E. LUGINBREHL.

STEAM ENGINE.

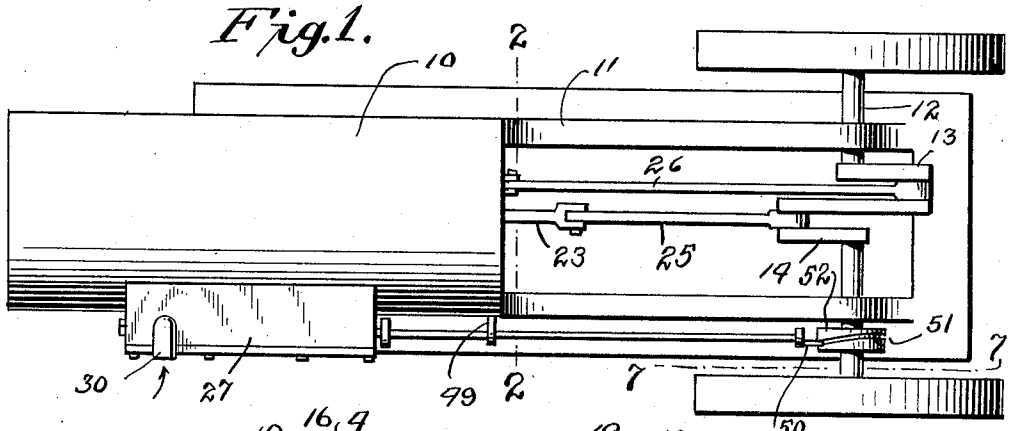
APPLICATION FILED JAN. 22, 1913.

1,088,156.

Patented Feb. 24, 1914.

2 SHEETS—SHEET 1.

Fig. 1.



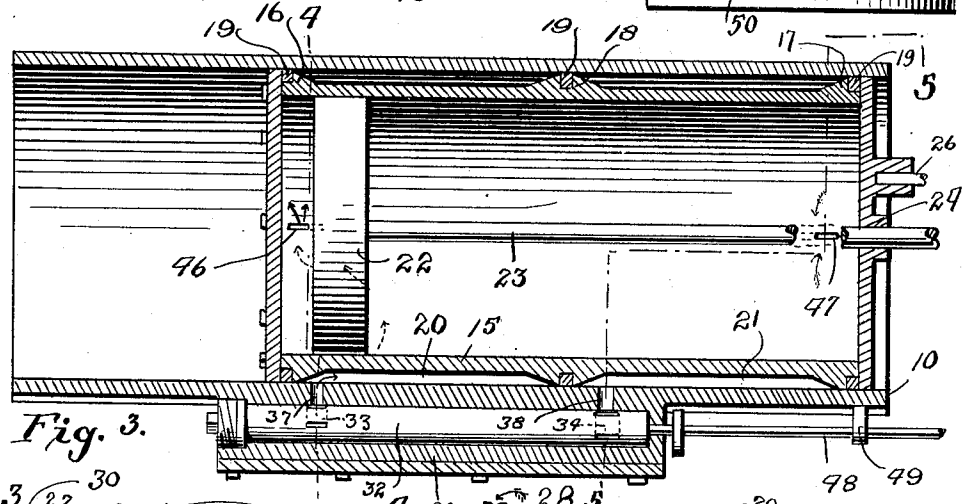
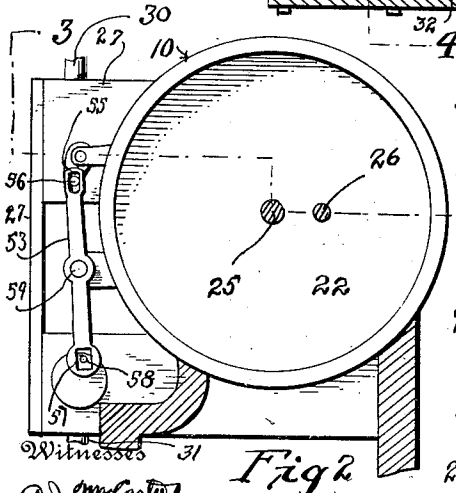


Fig. 3.



Witnesses

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Fig 2

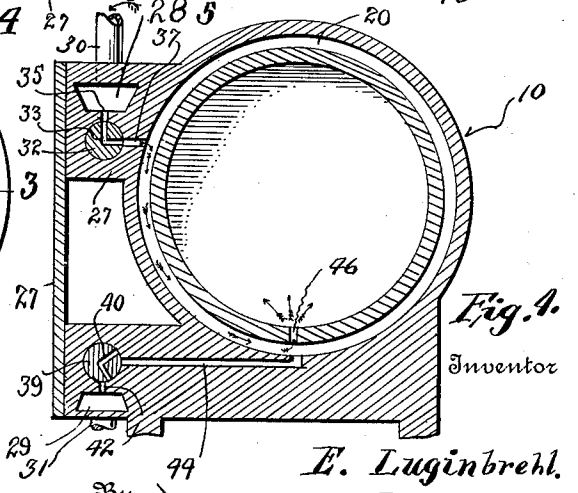

Fig. 4.

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2 SHEETS—SHEET 2.

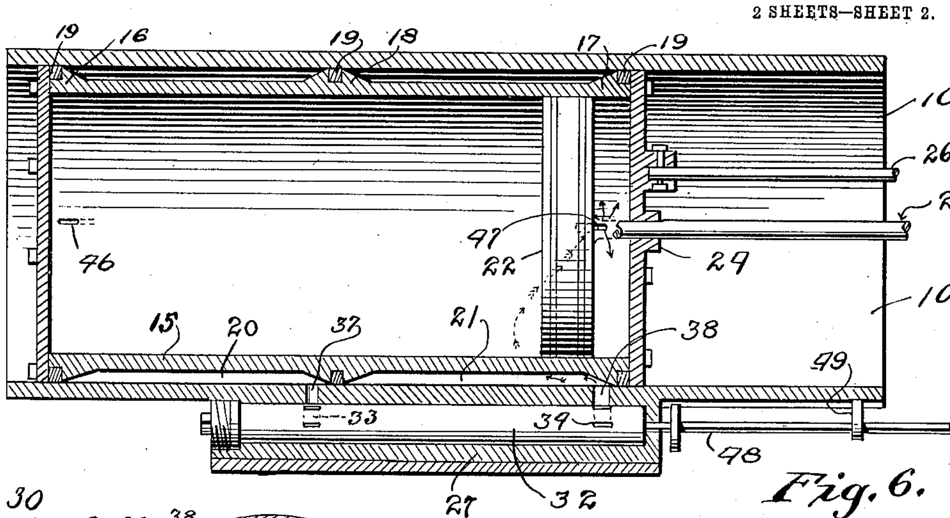

Fig. 6.

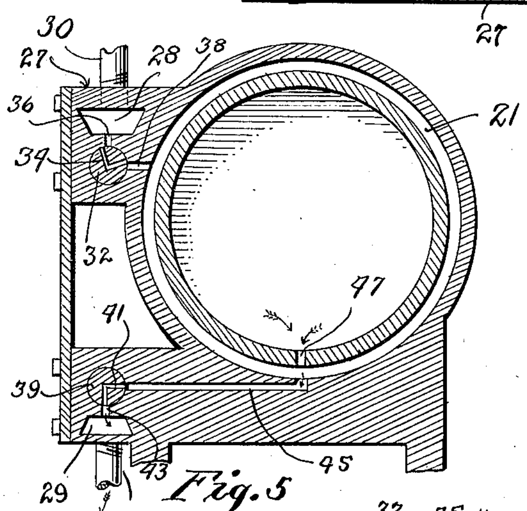

Fig. 5

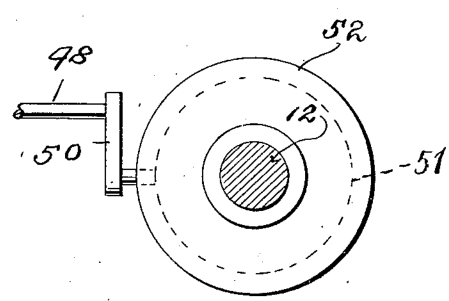

Fig. 7.

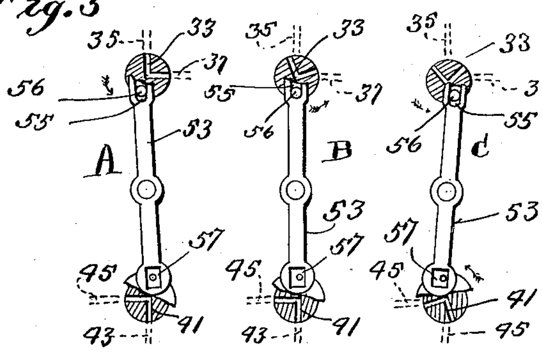

Fig. 8.

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ELIAS LUGINBREHL, OF NORWOOD, OHIO.

STEAM-ENGINE.

1,088,156. Specification of Letters Patent. Patented Feb. 24, 1914.

Application filed January 22, 1913. Serial No. 743,568.

To all whom it may concern:

Be it known that I, ELIAS LUGINBREHL, a citizen of the United States, residing at Norwood, in the county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Steam-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.

This invention relates to steam engines of that general class in which both the cylinder and piston are independently movable.

An object of the present invention is to provide a novel device of this character having a guide cylinder for housing the entrance cylinder and for coacting with the interior of the latter in defining intake and exhaust steam passages, and further to provide operative means for actuating the valves to properly time the intake and exhaust of steam.

With the above objects in view the invention consists of certain novel details of construction and combination of parts hereinafter fully described and claimed, it being understood that various modifications may be made in the minor details of construction within the scope of the appended claim.

In the accompanying drawings forming part of this specification:—Figure 1 is a plan view of the engine. Fig. 2 is a cross sectional view taken on the line 2—2 Fig. 1, with the engine frame removed. Fig. 3 is a sectional view taken on the line 3—3 Fig. 2. Fig. 4 is a cross sectional view taken on the line 4—4 Fig. 3. Fig. 5 is a cross sectional view taken on the line 5—5 Fig. 3. Fig. 6 is a sectional view similar to Fig. 3 but showing the piston and cylinder at the opposite limit of movement from that shown in Fig. 3. Fig. 7 is a detail sectional view taken on the line 7—7 Fig. 1. Fig. 8 is a diagrammatic view showing the operation of the link in actuating the valves.

Referring now to the drawings in which like characters of reference designate similar parts, 10 designates a guide cylinder which is open at both ends and is supported upon an engine bed 11 which carries a crank shaft 12 having two cranks 13 and 14. Within the guide cylinder is mounted a reciprocatory engine cylinder 15 having annular circumferential shoulders 16 and 17 at the ends and a centrally disposed annular shoulder 18, there being packing rings 19 carried by the shoulders and bearing against the inner face of the guide cylinder. Two steam spaces 20 and 21 are thus formed between the inner face of the guide cylinder and the outer face of the reciprocatory cylinder.

A reciprocatory piston 22 is mounted in the cylinder 15, and a piston rod 23 is connected to the piston and projects through a suitable opening 24 in one head of the cylinder, said rod being operatively connected to the crank 14 by means of a pitman 25. The cylinder has also connected thereto a pitman 26 which is operatively connected to the crank 13. The cranks 13 and 14 are disposed at 180 degrees apart, and the piston and cylinder are moved simultaneously in opposite directions, so that both the piston and the cylinder coact at each stroke in imparting rotary movement to the crank shaft.

A steam chest designated in general by the numeral 27 is formed integral with the guide cylinder, there being a live steam space 28, and an exhaust steam space 29 arranged in the chest and communicating with corresponding steam feed and exhaust pipes 30 and 31. A rocking rod inlet valve 32 is arranged in the steam chest below the live steam space and is formed with a pair of spaced radially disposed L-shaped steam passages 33 and 34 best shown in Fig. 3. Steam passages 35 and 36, afford communication between the live steam space and the valve steam passages, and other steam passages 37 and 38 afford communication between the valve steam passages and the above mentioned steam spaces 20 and 21 between the guide cylinder and reciprocatory cylinder. A rocking rod exhaust valve 39 is arranged in the steam chest above the exhaust steam space 29 and is formed with a pair of spaced radially disposed L-shaped steam spaces 40 and 41. Steam passages 42 and 43 afford communication between the exhaust steam space and the valve passages, and other steam passages 44 and 45 afford communication between the valve steam passages and the steam spaces 20 and 21 between the guide cylinder and reciprocatory cylinder.

Formed in the reciprocatory cylinder is a pair of steam ports 46 and 47 which communicate respectively with the steam spaces 20 and 21 and are disposed in close prox-

imity to the heads of the cylinder. By referring to Fig. 3 it will be seen that when the cylinder and piston are at one limit of stroke, steam will enter through the inlet valve passage 33 into the steam space 20 then follow around the cylinder as shown in Fig. 4 and pass into the cylinder through the port 46. The steam then urges both the piston and cylinder apart until they reach the opposite limit of stroke as shown in Fig. 6, the exhaust steam meanwhile escaping from in advance of the piston through the port 47, steam space 21 and exhaust valve passage 41 as shown in Fig. 5. In the position of the parts shown in Fig. 6, steam will now enter through the inlet valve passage 33 into the steam space 21 then follow around the cylinder and pass into the cylinder through the port 47 urging both the cylinder and piston apart until they again assume initial position as shown in Fig. 3, the exhaust steam during such movement of the parts escaping through the port 46, steam space 20, and valve passage 40.

For rocking the inlet and exhaust valves, a rock shaft 48 is journaled in a bearing 49 carried on the side of the guide cylinder and is equipped at one end with a crank 50 which works in a cam groove 51 formed in cam disk 52 which is fixed to the crank shaft 12. The opposite end of the shaft 48 is axially fixed to the inlet valve 32. A link 53 is centrally pivoted on the rear end of the steam chest as shown at 54 and is provided at the upper end with an eye 55 which loosely receives a crank pin 56 carried by the rock shaft 48, and is furthermore provided at the lower end with an eye 57 that loosely receives a crank pin 58 that is carried by the end of the exhaust valve.

By referring to Fig. 8 which shows consecutive positions of the inlet passage 33 and exhaust passage 41, see Figs. 4 and 5, when both piston and cylinder are moving from the positions shown in Fig. 3, it will be seen that at the beginning of the stroke as shown by diagram A, both inlet and exhaust passages are open. Contact of the rock link 53 with the pins 56 and 58 is so timed that the valve passages 33 and 41 will remain open until the piston has made three fourths stroke or enough to allow for the expansion of the steam whereupon the inlet passage 33 will be quickly closed as indicated in diagram B. The exhaust passage 41 remains open the full length of the stroke. At the end of the stroke the exhaust passage 41 will be closed as indicated in diagram C. The rock shaft is so timed as to reverse the movement of the rock link at the end of the exhaust stroke and simultaneously open the inlet passage 34 and exhaust passage 40 to produce the return stroke of the piston.

From the above description it will be seen that I have provided an extremely simple and efficient valve motion and valves for producing opposite simultaneous movement of both the piston and the cylinder.

What is claimed, is:—

In an engine, a cylinder, a steam chest on one side thereof, independent parallel intake and exhaust steam passages in said steam chest, a rotary intake valve having spaced ports, one near each end, adapted to alternately establish communication between said intake steam passage and said cylinder, a rotary exhaust valve having spaced ports one near each end, adapted to alternately establish communication between said exhaust steam passage and said cylinder, a centrally pivoted rock link between said intake valve and said exhaust valve having terminal operative connections with and serving to rotate and time the rotation of said valves whereby to simultaneously establish communication between the intake steam passage and cylinder through the port at one end of said intake valve and establish communication between the exhaust steam passage and cylinder through the port at the diametrically opposite end of said exhaust valve, and means for actuating said connection.

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

ELIAS LUGINBREHL.

Witnesses:
NELLIE RAIDT,
C. REZTERMAN.