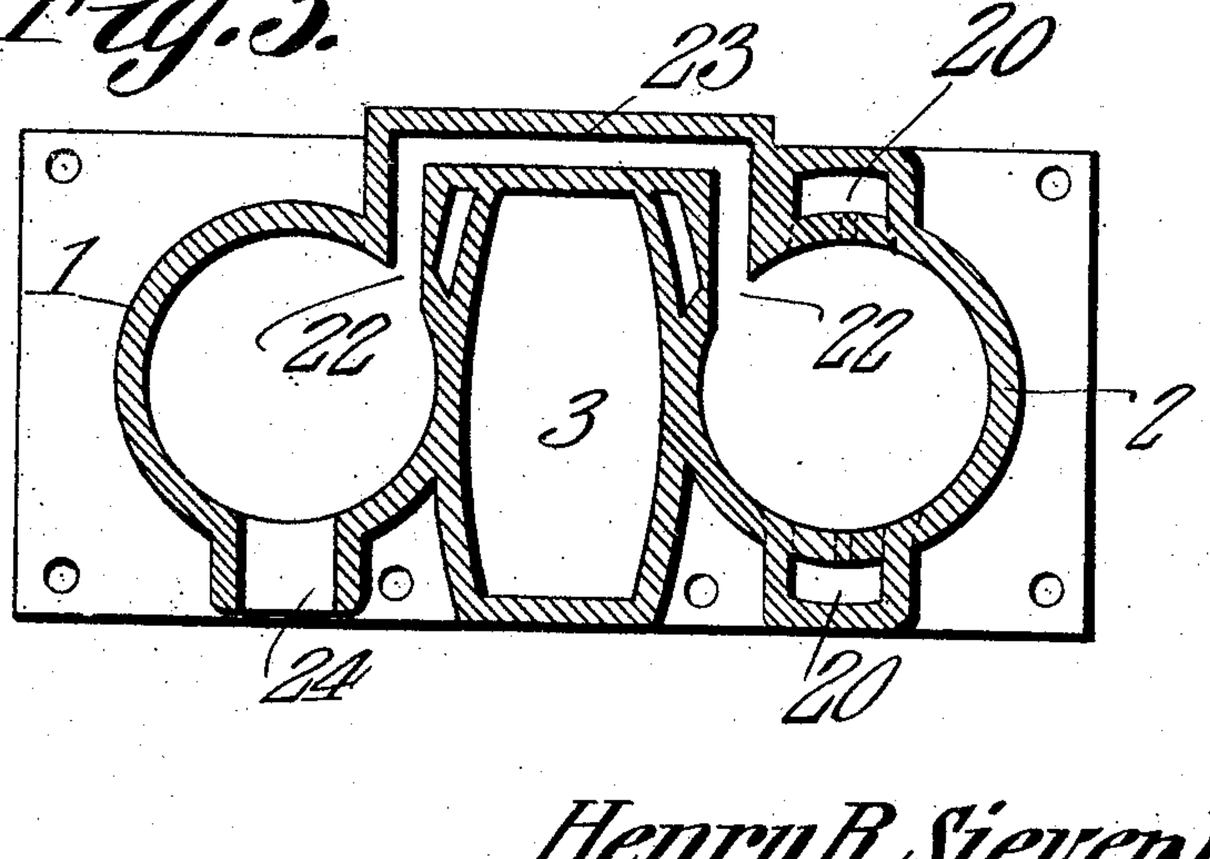


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY R. SIEVERKROPP, OF DAVENPORT, IOWA.

TWO-CYCLE EXPLOSION-ENGINE.

979,040. Specification of Letters Patent. Patented Dec. 20, 1910.

Application filed October 11, 1909. Serial No. 522,029.

To all whom it may concern:

Be it known that I, HENRY R. SIEVERKROPP, a citizen of the United States, residing at Davenport, in the county of Scott and State of Iowa, have invented a new and useful Two-Cycle Explosion-Engine, of which the following is a specification.

This invention has reference to improvements in explosion engines and more especially two cycle explosion engines, and it is the object of the present invention to improve the scavenging action of an engine of this type, to eliminate the crank case intake and compression and to avoid waste of the fresh charge by escape of the same through the exhaust port. Furthermore the improved engine eliminates the necessity of stuffing boxes and the construction is such that but one pitman is needed for two pistons.

In accordance with the present invention there are provided two cylinders spaced apart, but if desired formed in one casting and within the cylinders work pistons connected together for simultaneous action by a pin to which is connected one end of the pitman while the other end of the latter is connected to the crank of the power shaft of the engine.

The interior of the cylinders has no connection with the crank case, but there is provided an arrangement of ports and connecting conduits whereby the ends of the cylinders remote from the explosion chamber constitute compression chambers from which the air or a suitable explosive mixture after compression is conducted to the explosion end of one of the cylinders and will flow into the other cylinder by a constantly open passage between the explosion ends of the two cylinders, while the exhaust port for the engine is located in the cylinder other than the one into which the explosive mixture or the air under compression flows.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings—

Figure 1 is a central section through the engine in the plane of the longitudinal axis of the power shaft, the sectional plane also coinciding with the central longitudinal axes of the cylinders. Fig. 2 is a section similar to the section of Fig. 1 but omitting the crank case and the pistons and pitman. Fig. 3 is a section on the line A—B of Fig. 2.

Referring to the drawings there is shown an engine having two cylinders 1, 2, which may be formed in one casting but are spaced apart to provide an intermediate chamber 3, preferably though not necessarily closed at the portions not closed in by the cylinders. The explosion chamber end of the cylinders is provided with a suitable water-jacket, 4, the construction of which does not enter into the present invention and need not be specifically described. The head of each cylinder is entered by a passage 5 for the insertion into the cylinder of a suitable spark plug or other type of igniter, but as this forms no part of the present invention, the igniter has been omitted from the drawings.

Leading from the interior of each cylinder 1, 2, to the interior of the chamber 3 is a slot 6 extending longitudinally of the cylinder and one slot matching the other. In each cylinder there is a piston 7 of the trunk type except that it may be more elongated than the usual piston of explosion engines while packing rings 8 are provided near the closed end of the piston and also near the open end thereof. The piston is of such length as to always maintain the slots 6 of the respective cylinders closed to the explosion end or the other end of the cylinder.

Extending diametrically through each piston at a point about intermediate of its ends is a cylindrical web 9 having a passage therethrough diametrical to the respective pistons. this passage being for the purpose of receiving the corresponding end of the pin 10 extending through each piston and through the intervening space of the chamber 3, the pin 10 also extending through the slot 6. For the purpose of introducing the pin passages 11 may be made at appropriate points but in matching relation to the outer walls of the two cylinders 1, 2, and while not absolutely essential these passages may be closed by suitable plugs 12, or any other form of closure adapted to the purpose may be used.

The cylinders 1, 2, may be mounted on a suitable base 13 inclosing a chamber in which is housed the crank 14 of a crank shaft 15, suitable bearings 16, 17, being provided for each end of the crank shaft. The base 13 may be of any of the ordinary types

and is so formed as to close the ends of the cylinders 1, 2, remote from the explosion chamber ends thereof. A pitman 15′ connects the pin 10 to the crank 14.

In the explosion chamber end of the cylinder 1 is an exhaust port 18 so located as to be uncovered by the piston 7 in the cylinder 1 as it approaches the completion of its power stroke. In the explosion end of the cylinder 2 is a port 19 so located as to be uncovered by the piston 7 in the cylinder 2 on the completion of its power stroke. The port 18 is however of greater length in the direction of the longitudinal axis of the cylinder 1 than is the port 19 in the cylinder 2 so that on the forward stroke of the respective pistons, the port 18 will be unclosed before the port 19 is unclosed.

In the drawings there are shown conduits 20, one on each side of the cylinder 2 and each leading from a port 19 to another port 21 at the end of the cylinder 2 remote from the explosion chamber end thereof. While in the drawings only one port 19 and one port 21 are shown, two conduits 20 are indicated and it will be understood that two ports 19 and two ports 21 are also provided on opposite sides of the cylinder 2.

The ends of the cylinders remote from the explosion chamber ends thereof are provided each with a port 22 connected by a conduit 23. The cylinder 1 is also provided at an appropriate point so as to be uncovered by the piston within the cylinder when at the completion of its compression stroke, with a port 24 which may constitute a simple air inlet or may be connected to a suitable pipe or conduit leading from a carbureter or other source of explosive mixture.

Let it be assumed that the pistons 7 are at the completion of the compression stroke and that the port 24 has been uncovered. Since during the greater portion of the movement of the pistons on the compression stroke the ports 19 have been closed and the port 24 is also closed there is created within the ends of the cylinders 1 and 2 remote from the explosion chamber ends, a partial vacuum so that when the port 24 is uncovered there is an inrush of air or explosive mixture as the case may be which quickly distributes through the corresponding ends of the two cylinders because of the connecting conduit 23 and ports 22. The compressed explosive charge has become equalized through the explosion chamber ends of the cylinders 1 and 2 because of a common connecting passage 25 at this end of the structure, this passage being unobstructed or free between the two cylinders.

In order that the compressed charge may be thoroughly ignited there is provided an igniter for each cylinder, although one single igniter would answer because of the free communication between the explosion chambers of the two cylinders by way of the passage 25. Now on the ignition of the charge the pistons are driven simultaneously toward the other ends of the cylinders on the power stroke and the movement is imparted through the pin 10 and pitman 15′ to the crank shaft causing the latter to turn in the usual manner. The power stroke of the piston in cylinder 1 quickly closes the inlet port 24 and the air or charge imprisoned in the forward ends of the cylinders becomes compressed because of the movement of the pistons 7 toward such ends of the cylinders. Before the power stroke is completed the piston in cylinder 1 uncovers the exhaust port 18 and a portion of the gases of combustion find their escape therethrough before the ports 19 in the cylinder 2 are uncovered. When this takes place there is an intermediate inrush of the fresh charge through the ports 19 driving out before it the burned gases within the cylinder 2 and forcing the latter through the passage 25 into the explosion chamber end of the cylinder 1 and out through the now enlarged exhaust port 18. By the time this has occurred and before any of the fresh charge can escape through the exhaust port 18 the latter has been again closed by the compression stroke of the piston within the cylinder 1.

The engine continues to run in the same manner as an ordinary two-cycle engine but with increased power because of the twin pistons moving simultaneously in the same direction while the comparatively long distance necessary for the inrushing charge to travel before it can reach the exhaust port causes it to thoroughly scavenge both cylinders without any material portion of the fresh charge escaping through the exhaust port or any material portion of the burned gases remaining in the explosion chambers to dilute the fresh charge. Furthermore the compression chambers have less capacity than is the case where the crank case is utilized for the compression of the fresh charge or of the air to be mixed with the fuel and consequently a higher initial compression of the incoming charge or air is accomplished and consequently the charge is injected into the explosion chambers with greater force and the scavenging action is more thorough than with the ordinary type of two-cycle engines.

So far as the action of the engine is concerned, the crank case 13 may be open to the atmosphere or may be entirely omitted, but it is usually desirable to inclose the crank to make the engine cleanly, to provide for the splash lubrication of the crank bearings and to prevent exposure of moving parts more than is absolutely necessary. All moving parts of the engine are inclosed except the ends of the power shaft carrying the balance wheel and drive pulley and in

most cases both the balance wheel and pulley may be at the same end of the shaft and under these circumstances the other end of the shaft may be covered.

What is claimed is:

1. An explosion engine having like cylinders in parallel relation, said cylinders being spaced apart and intercommunicating at each end, with both ends of each cylinder normally closed to the atmosphere and the two cylinders at the adjacent walls each having a longitudinal slot matching that of the other cylinder, pistons in the cylinders, a connecting member for the pistons traversing the slots in the cylinders, an inlet port in one cylinder controlled by one end of the piston in the said cylinder, an exhaust port in the same cylinder controlled by the other end of said piston, a port at the power end of the other cylinder controlled by the piston in said other cylinder, the last named port communicating with the end of the same cylinder remote from the power end, a base or support for the cylinders, a crank shaft mounted in said base, and a pitman between the crank shaft and the connecting member for the pistons, the base constituting a closure for the corresponding ends of the cylinders where engaging said cylinder ends.

2. An explosion engine having like cylinders in parallel relation, said cylinders being spaced apart and inter-communicating at each end, with the ends of the cylinders normally closed to the atmosphere, pistons in the cylinders connected for movement simultaneously in the same direction, an inlet port in one cylinder controlled by one end of the piston in said cylinder, an exhaust port in the same cylinder controlled by the other end of said piston, and a port at the power end of the other cylinder controlled by the piston in the said other cylinder, the last named port communicating with the end of the same cylinder remote from the power end.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

HENRY R. SIEVERKROPP.

Witnesses:
I. P. SCHWARZ,
J. H. KERKER.