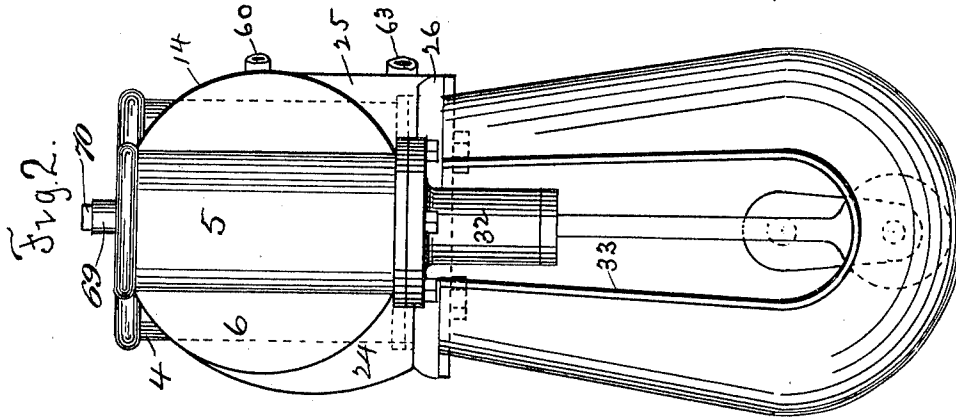
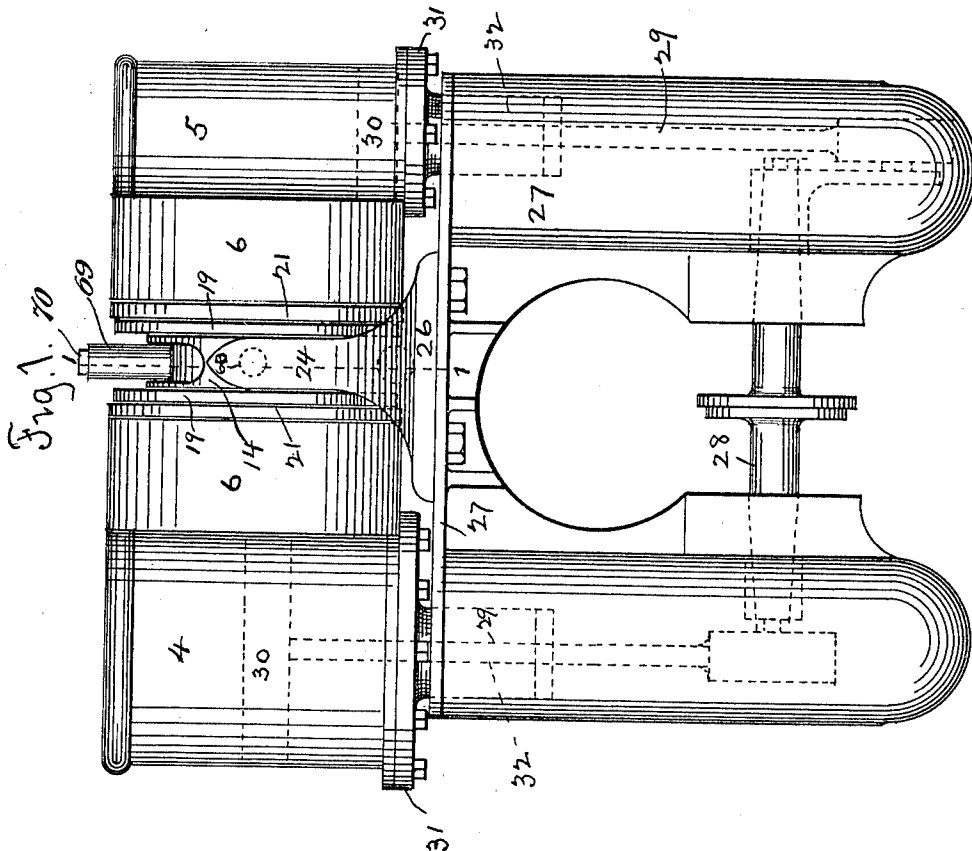


P. L. CROWE.
OSCILLATING ENGINE.
APPLICATION FILED JULY 16, 1909.

1,066,470.

Patented July 8, 1913.

4 SHEETS—SHEET 1.



Witnesses:
P. Barritt
N. Loe

Inventor
Paul L. Crowe

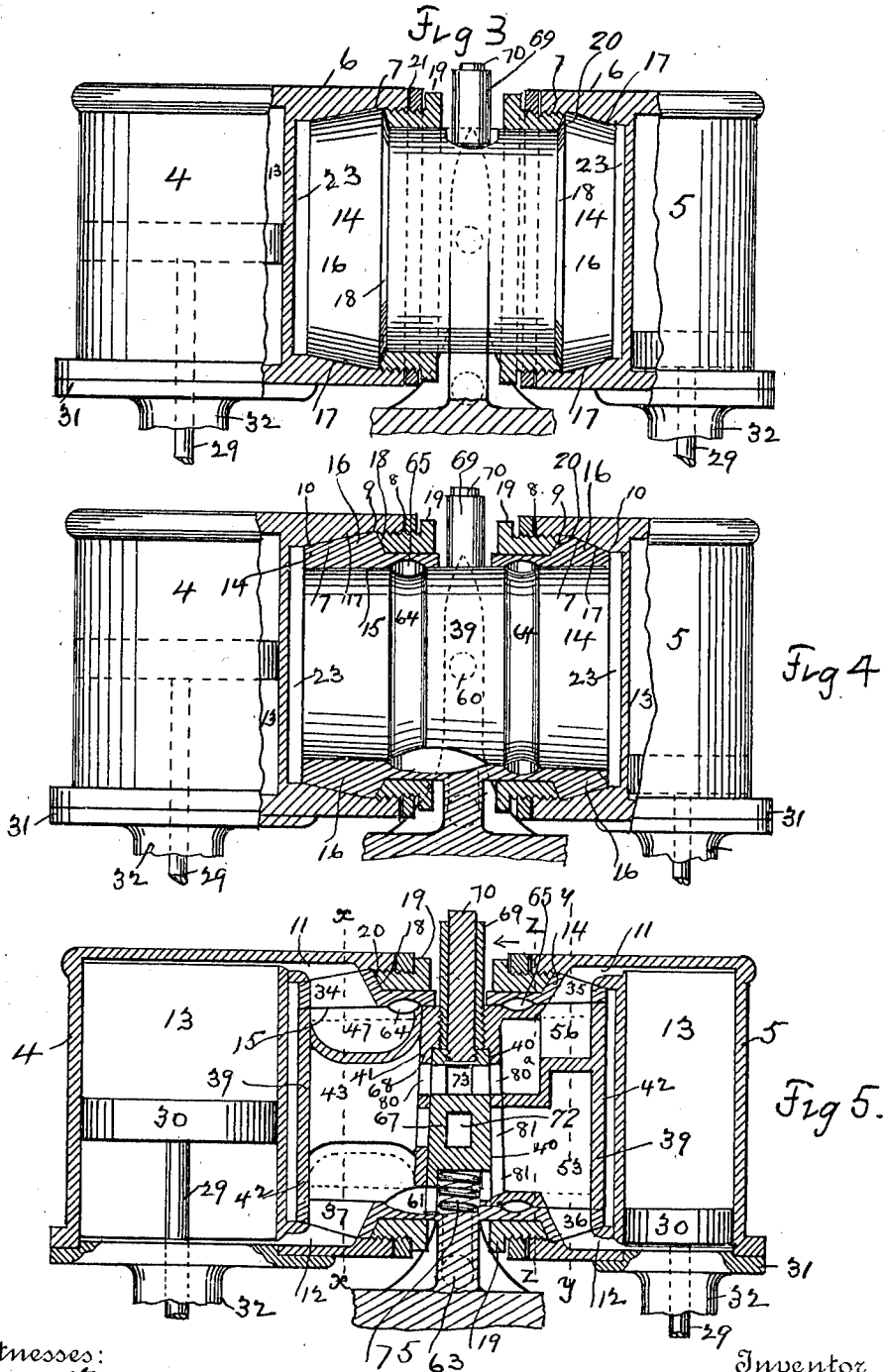
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4 SHEETS—SHEET 2.



Witnesses:
C. Garrett.
H. Case

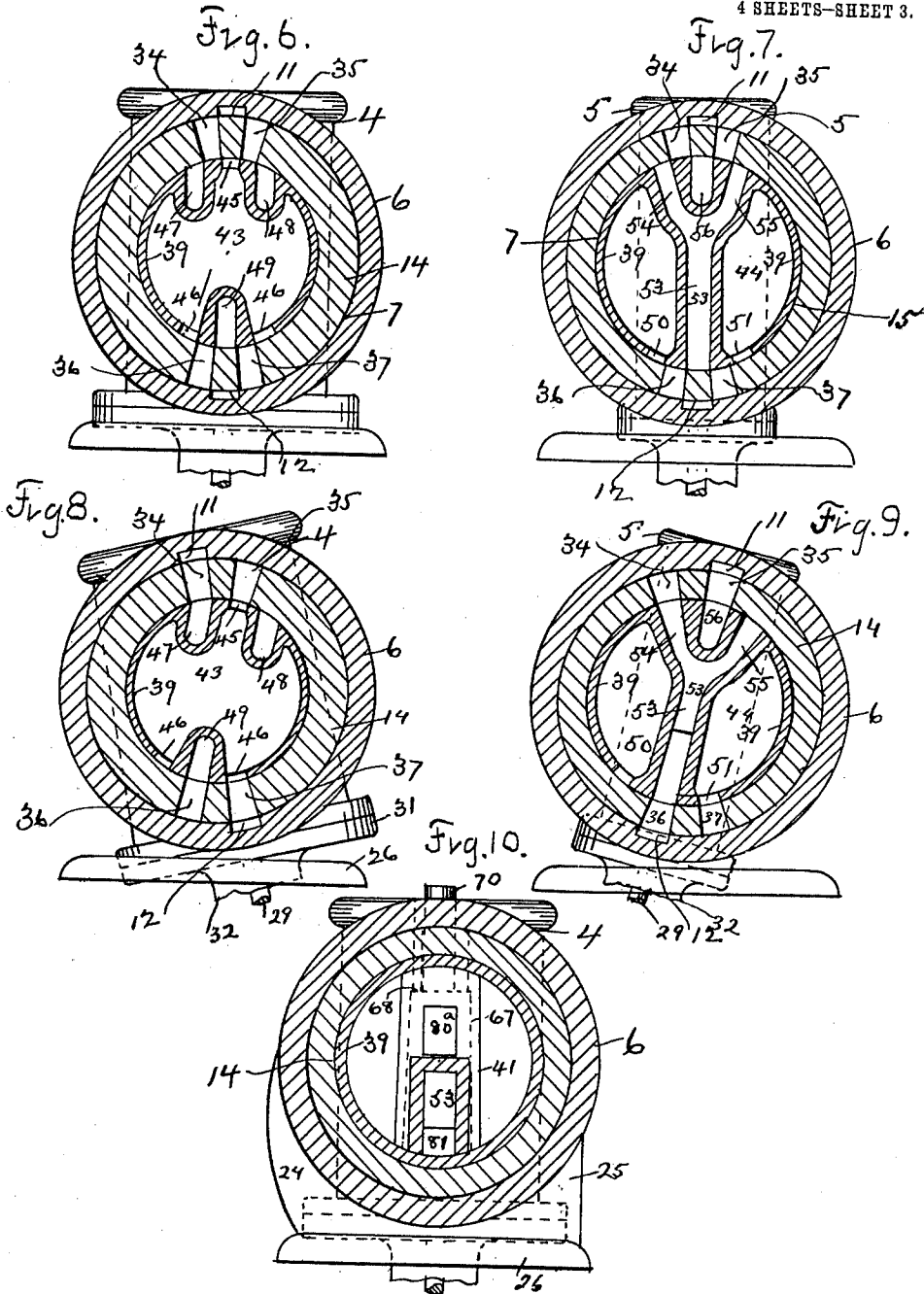
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4 SHEETS—SHEET 3.



Witnesses:
T. Barnett
H. T. Lee

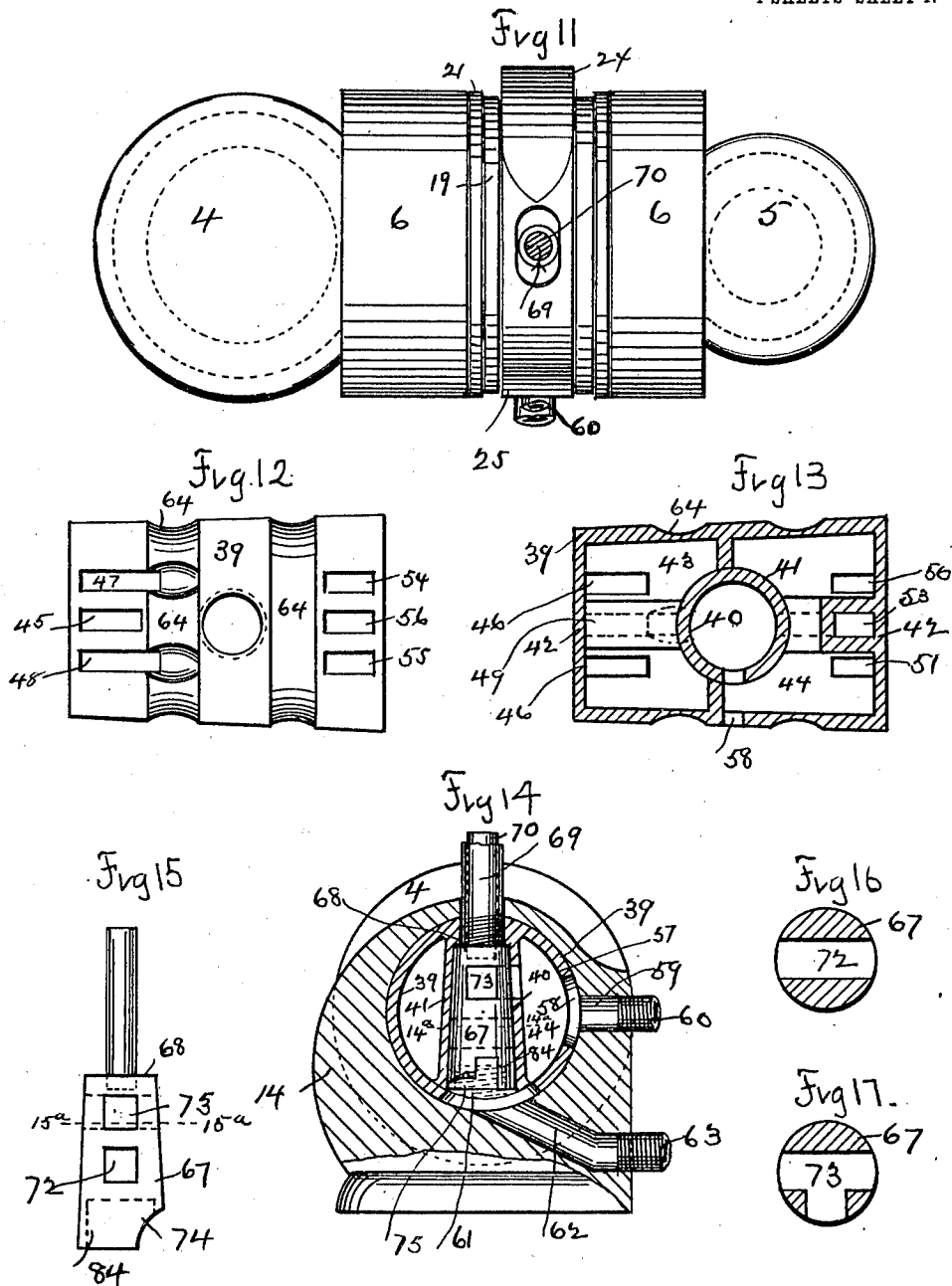
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UNITED STATES PATENT OFFICE.

PAUL L. CROWE, OF JERSEY CITY, NEW JERSEY.

OSCILLATING ENGINE.

1,066,470.

Specification of Letters Patent.

Patented July 8, 1913.

Application filed July 16, 1909. Serial No. 508,020.

To all whom it may concern:

Be it known that I, PAUL L. CROWE, a citizen of the United States, and resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Oscillating Engines, of which the following is a specification.

My invention relates to oscillating engines, and the object is to increase the usefulness and efficiency of this class of engines.

The invention consists in certain new and novel constructions of the parts of an oscillating engine whereby a more perfect combination and arrangement are attained for producing a perfect engine of this class.

In order to more fully describe my invention I refer to the accompanying drawings:

Figure 1 is an elevation of my improved oscillating engine. Fig. 2 is a side or end view of the same. Fig. 3 is an elevation of the cylinders of the engine partly broken away to show in full lines the cylinder support. Fig. 4 is a similar view to Fig. 3 with the exception that the cylinder support is shown in section, to show the reverse valve in full lines. Fig. 5 is a similar view to Fig. 4, excepting that the reverse valve is shown in section and also the distributing valve. Fig. 6 is a sectional view of the low pressure cylinder taken on line X X Fig. 5, showing the ports closed. Fig. 7 is a sectional view of the high pressure cylinder taken on line Y Y Fig. 5, showing the ports closed. Fig. 8 is a sectional view of the low pressure cylinder similar to Fig. 6, showing the ports open for pressure and exhaust. Fig. 9 is a sectional view of the high pressure cylinder similar to Fig. 7, showing the ports thereof open for pressure and exhaust. Fig. 10 is a cross sectional view on line Z Z Fig. 5 of the high pressure cylinder, support and reverse valve looking in direction of arrow. Fig. 11 is a plan view of the engine as shown in Fig. 1. Fig. 12 is a plan view of the reverse valve, detached. Fig. 13 is a sectional view of reverse valve detached. Fig. 14 is a cross sectional view taken on line 1—1, Fig. 1. Fig. 15 is an elevation of the distributing valve, detached. Fig. 16 is a cross sectional view of the distributing valve on line 14^a 14^a, Fig. 14. Fig. 17 is another cross sectional view of the distributing valve on line 15^a 15^a, Fig. 15.

Numeral 4 designates the low pressure

cylinder, and 5 the high pressure cylinder. Each of the cylinders support integrally an extension 6, circular in shape. The bore 7 of each of the extensions 6 is straight from 8 to 9, but from 9 to 10 it is on a bevel line 17, see Fig. 4. These extensions 6 have each upper and lower port openings 11—12, see Figs. 5—6—7—8—9, which communicate with the interior portion 13 of each of the cylinders 4 and 5.

Numeral 14 designates the cylinder support upon which the extension 6 of the two cylinders 4 and 5 oscillate. This support is provided with a central bore 15 slightly tapered. The outer ends of this support are bevel enlargements 16, upon which rest and oscillate the bevel portions 17, of the extensions 6.

18 are bevel shoulders formed on the rear portions of the enlargements 16. Between these bevel portions 18, the outer surface of the support 14, is straight.

In order to hold the cylinder extensions 6 upon the support 14 I use the annular adjusting nuts 19, which pass over the straight portion of the support and are threaded in the straight portion of the extensions, the inner surface 20 of the nuts being beveled to fit against the bevel shoulders 18 of support. To lock the nuts 19 in place I use the locking nuts 21 interposed between the nuts 19 and extensions 6.

It will be observed that the support 14 does not occupy the entire length of the extension bores 7, spaces 23 are thereby left at each end of the support. These spaces are left for the purpose that when the wear and tear is taken up by the adjusting nuts 19 the adjustment of said support is accommodated in the said cylinder extensions.

The cylinder support is made with central enlargements 24—25, Figs. 1 and 2, which terminate into a foot 26, whereby the said support can be securely bolted onto the top of engine frame 27 which supports the driving shaft 28, to which by cranks the piston rods 29 are connected. Each of the cylinders 4 and 5 are provided with pistons 30 to which the said rods 29 are attached. Each cylinder has a removable lower head 31 to which is mounted a stuffing box 32. The end of the frame 27 is left open at 33 for the ready insertion and removal of the cylinders. The support 14 is provided at each end with two upper ports 34 and 35 and two

lower ports 36 and 37, directly opposite each other.

Within the conical bore 15 of the support 14 is inserted the conical reverse valve 39. This valve 39 is provided with central passage 40 surrounded by a wall 41. It has also end walls 42 which form two end compartments 43 and 44. Compartment 44 is on the high pressure side, and compartment 43 on the low pressure side. The low pressure side 43 of the valve 39 has one upper port 45 and two lower ports 46 which lead into the compartment 43. It has also two inclosed upper ports 47—48, and one inclosed lower port 49 (see Figs. 6—8.)

The high pressure side of the valve 39 (see Figs. 7 and 9) has two lower ports 50, 51, which lead directly into compartment 44 and a single inclosed vertical port 53 with inclosed branch ports 54—55. Between the branch ports 54 and 55 there is an inclosed upper port 56 (see Figs. 7—9). The outer wall of the reverse valve 39 at 57 is provided with an opening 58 leading into the high pressure compartment 44. This opening is connected by passage 59 in the support 14 with the pressure inlet pipe 60. The bottom of the reverse valve 39 is provided with passage 61 leading into the exhaust passage 62 in the support 14, said passage 62 having an exhaust pipe 63.

The outside of the reverse valve at or near the center is provided with annular half circular grooves 64 which when joined with the half circular grooves 65 of the support 14 form a circular compartment around the reverse valve, the circular groove thereof leading into the exhaust opening 61 in the bottom of the reverse valve 39 (see Fig. 5.)

Within the central conical opening 40 of the reverse valve 39 is inserted the conical distributing valve 67. The hole 40 in the reverse valve 39 is provided with a shoulder 68, against which the shoulder of the valve 67 rests. The reverse valve is operated by lever 69 threaded in hole 40 of the same and to permit me to turn the distributing valve 67 I use the rod 70 which passes through the tubular lever 69 into the valve 67 where it is held permanently to it. The distributing valve 67 is provided with a passage 72 extending entirely through the valve, and a three way passage 73. The bottom of the valve 67 is cut away at 74. The distributing valve 67 is held up in place by a spiral spring 75.

The central wall 41 of the reverse valve 39 has upper passages 80 and lower passages 81. The upper passage 80 places the compartment 43 in communication with the three-way passage 73 in the distributing valves, and the passage 81 places compartment 44 in communication with the cut-away portion 74 of said distributing valve. The reverse valve 39, is turned from the

outside by the stem 69. As this valve is turned to the right or to the left it will change its ports and connect them with the intake and exhaust ports of the cylinders, which changes will reverse the movements of the pistons in said cylinders, as desired.

The operation of the engine is as follows: The distributing valve 67 is set as shown in Fig. 5. The cylinders 4 and 5 are then set as shown in Figs. 8 and 9, and the reverse valve 39 as shown in Figs. 8 and 9. The pressure then passes through compartment 44 into and through the three passages 73 of the distributing valve 67, where it is allowed to pass through passages 80^a into the port 56 of the high pressure cylinder and thence through port 35 and extension port 11 into the interior 13 of the high pressure cylinder 5. The exhaust then returns through port 11, into port 34, and compartment 53, thence through passages 72, of the distributing valve into compartment 43, and through ports 37, and 12, into low pressure cylinder, thence returning to ports 36, into port 49, and thence to 61, and 63, the fluid taking a similar route at the opposite end of the cylinders. But when the engine is to be used as a high pressure or simple engine, the distributing valve is turned one fourth of a revolution which closes the passage 72, in the distributing valve and opens the passage 81, to compartment 53, and also to exhaust passage 61, and 63. At the same time the passage 73, is opened to both the high and the low pressure cylinders which permits the high pressure to enter the low as well as the high pressure cylinders, at the same time. Thus it will be seen, by turning the distributing valve 67, one fourth of a turn the engine may be made to operate as a double simple, or a compound engine as desired. Live steam also passes from the three-way passage 73 through the passage 80 into the low pressure compartment 43, whence by ports 46, 37 and 12 it enters the interior 13 of low pressure cylinder 4. The exhaust in low pressure cylinder 4 passes through ports 11—34 and 47 into the passage 64, thence into the exhaust opening 61. The exhaust of the high pressure cylinder 5 passes through ports 12, 36, and into long port 53 and thence into exhaust 61 (see Fig. 5.) As the cylinders oscillate the above named ports will become respectively exhaust and pressure ports as can be readily seen. In the foregoing operation the cylinders 4 and 5 receive the pressure equally, but by turning the distributing valve 67 as shown in Fig. 14 the cylinder 5 becomes a high pressure cylinder and the cylinder 4 a low pressure cylinder.

What I claim is:

1. In an oscillating engine, comprising a high and a low pressure cylinder, supports upon which said cylinders oscillate, means

for locking said cylinders and supports together, a tapered reversing valve mounted within said supports, said reversing valve closed at both ends and containing divided
 5 compartments, said cylinders, reversing valve and supports each having ports communicating with each other when the cylinders oscillate, and the reversing valve is operated, said reversing valve having a central cross chamber, the walls of said chamber being provided with ports communicating with the said compartments and the said
 10 cylinders, a conical distributing valve located in said cross chamber of the reversing valve, said distributing valve having passages for distributing the pressure for changing the condition of the engine from high to low, a hollow operating lever mounted on said reversing valve and an operating
 20 rod mounted on said distributing valve within the said reversing valve operating lever, the combined operating lever providing means for instantaneously reversing the engine and changing from a simple, to a
 25 compound engine.

2. An oscillating engine comprising cylinders each of said cylinders supporting a central support with trunnion hubs, each of said hubs internally tapered, a conical steam
 30 chest, said chest having conical tapered por-

tion over which tapered portion of the cylinders oscillate, said chest having supply and exhaust compartments, means for holding the tapered portion of said cylinders on the said chest consisting of an adjustable
 35 nut of smaller diameter than said cylinder trunnion hub, a locking nut mounted on the said adjustable nut, and adapted to press against the cylinder trunnion hubs, said cylinders having end ports, said compartments of said steam chest being connected by ports with the said cylinders, a reversing valve interposed between the compartments of said steam chest, said reversing valve having communicating ports at each end
 40 thereof, said ports communicating with the ports of said steam chest, and thence with the cylinders, means of operating the said distributing valve, the operation of said distributing valve causing steam pressure to be
 45 communicated to both of said cylinders, or to only one cylinder, whichever way the engine runs.

Signed at Jersey City in the county of Hudson and State of New Jersey this 10th
 55 day of July. A. D. 1909.

PAUL L. CROWE.

Witnesses:

M. F. CARROLL,

WILLIAM MULLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."