

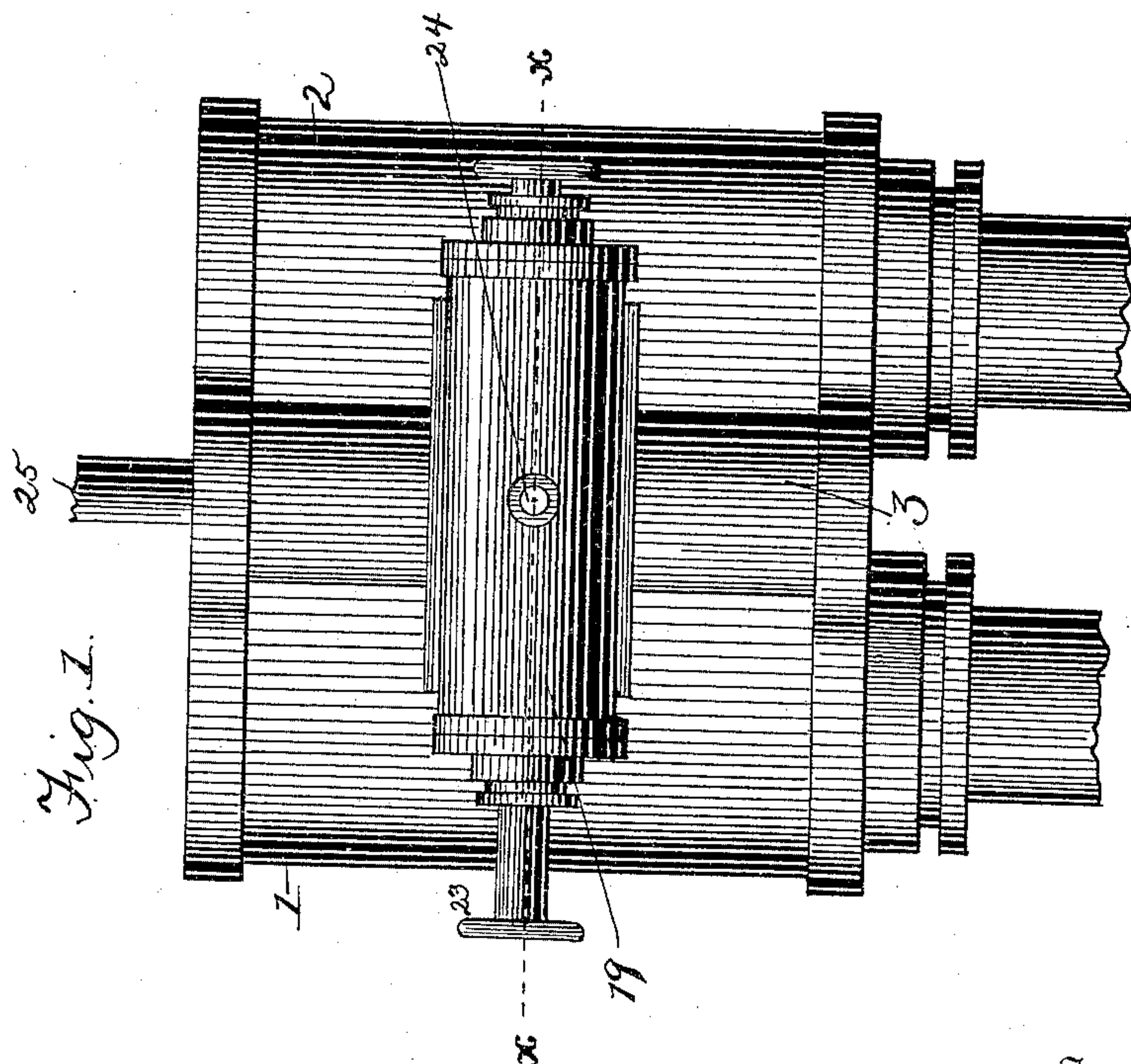
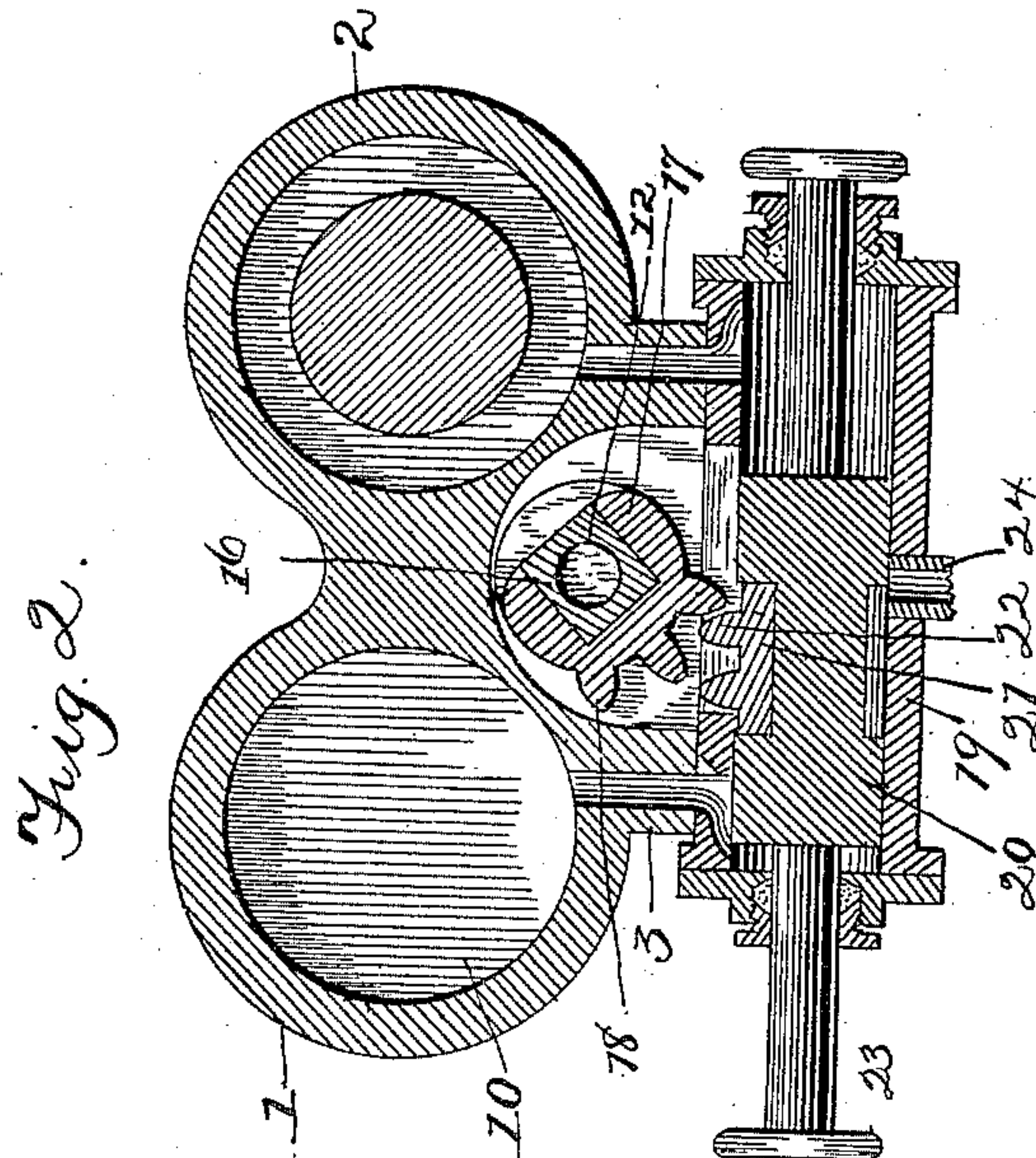
(No Model.)

C. W. TREMAIN.  
STEAM ENGINE.

2 Sheets—Sheet 1.

No. 467,458.

Patented Jan. 19, 1892.



Witnesses  
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M. A. White

Inventor  
Charles W. Tremain  
By J. H. Robertson  
Attorney

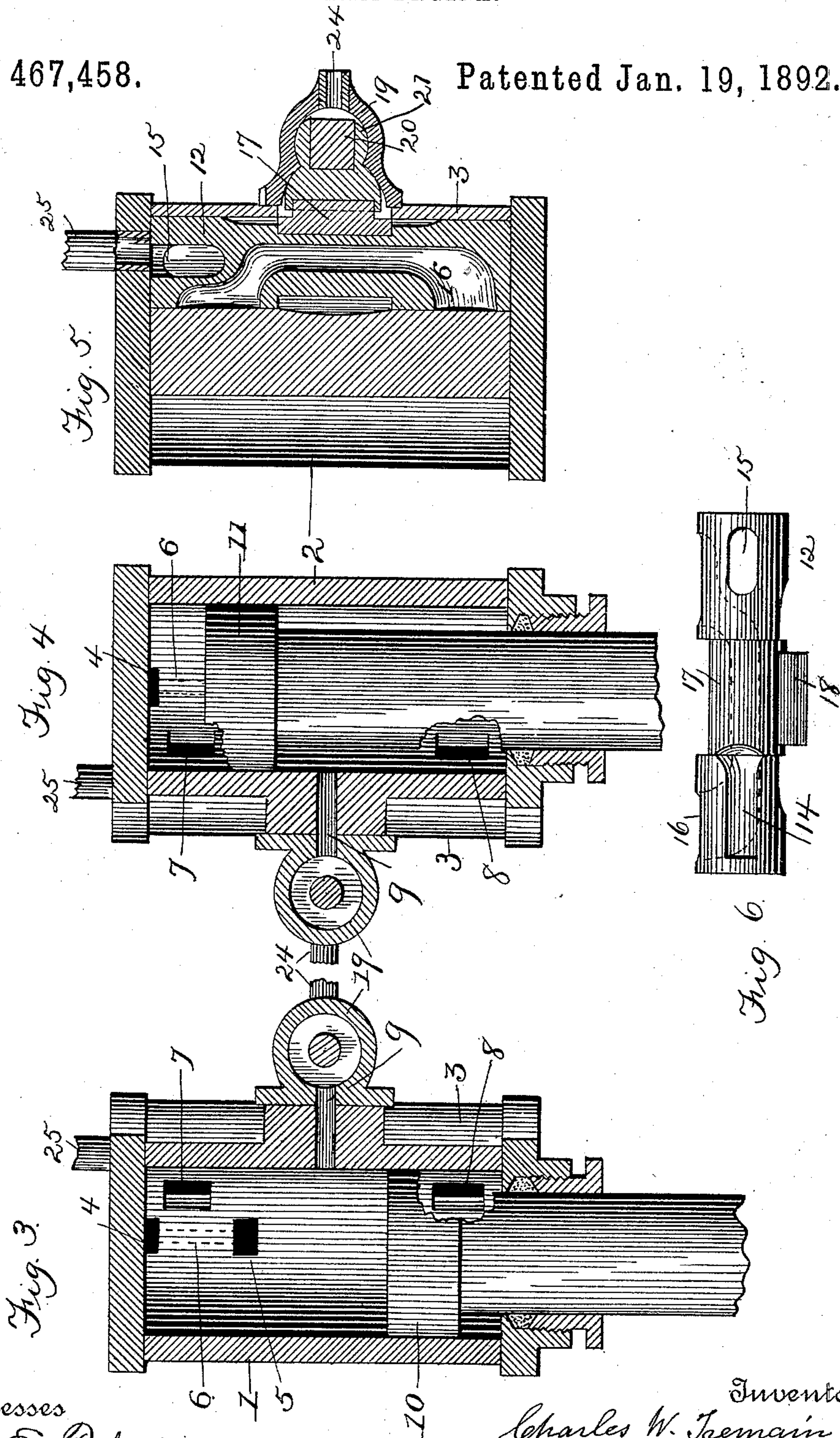
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# UNITED STATES PATENT OFFICE.

CHARLES W. TREMAIN, OF PORTLAND, OREGON.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 467,458, dated January 19, 1892.

Application filed August 14, 1891. Serial No. 402,631. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. TREMAIN, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This improvement relates to that class of engines shown in my application, Serial No. 396,861, filed June 19, 1891, designed to operate ore-stamps, and is intended to provide a new mode of operating the valve.

15 The invention consists in the peculiar construction, arrangement, and combinations of parts hereinafter more particularly described, and then definitely claimed.

In the accompanying drawings, Figure 1 shows a front elevation of an engine adapted for use in ore-stamps and constructed according to my improvement. Fig. 2 is a horizontal cross-section of the same on the line *x x*. Fig. 3 is a vertical section through the center of the left-hand cylinder with parts broken away. Fig. 4 is a similar section through the center of the right-hand cylinder, also with parts broken away. Fig. 5 is a vertical central section through the valves. Fig. 6 is a side view of the main valve detached.

Referring now to the details of the drawings by figures, 1 represents the left and 2 the right hand cylinder, which are preferably cast together and with the main steam-chest 3. Each cylinder has preferably five openings for the passage of steam, two of which 4 and 5 communicate with each other through a passage 6, formed behind the wall of the cylinder and shown in dotted lines. Two others 7 and 8 communicate with the inlet and exhaust ends of the main valve-chest, and the fifth opening 9 communicates with a small cylinder, which will be hereinafter more fully described.

Working in the cylinders 1 and 2 are two trunk-pistons 10 and 11, to the lower ends of which may be attached the stamps or other articles to be operated.

In the steam-chest 3 is shown a rocking or oscillating valve 12, having inlet-ports 14, exhaust-ports 15, and a central passage 16, whose use will hereinafter be set forth. The center

of this valve is reduced to receive the saddle 17, having cog-teeth 18.

For convenience in making, the saddle and its teeth are cast separate from the valve, and after the latter are set in place the saddle is slipped on; but it is obvious that the teeth may be attached in any convenient way.

Arranged at right angles to the valve-chest is a small cylinder 19, in which is set a double piston-valve operator 20, provided with a saddle 21, having teeth 22, which engage with the teeth 18 and operate the oscillating valve 12. At each end of the piston-valve operator is a stem 23, by means of which the valve-operator may be moved by hand when required.

At 24 is shown the steam-pipe, and at 25 is shown the exhaust-pipe.

The operation is as follows: Supposing the parts to be in the position indicated in the drawings, the exhaust is open through opening 8 and port 15, and the live steam passes through the cylinder 19 and steam-chest 13 into and along the inlet-ports 14 and opening 7 into the left-hand cylinder, driving it up to the position shown in dotted lines in Fig. 3, in which position there is a free communication between the live-steam and left-hand end of the cylinder 19 through the opening 9, and thus the live steam acts on the valve-operator 20 and drives it to the opposite end, and through the teeth 18 and 22 oscillates the valve 12, opening communication between the openings 7 and 8 through the central passage 16 in the valve 12, so that steam is at this period acting on the top and bottom of the piston; but as the upper surface of the piston has a larger area than the lower surface the force of the steam of course acts to drive the piston downward. In the meantime the other piston 11 in the right-hand cylinder 2 has been driven down from the position shown in Fig. 4, and the same operation is repeated on that side when the valve-operator is moved in the same way in the opposite direction, and the two pistons are kept in constant motion, but travel in opposite directions. The passage 6, connecting the openings 4 and 5, is of a length equal to the depth of the pistons, and as soon as a piston has passed opening 4 in rising steam is admitted through said opening, the passage 6, and open-



ing 5 to the top of the piston, and thus the latter is prevented from striking the cylinder-head. By this construction a cheaply built, yet durable, engine is constructed, that  
5 will be found very convenient in use and capable of driving very powerful stamps at a great speed.

Although I intend my engine mainly for use in ore-stamps, yet it is obvious that it may be  
10 used for many other purposes, and that it may be modified to a considerable extent without departing from the spirit of my invention.

What I claim as new is—

1. The combination of two cylinders and  
15 their pistons with a single valve admitting and exhausting steam and a valve-operator for moving said valve operated by steam from each cylinder alternately, substantially as described.

20 2. The combination of two cylinders and their pistons and an oscillating valve set between them and having teeth on its back with a valve-operator working at right angles to the axis of the valve and provided with teeth engaging with the teeth of the valve, substantially  
25 as described.

3. The combination of the valve 12 and the saddle 17, mounted thereon and provided with teeth 18, and the valve-operator 20, also provided with teeth engaging with the teeth 18,  
30 substantially as described.

4. The combination, with the pistons 10 and 11 and the cylinders 1 and 2, having openings

7 and 8, of the valve 12, having inlet-ports 14, exhaust-ports 15, and a central passage 16, 35 substantially as described.

5. The combination, with the pistons 10 and 11 and the cylinders 1 and 2, having openings 9, of a valve governing the admission and emission of the steam operating said pistons, 40 and a valve-operator controlled by the steam passing through said openings 9, substantially as described.

6. The combination, with piston 1 and cylinder 10, in which it works, having openings 45 4 and 5, connected by the passage 6, and the openings 7, 8, and 9, of a valve controlling the admission and emission of steam operating said piston, and a valve-operator controlled by steam passing through the opening 9, substantially  
50 as described.

7. The combination, with the pistons 10 and 11 and the cylinders 1 and 2, provided with openings 7, 8, and 9, of a valve having ports 14 and 15 and central passage 16, and a piston-valve operator 20, set at right angles to  
55 the axis of the valve and operated by steam passing through the openings 9, all substantially as described.

In testimony whereof I affix my signature, 60 in presence of two witnesses, this 6th day of August, 1891.

CHARLES W. TREMAIN.

Witnesses:

J. D. COLEMAN,

H. J. KENNY.