

No. 725,911.

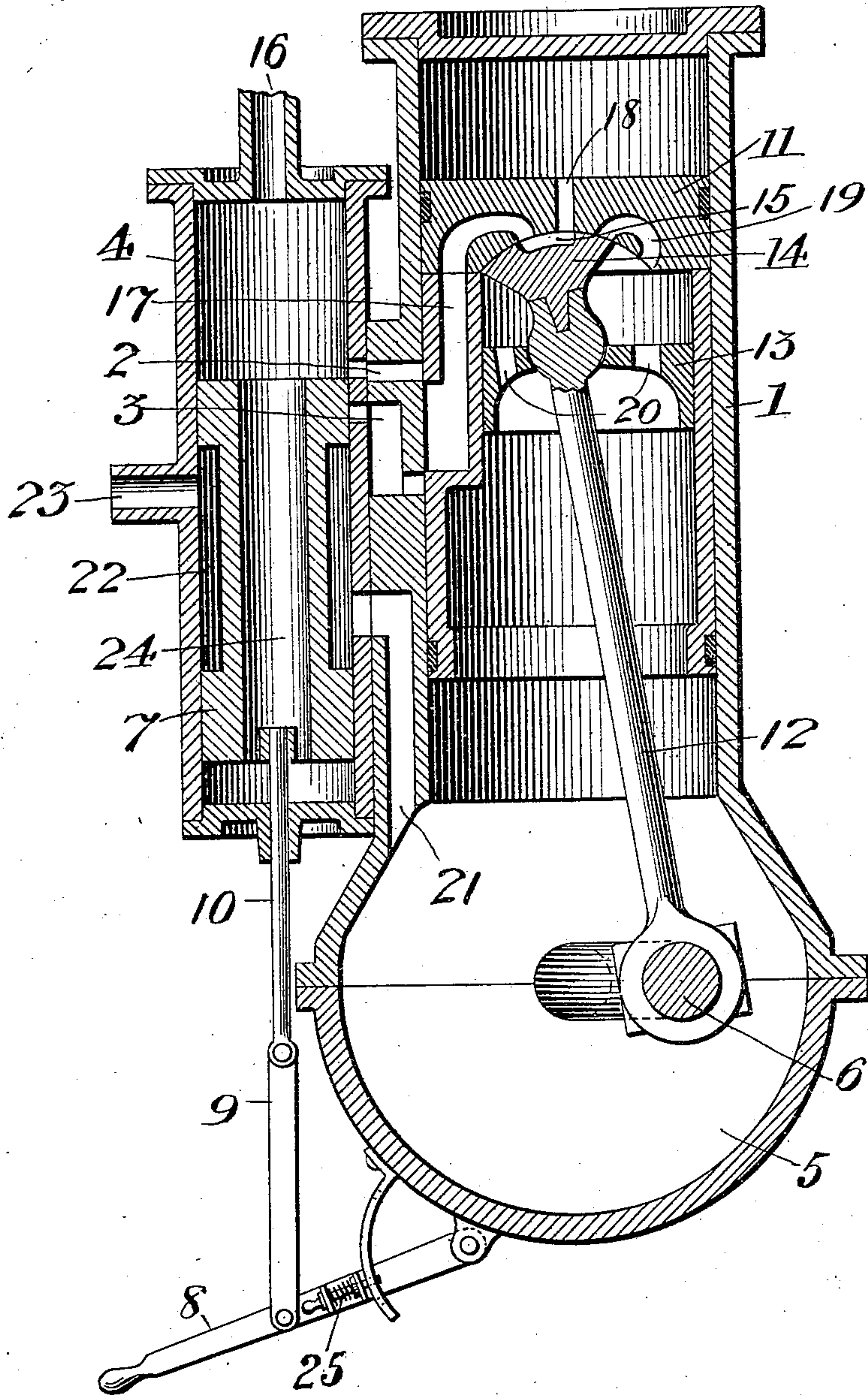
PATENTED APR. 21, 1903.

W. A. ALSTERLUND.

ENGINE.

APPLICATION FILED AUG. 14, 1902.

NO MODEL.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## ENGINE.

SPECIFICATION forming part of Letters Patent No. 725,911, dated April 21, 1903.

Application filed August 14, 1902. Serial No. 119,674. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ANDREW ALSTERLUND, a citizen of the United States, residing at Moline, county of Rock Island, State of Illinois, have invented certain new and useful Improvements in Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to direct-acting single or multiple cylinder engines, and has for its object to provide an engine of this type wherein a plurality of inlet-ports are arranged in the sides of the cylinders in such relation to the stroke of the piston that when one of the ports is opened steam is admitted within the cylinder for only a portion of the stroke of the piston, and upon the opening of a further port or ports steam is admitted for a greater portion of the whole of the stroke. The inlet-valve may be moved only far enough to open one of the ports, but may also have sufficient movement to open one or more additional ports, so that the engine may be operated for a portion or for the whole stroke while under boiler-pressure.

With this object in view the invention consists of certain novel combinations and arrangements of parts for effecting this result, the same being applicable to engines having one, two, three, or more cylinders. I have shown only a one-cylinder engine herein as illustrating such parts as are deemed necessary to a full understanding of the invention; but it is to be understood that any approved form and construction of frame and other necessary parts and connections may be employed.

Referring to the drawing, the figure represents a vertical sectional view through one of the cylinders and its piston, also showing the inlet-valve and its casing.

In the drawing, 1 denotes the cylinder, furnished with two inlet ports or passages 2 and 3, leading from the valve-casing 4 into the interior of the cylinder. The cylinder is closed by a head at its outer end and opens at its inner end into the chamber 5, within which the crank-shaft 6 is located. The ports 2 and 3 communicate with the interior of the cylinder,

as before stated, and are controlled by means of a slide-valve 7 in a manner that will be hereinafter described. This valve is located within the valve-casing 4 and is connected to a hand-operated lever 8 by means of the link 9, which is pivoted to the end of the valve-rod 10, and by means of this lever the valve may be raised or lowered as occasion may demand.

The piston 11, preferably of the trunk class, is connected to the engine crank-shaft 6 by means of the connecting-rod 12, the upper end of which is of spherical shape and loosely mounted within the head of the piston by means of the bracket 13, which is provided with an annular concave seat to receive the same. The bracket is rigidly secured to the piston-head by any well-known fastening means.

Upon the upper end of the piston-connecting rod 12 and arranged so as to rock therewith is the oscillating valve 14, which is provided with a suitable steam-passage 15, by means of which the admission and exhaust of steam to and from the cylinder is regulated. The valve-casing 4 is mounted upon the side of the cylinder and is provided with the sliding valve 7, as before stated, the same being adapted to be so set and regulated that steam may be admitted into the cylinder during only part of the piston's stroke or for its whole stroke. This valve 7 has a steam-passage 24 running lengthwise of the same for the purpose of permitting a portion of the steam that enters the inlet-port 16 to escape to the opposite side of the valve, and thereby balance the same. In order that the valve may be firmly held in its different positions, any well-known locking means may be provided—as, for instance, the spring-catch shown at 25 in the drawings. This valve-casing is provided with a steam-admission port 16 for supplying steam to the cylinder either through steam-port 2, in which case steam enters for half a stroke, or through both parts 2 and 3, in which case port 2 allows steam to enter for the first half of the stroke and port 3 for the remainder of the stroke. With the valve in the position shown in the figure steam is admitted to the valve-casing through the steam-port 2 into the



steam-passage 17, with which the said port communicates at the beginning of the stroke of the piston and then passes to the steam-passage 15 and out through the steam-port 18 in the head of the piston to the space above the piston. As soon as steam has been admitted into the space above the piston the piston begins its initial stroke, the steam entering, as above described, and operating upon the upper surface of the piston-head with full boiler-pressure for only one half of its stroke, whereupon the steam is cut off by movement of the piston which closes the port in the cylinder during the latter portion of the stroke, and thus allows the steam which has entered the cylinder to act expansively during the remainder of the stroke. At this point the piston begins to make its return stroke by reason of the momentum of the engine or otherwise, the inlet-valve having rocked within the piston-head to such a position as to close the valve-passage 17, cutting off all communication between steam-passages 17 and the valve-port 18 and opening up communication between the said port 18 and the steam-passage 19, also located in the piston-head. It will thus be seen that the steam which has entered the space above the piston and has acted to drive the piston for its whole stroke, part by direct boiler-pressure and part by expansion of the steam, may now during the return stroke of the piston exhaust through the communicating ports and passages, as aboved mentioned—namely, 18, 15, and 19—and pass through openings 20 in the bracket 13 to the crank-shaft chamber 5 below. When the steam reaches the chamber, it is free to exhaust through the passage 21 in the lower part of the cylinder and out into the valve-casing 4, passing into the space 22 around the piston-valve and thence out through the exhaust-port 23. When it is desired that the steam should enter the cylinder during the whole stroke of the piston, thus allowing the steam to act with full boiler-pressure during such complete stroke, the inlet-valve is lowered by means of the operating-handle 8, so as to open both of the steam-ports 2 and 3, which allows the steam to first enter through the port 2, as above described, for half the stroke, whereupon by the movement of the piston itself the steam-port 2 is closed, and the steam-port 3, which has been closed by reason of the piston covering the same during the first half of the stroke, is now opened to allow steam to be admitted for the remainder of the stroke. It will be understood that when steam is allowed to enter the cylinder and act upon the piston with full boiler-pressure during the whole stroke the inlet-valve is moved to uncover both ports; but steam enters only one of them at a time, for the reason that the piston itself shuts off one port while steam is entering through the other.

Provision is made for the reversing of the engine, which is accomplished by lifting the valve 7 to such a position within the valve-casing that the lower part of said valve shall be positioned above the outlet of the exhaust-passage 21, and the two inlet-ports 2 and 3 and the exhaust-port 23 register with the space around the valve 7. In this position of the valve steam enters the valve-casing and passes directly to the opposite side of the valve 7 through the passage-way 24 and is conducted through the steam-passage 21 to the chamber 5, whereupon it acts upon the under side of the piston and drives the engine in a reverse direction, using the two inlet-ports 2 and 3 for the exhaust, the exhaust-steam passing therethrough into the space 22 around the valve and out through the exhaust-port 23, which also registers with the space 22 when the valve is in this position.

It is apparent that in carrying out my invention some changes from the combinations herein shown and described may be made, and I would therefore have it understood that I do not limit myself to the precise details herein shown, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

It will of course be understood that my improved engine may use as the motive agency gas, compressed air, steam, or any other suitable expansive fluid.

Having thus described my invention, what I claim is—

1. In an engine, the combination with the cylinder having a plurality of inlet-ports, of a piston adapted to successively open and close communication between said ports and one side of the piston, and a valve adapted to admit steam through one or more of said ports, substantially as specified.

2. In an engine, the combination with a cylinder having a plurality of ports therein, of a piston having a live-steam passage, an exhaust-steam passage, and an intermediate port, an oscillating valve for alternately establishing communication between said ports and passages, and a valve for admitting steam through one or more of the ports in the cylinder; substantially as specified.

3. In an engine, the combination with a cylinder having a plurality of live-steam ports and an exhaust-passage, of a piston having a live-steam passage adapted to communicate with the live-steam ports of the cylinder and also having a steam-port and an exhaust-passage, an oscillating valve for alternately establishing communication between said port and passages in the piston, and a valve for admitting steam to one or more of the live-steam ports in the cylinder; substantially as specified.

4. In an engine, the combination with a cylinder having a plurality of live-steam ports



and an exhaust-passage, of a piston having  
a live-steam passage adapted to communicate  
with the live-steam ports of the cylinder, and  
also having a steam-port and an exhaust-pas-  
5 sage, a pitman having an oscillating connec-  
tion with the piston and carrying a valve for  
alternately establishing communication be-  
tween said port and passages in the piston,

and a valve for admitting steam to one or  
more of the live-steam ports in the cylinder. 10

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

WILLIAM ANDREW ALSTERLUND.

Witnesses:

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W. G. SCHOTT.