

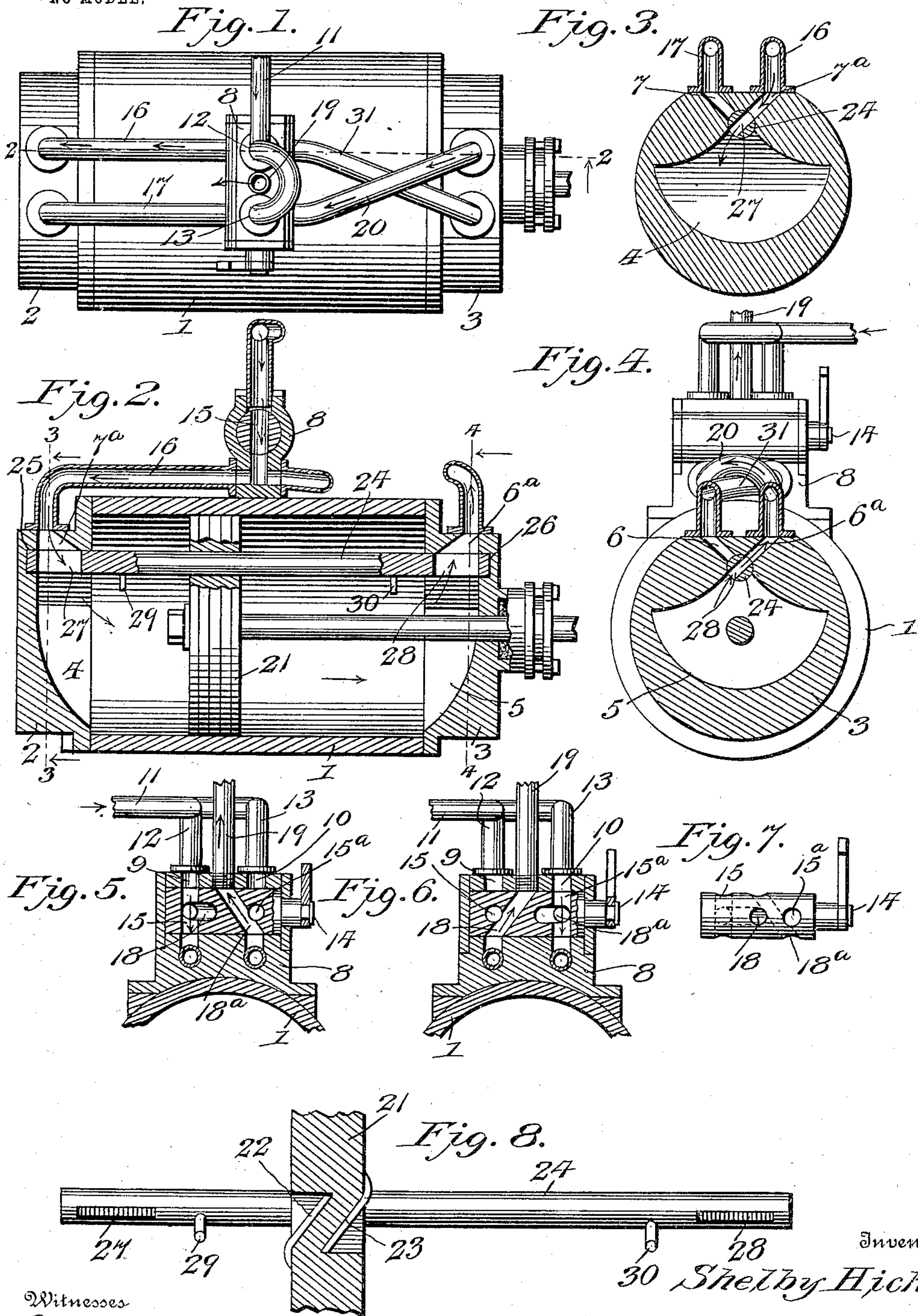
No. 726,429.

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S. HICKS.
STEAM ENGINE.

APPLICATION FILED JUNE 16, 1902.

NO MODEL.



Witnesses
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SHELBY HICKS, OF PROVIDENCE, KENTUCKY.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 726,429, dated April 28, 1903.

Application filed June 16, 1902. Serial No. 111,929. (No model.)

To all whom it may concern:

Be it known that I, SHELBY HICKS, a citizen of the United States, residing at Providence, in the county of Webster and State of Kentucky, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates, primarily, to reciprocating steam-engines; and one of the objects thereof is to provide an automatically-controlled valve within the cylinder whereby the builder may dispense with the ordinary steam-chest and its accessories.

Another object of the invention is to provide an effective and convenient reversing mechanism whereby the piston may reverse quickly and without liability of the engine dead-centering.

Other objects, as well as the novel details of construction, will be clearly described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of the cylinder provided with the novel arrangement of inlet and exhaust ports contemplated in my invention. Fig. 2 represents a vertical longitudinal sectional view of the same. Fig. 3 represents a transverse sectional view on the line 3 3 of Fig. 2. Fig. 4 represents a similar view on the line 4 4 of Fig. 2. Fig. 5 represents a transverse sectional view through the inlet and exhaust ports, showing one position of the reversing-valve. Fig. 6 represents a similar view of the inlet and exhaust ports, showing the offset adjustment of the reversing-valve. Fig. 7 is a side elevation of the reversing-valve. Fig. 8 represents a side elevation of the valve-rod within the cylinder, part of the piston being shown in section.

The reference-numeral 1 designates a cylinder of preferred construction, the heads 2 and 3 of which are provided with segmental recesses 4 and 5, respectively. The upper walls of the recesses converge, terminating in an outlet or inlet, as the case may be, for the escape of the motive fluid or its admission, according to which end of the cylinder the motive fluid is introduced. From the respective outlets or inlets, which for convenience we will term "ports," diverge two passages 6 and 6^a and 7 and 7^a.

Motive-fluid pipes are connected and com-

municate with the respective passages and discharge into a valve-casing 8 at a convenient point on the cylinder. This valve-casing 8 is provided with two inlet-ports 9 and 10, through which motive fluid is admitted from a supply-pipe 11, having branch pipes 12 and 13, which communicate with the inlets of said valve-casing. Extending from the valve-casing 8 are two sets of pipes, each set numbering two, which alternately supply the motive fluid and exhaust it from the cylinder. The manner in which the motive fluid is conveyed to the cylinder depends entirely upon the position of the valve 14 within the casing. By reference to Fig. 7 it will be noticed that the valve 14 is provided with a plurality of channels arranged at various angles in the body thereof. When the valve is in the position shown in Fig. 5, the motive fluid will enter the casing through the branch pipes 12 and 13 and after passing through the channel 15 will be conveyed, through the medium of the pipe 16, which is in communication therewith, into the passage 7 and into the cylinder, shutting off the passage 7^a and its pipe 17, which also communicates with the steam-chest.

The inclined channel 18 in the valve 14 will communicate with the exhaust-pipe 19 in the top of the chest and with an exhaust-pipe 20, which leads therefrom and is in communication with the cylinder through the medium of the passage 6^a. Hence the reciprocation of the piston 21 within the cylinder will exert enough pressure to force the dead steam through the passage 6^a, thence through the pipe 20, and finally through the exhaust-pipe 19. The piston 21 is provided on its opposite faces with cam-recesses 22 and 23, and immediately above these recesses I provide an opening through which projects a valve-rod 24, on which the piston is sleeved. This rod is journaled in suitable bearings 25 and 26 in the respective cylinder-heads and is provided near its ends with slots forming valves 27 and 28, which register with the passages 7 and 7^a and 6 and 6^a alternately—that is to say, the valve 27 closes the passages 7 and 7^a alternately, opening the other, while the valve 28 performs a like function with regard to the passages 6 and 6^a at predetermined points on the rod 24—and at the estimated for-

ward and backward stroke of the piston I arrange downwardly-projecting pins or projections 29 and 30.

As the piston moves forward and nears the
5 end of its stroke, the pin 29 will slide upon
the cam-face of the recess 22, thus slightly turning
the rod and closing the port 7. This will
cause the motive fluid to be cut off from the
pipe 16 and will admit it into the pipe 17 and
10 into the cylinder through the passage 7^a. Of
course this pressure of motive fluid will recip-
rocate the piston 21 rearwardly, exhausting
whatever dead steam is in the cylinder through
the pipe 20. When the piston reaches the
15 end of its rear stroke, the projection 30 will
travel upon the cam-face of the recess 23,
slightly oscillating the rod, bringing the slot-
ted valve 28 in communication with the pas-
sage 6 and incidentally with a pipe 31, which
20 communicates with the steam-chest. The
pipe 21 and the pipe 16 will have been cut
out, owing to the fact that the passages 7^a
and 6^a are closed. The motive fluid will pass
through the inlet-pipe 11 and from the chan-
25 nel 18^a of the valve 14, having passed through
the channel 15^a, through the pipe 31, and into
the passage 6, thence into the cylinder.

The slotted valve 27 will be in communica-
tion with the passage 7 and incidentally with
30 the pipe 17 and will pass out through the ex-
haust-pipe 19 through the channel 18 in the
valve 14. The operation just described will
be carried on in alternation successively as
the piston reciprocates within the cylinder.
35 In other words, at each successive stroke
of the piston the pipe 16 and its coinciding
passage 7^a will act as the inlet of the motive
fluid to the cylinder and the pipe 20 and its
passage 6^a will act as the exhaust as the pis-
40 ton moves through the anterior to the pos-
terior of the cylinder. When, however, the
piston moves through the posterior to the an-
terior ends, the pipe 31 and the passage 6 will
be the inlet for the motive fluid, while the
45 pipe 17 and the passage 7 will be the exhaust.

When it is desired to reverse the engine,
the valve 14 will be caused to assume a posi-
tion within its casing, as shown in Fig. 6, in
which the motive fluid will enter through the
50 channels 15^a and 18^a and exhaust through the
channels 15 and 18. By turning in this po-
sition, it matters not whether the piston is at
its forward or rearward stroke or intermedi-
ate the strokes, the exhaust will be changed
55 to the pressure-passages and the pressure-
passage will be changed to the exhaust.

From the foregoing it will be apparent that
the successive strokes of the piston will be
sufficient to automatically open and close the
60 various ports, thus dispensing with the com-
mon form of steam-chest, the complicated
valve-gear, and other accessories accompany-

ing the common type of reciprocating en-
gines. While I have specifically described
what to me at this time appears to be the 65
very best means of accomplishing the desired
result, I would have it understood that I do
not limit myself to the exact construction
shown, as it is obvious that many slight
changes may be made in the construction and 70
relative arrangement of parts without ma-
terially departing from the spirit of this in-
vention. I therefore reserve the right to
make such slight changes and minor altera-
tions as would suggest themselves from time 75
to time and which come within the scope of
the accompanying claims.

Having thus described my invention, what
I claim as new, and desire to secure by Letters
Patent, is— 80

1. In a steam-engine, the combination with
a cylinder having ports at its respective ends,
a reciprocating piston within the cylinder, a
valve-rod within the cylinder, valves carried
by the respective ends of the rod adapted to 85
open and close the passages, projections on
the end of the rod, and cam-recesses in the
piston for engagement with the projections
on the rod whereby the valves may be oper-
ated. 90

2. In a steam-engine the combination with
a cylinder having two passages, one at each
end, said cylinder being provided with rec-
esses at its respective ends with which the
passages communicate, of a reciprocating pis- 95
ton within the cylinder designed to move al-
ternately to the ends of the cylinder but not
within the recesses, and oscillating valves op-
erated by the piston for alternately closing
and opening the respective passages. 100

3. In combination with a cylinder of a
steam-engine formed with end recesses and
having inlet and outlet passages communi-
cating therewith, of an oscillating valved rod
within the cylinder and means on the piston 105
for oscillating the rod so as to alternately
open and close the passages within the cyl-
inder.

4. The combination with the cylinder of a
steam-engine, the heads of said cylinder be- 110
ing provided with segmental recesses, the up-
per walls of which converge terminating in
outlet and inlet passages respectively, of an
oscillating valved rod within the cylinder
having valves arranged opposite the outlet 115
and inlet passages, and a reciprocating pis-
ton adapted to operate the rod to alternately
open and close the respective passages.

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

SHELBY HICKS.

Witnesses:

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