

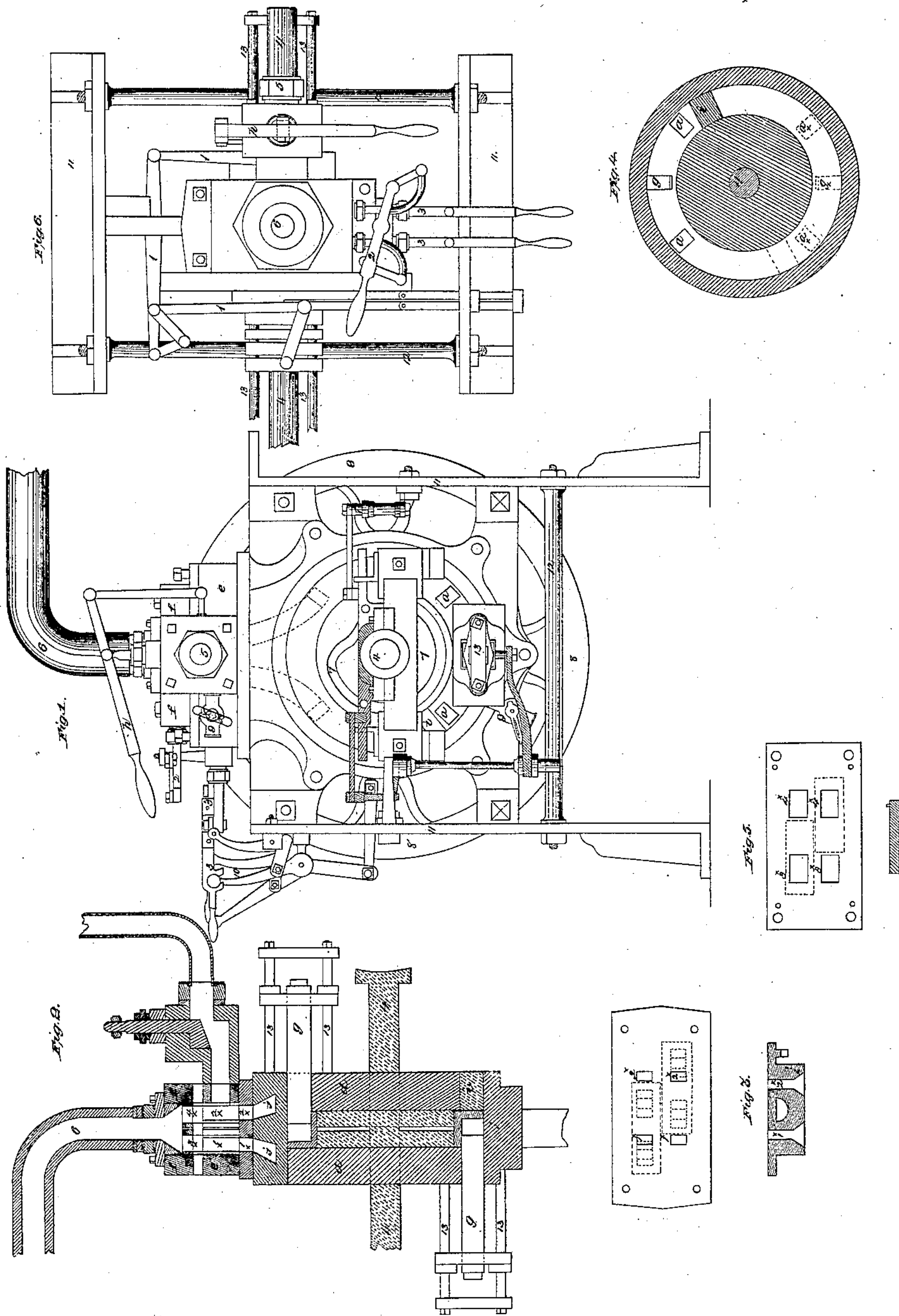
J. M. Webb,

2 Sheets-Sheet 1.

Rotary Steam Engine.

N^o 9,550.

Patented Jan. 18, 1858.



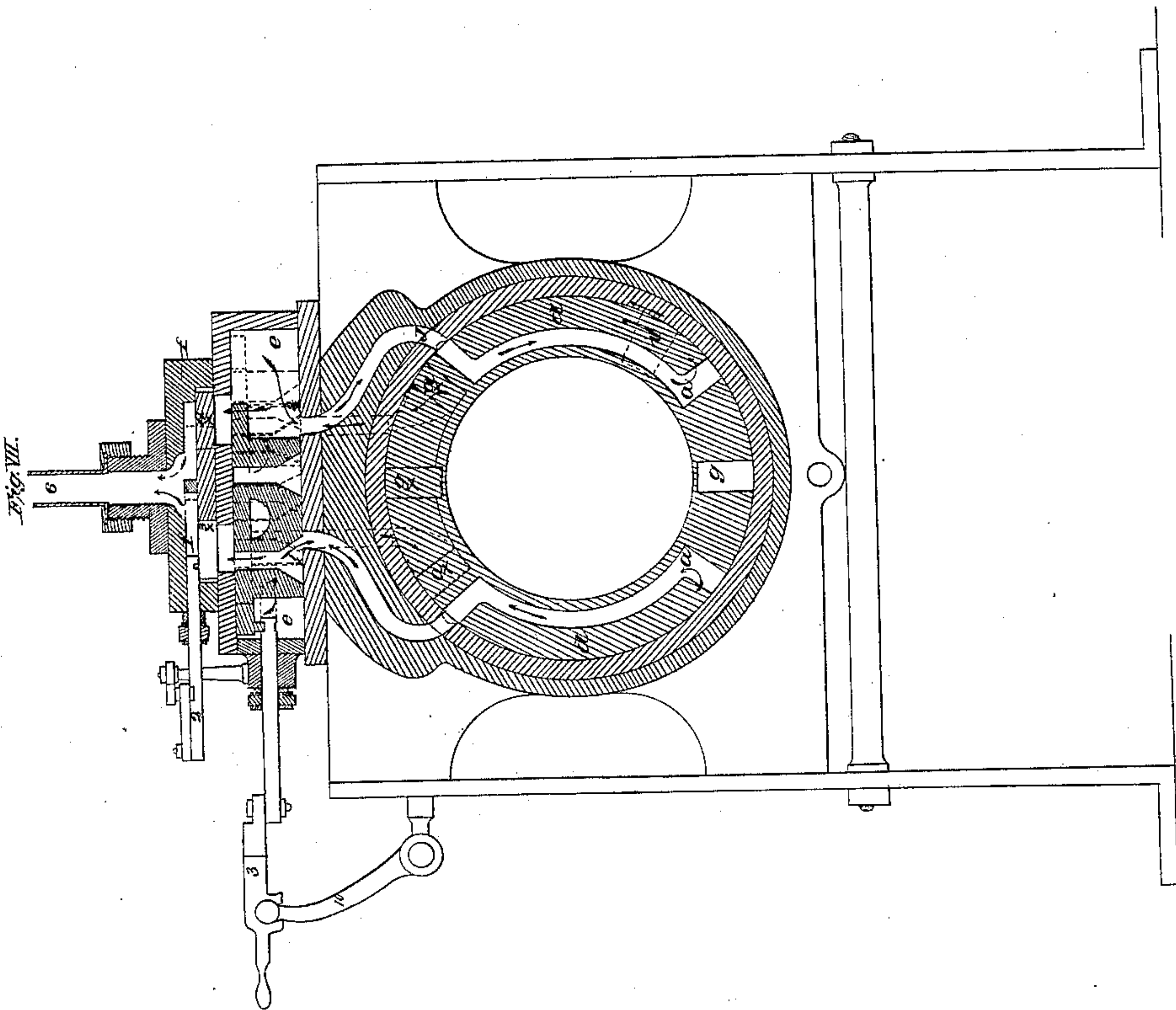
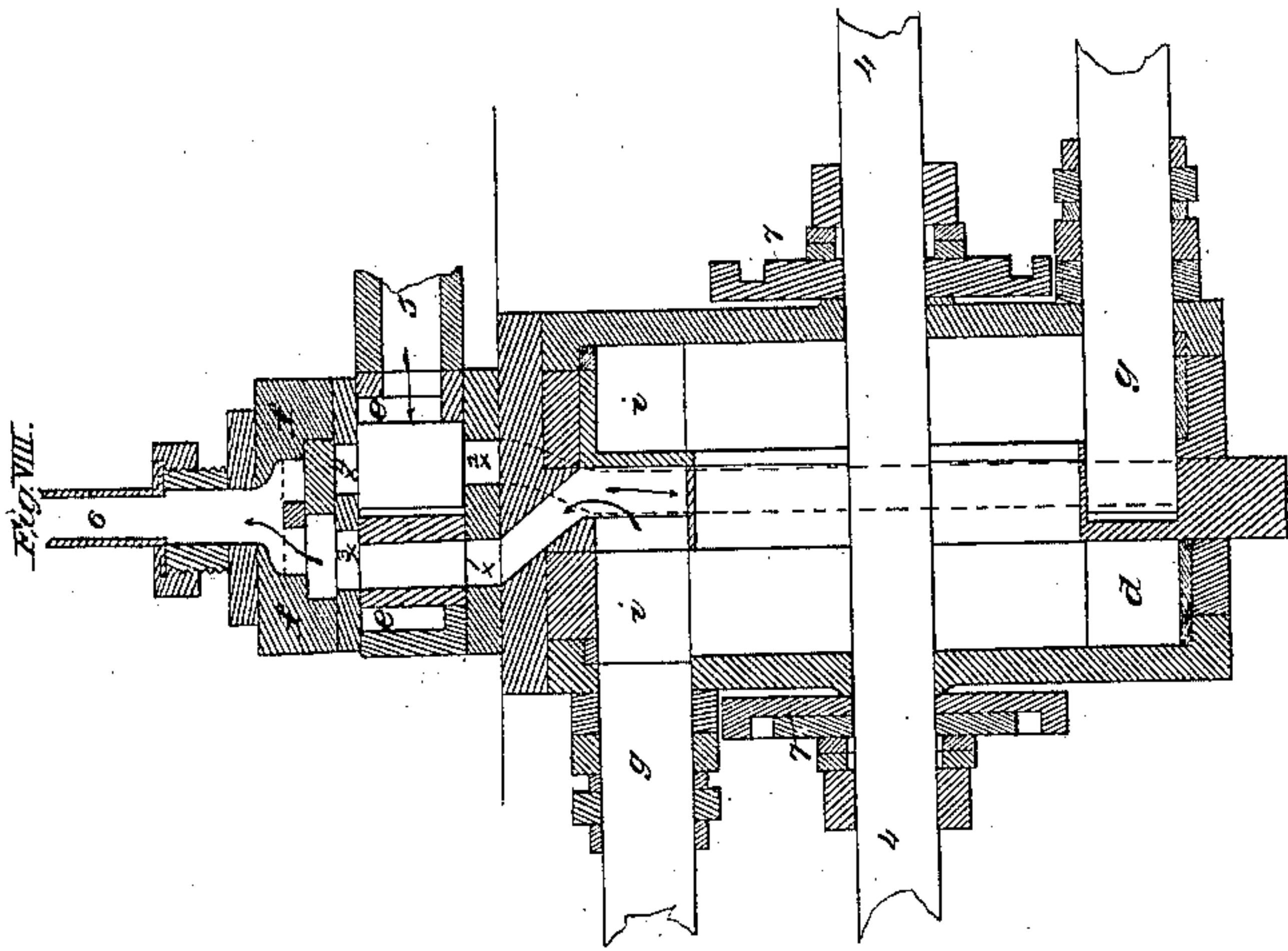
2 Sheets-Sheet 2.

J. W. Webb,

Rotary Steam Engine.

No 9,550.

Patented Jan. 18, 1853.



UNITED STATES PATENT OFFICE.

JOSEPH W. WEBB, OF AURORA, NEW YORK, ASSIGNOR TO BENJAMIN GOULD.

IMPROVEMENT IN VALVES OF ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. 9,550, dated January 18, 1853.

To all whom it may concern:

Be it known that I, JOSEPH WARREN WEBB, of Aurora, in the county of Cayuga and State of New York, have invented a new and useful improvement in rotary, steam, and other power engines which gives to it all the advantages of the expansive power of the steam, as in the reciprocating engines, giving equal power at every point as it revolves, with cut-off valves so constructed and arranged as to enable the engine to be used without greater expense of steam or decrease of rapidity of motion than the reciprocating engine, of which the following is a specification.

My invention consists, principally, in so constructing, arranging, and operating the steam-chest valves, exhaust-chamber, and slides with reference to each other and with reference to the ports and cylinders that steam may be made to operate expansively in said cylinders in a more convenient, effective, and economical manner than has hitherto been effected.

To accomplish my objects in the most efficient manner I construct a double engine having two annular cylinders firmly connected to each other and stationary, but which do not communicate with each other. Each has its ports, stop, and piston, &c., as usual, but so arranged that when the steam is exhausting from one cylinder it shall be operating in its greatest power upon the piston of the other, and vice versa, the pistons being firmly connected to the same shaft by means of appropriate disks, which are familiarly known. Both cylinders receive steam from the same steam-chest, but through different ports governed by separate valves, and both exhaust into the same exhaust-chamber, each through its own valve and through an aperture in the top of the steam-chamber governed by slides, which are stationary when the engine is in operation, but shifted for reversing at the pleasure of the engineer.

The following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure I is a geometrical view of the side or flank of the engine. Figs. II and VIII are vertical sections parallel with the axis, show-

ing the interior of the two cylinders and the pistons *i* and steam-stop *g*. Figs. IV and VII are sections of the engine perpendicular to the axis on both sides, showing the piston *i*, the cavity *g*, for receiving the steam-stop *g*, and the ports *a* for the induction and education of steam. Figs. III, VII, and VIII show the peculiar construction of the steam and cut-off valves 1 and 2 in steam-chest *e*. Figs. V, VII, and VIII show the peculiar construction of the slide-plate valves 3 and 4 in exhaust-chamber *f*. Fig. VI shows the plan of the engine, looking down on the top of the same.

The steam enters the steam-chest through the pipe marked 5, Fig. II, and issues from the exhaust-chamber through the pipe 6, Fig. VII.

e is the steam-chest, and *f* the exhaust-chamber. The steam-chest, as seen in the drawings, has four apertures or ports on the lower side, two of which belong to each engine and are controlled by each steam-valve. It has also four larger apertures on the upper side, two of which are controlled by each of the slides in the exhaust-chamber, and each of these apertures corresponds with an opening through the steam-valves. When the action of the engine is direct, the steam exhausts through one of these openings in the steam-valve, and when reversed it exhausts through the other, the slides being so adjusted or shifted that the aperture over that opening in the valve through which the exhaust is to take place shall be constantly open. The form of the valves and slides is fully shown in the drawings. The slides are merely oblong plates fitted to their seats and held down by projections in the upper part of the exhaust-chamber. Rods are also connected with these slides, passing out at the end of the chamber, and further connected with a lever by which the position of the slides is shifted at the pleasure of the engineer.

The steam-valves fit snugly both to the upper and lower sides of the steam-chests, space being left around them for the admission of the steam, as seen in the drawings, the steam passing into the cylinder at the end of the valve. The openings through the valves are enlarged to such a degree at the bottom and the solid part of the valve is left so thin at

the end that before the steam-port is closed to cut off the steam it opens into the opening through the valve, and but for the slide in the exhaust-chamber the steam would immediately escape from the cylinder. The steam passing up through the valve and against the slide will tend to balance the valve by pressure upon the upper side of it, thus diminishing friction. By thus widening the aperture through the valve at the lower side the exhaust-passage is constantly kept open, and when the engine is reversed the change in the position of the valve is made less than under other arrangements, thus allowing the steam-chamber to be smaller and diminishing any loss of steam which might result from the size of the chamber, and I am enabled to make these improvements by the use of the slides and the separate openings through the valves for the exhaust. The valves are operated by a cam on the main shaft through the medium of connecting-rods, levers, &c., of common construction and arrangement, and which require no particular description, but are shown on the drawings. The same may be said of the operation of the stops. The cams operating the valves and stops are seen on opposite sides of the engine and connected with the shaft in Fig. VII.

When the throttle-valve or gate is opened, the valves being in proper position, the steam enters the steam-chest, and passing by the end of the first valve enters the steam-port, and thence passes down through the channel marked *j* to the port *a*, when it enters the cylinder between the stop *g* and piston *i*. Thence it forces forward and follows the piston. The whole direction is indicated by the black arrows on the drawings, particularly Fig. VII. The pistons are placed directly opposite to each other on a line parallel to the axis, as shown in Fig. VIII. When the piston and shaft have been driven about half-way around, the steam enters the second cylinder through the port at the opposite end of the second steam-valve and passes down through the opening *a* between the second stop and the second piston, as shown in drawing Fig. VII, the red arrows showing its course. Immediately after the steam last admitted com-

mences to take its full effect the first valve cuts the steam off from the first cylinder, and from the time of cutting off until the exhaust the steam in the first cylinder acts by expansion, the slide in the exhaust-chamber preventing its escape. When the first piston passes the opening *a*, the steam behind it exhausts through that opening, taking the course indicated by the black arrows through the valve to the exhaust-chamber, and is thence discharged into the air or condenser, while the steam behind the other piston continues to do the work until the lower stop *g* is withdrawn, the first piston passes it, the stop resumes its place, and the steam begins to enter again behind the first valve. When the steam is cut off from the second piston it continues to act by expansion until the second piston reaches the opening *a*, when it escapes in the direction indicated by the red arrows through the second or red valve, the same operations are repeated, and thus motion is given to the shaft and the dead-points avoided. The engine is reversed by connecting the valve-rods with a second set of levers (shown in the drawings) with motions the reverse of the first, and shifting the slides, and thus admitting the steam through the passage first used for the exhaust and exhausting through those originally used for induction.

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

Making two exhaust-openings such as described separate and distinct from each other through each steam and cut-off valve, said valves having seats on the upper as well as lower side of the steam-chamber, each of said exhaust-openings communicating with the exhaust-chamber through apertures in the upper side of the steam-chamber which are opened and closed at pleasure by slides used in connection with the valves for governing or reversing the engine, the whole being constructed, arranged, and operating substantially as described and represented.

J. W. WEBB.

Witnesses:

ROBT. MILLS,
E. FRIEDRICH.