

No. 628,945.

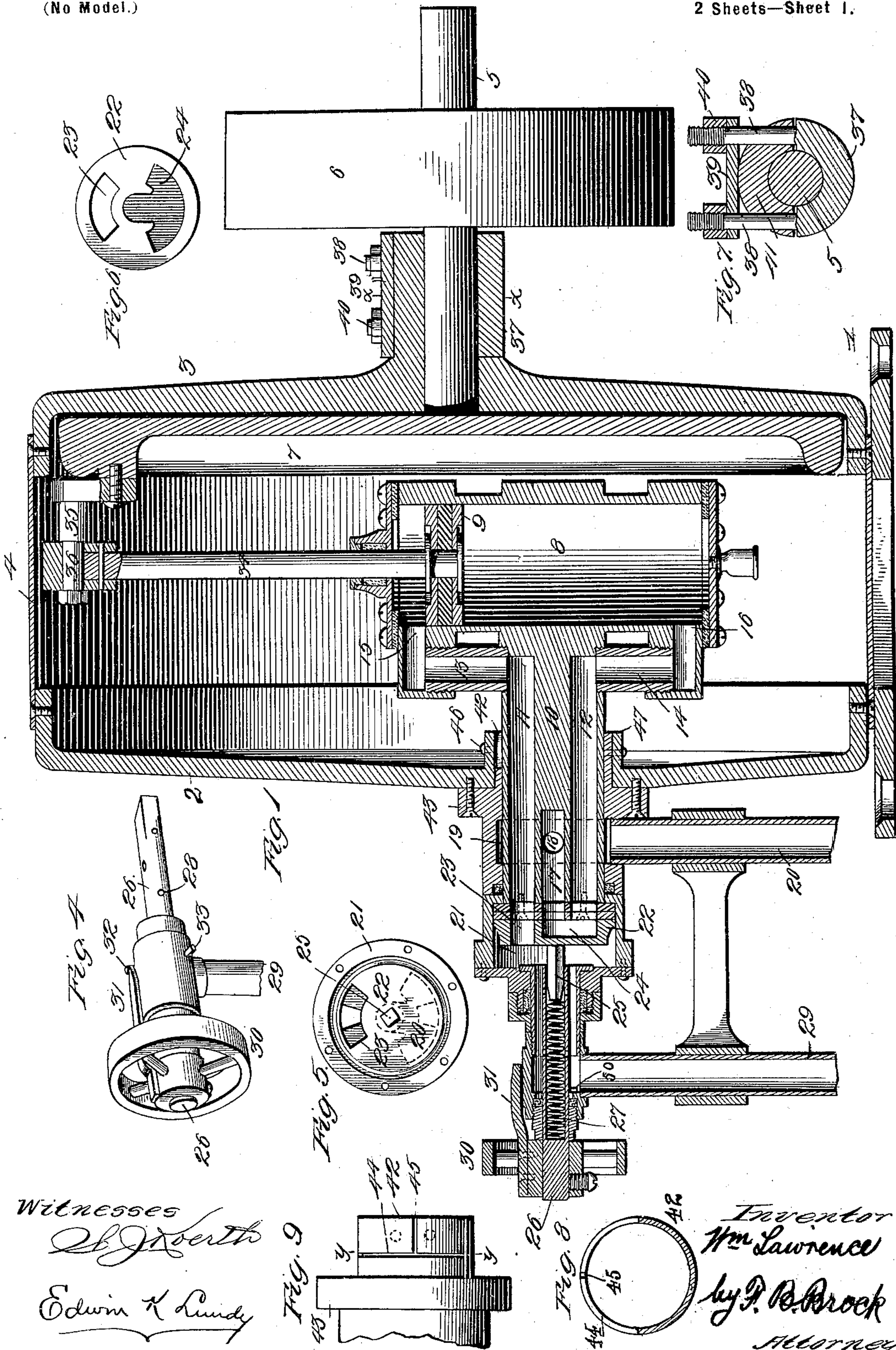
Patented July 18, 1899.

W. LAWRENCE.
ROTARY CYLINDER ENGINE.

(Application filed Apr. 2, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
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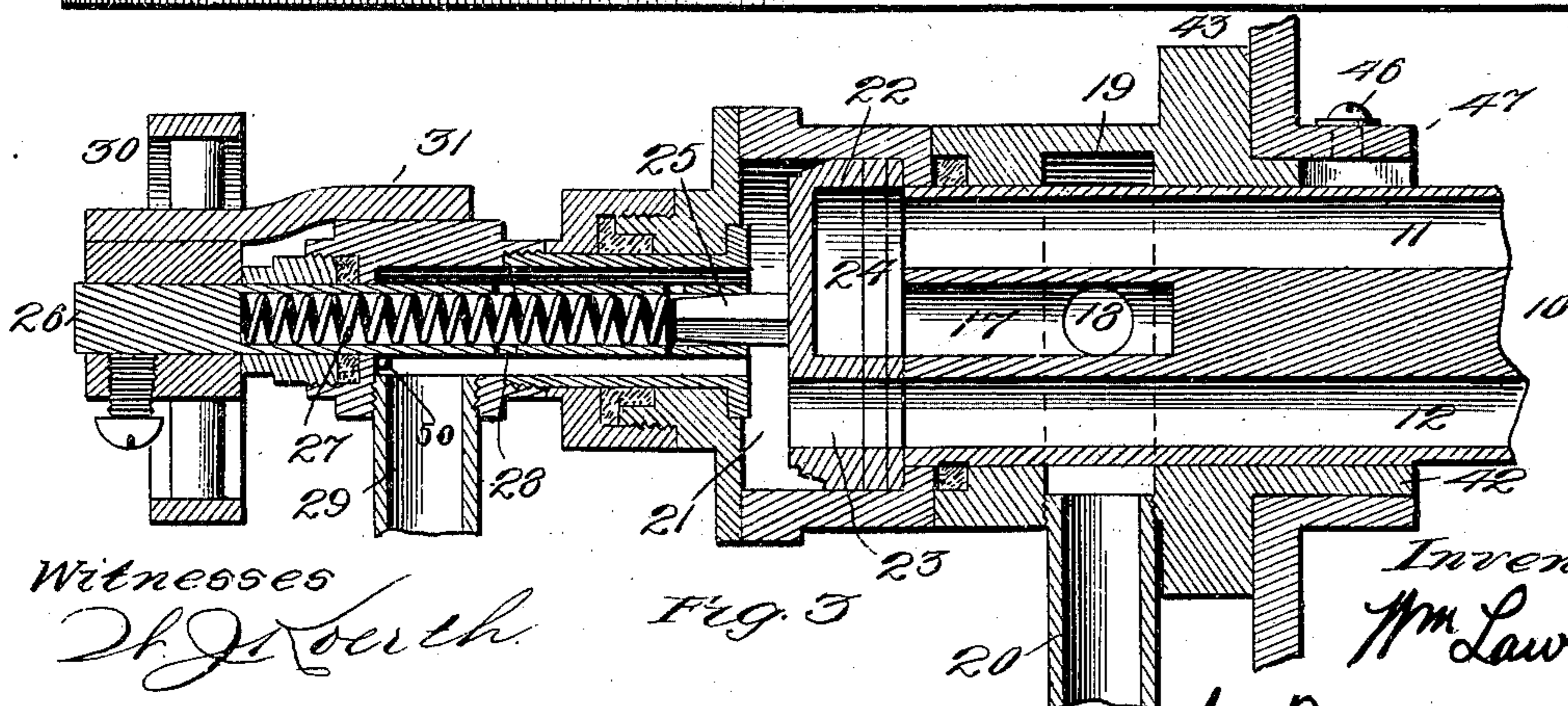
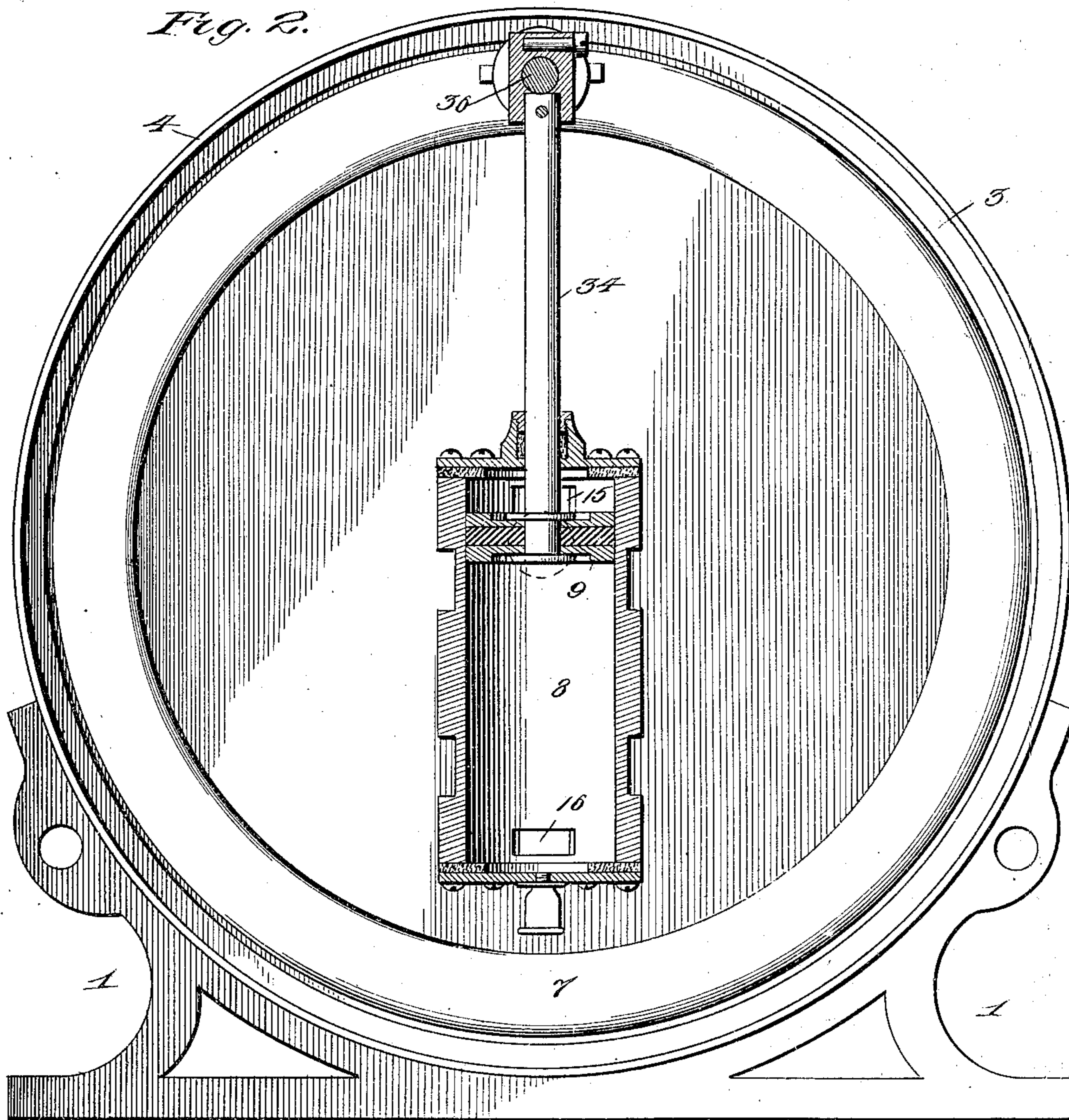
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Fig. 3

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UNITED STATES PATENT OFFICE.

WILLIAM LAWRENCE, OF NEW YORK, N. Y.

ROTARY-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 628,945, dated July 18, 1899.

Application filed April 2, 1898. Serial No. 676,195. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LAWRENCE, a citizen of the United States, residing at New York, in the borough of Manhattan and State of New York, have invented and produced a new and useful Improvement in Rotary-Cylinder Engines; and I do 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, reference being had to the figures marked on the accompanying drawings, which form a part of this specification.

Figure 1 is a central longitudinal section of an engine to which I have applied my improvements. Fig. 2 is a transverse vertical section with parts in elevation. Fig. 3 is an enlarged detail longitudinal section of the valve and its connections. Fig. 4 is a detail perspective view of the valve-actuating apparatus. Fig. 5 is a face view of the valve and steam-chest. Fig. 6 is a detail view of the valve on the opposite side from that shown in Fig. 5. Fig. 7 is a detail transverse section through the line *xx* of Fig. 1. Figs. 8 and 9 are respectively detail views in cross-section and elevation of the valve and cylinder-bearing 43, Fig. 8 being a cross-section on the line *yy* of Fig. 9.

My invention consists in the following construction and combination of parts, the details of which will first be described and the patentable features then set forth and claimed.

The construction and operation of this engine will be described in connection with steam as an actuating vapor or fluid for purposes of clearness; but it will be understood that gas, air, steam, or any other vapor or fluid may be employed as a motive force.

In the drawings, 1 represents a bed-plate upon which the engine is supported.

2 and 3 are supporting plates or disks inclosing the cylinder and forming bearings for the drive-shaft, cylinder, valve, and valve-operating devices.

4 is a plate or band forming, in connection with plates 2 and 3, the casing, completely inclosing the cylinder and adapted to contain oil for lubricating the interior parts.

5 is a drive-shaft mounted centrally of the engine-casing and carrying a drive-pulley 6 and the disk, wheel, or crank 7 within the

casing, both parts 6 and 7 being rigid with the shaft 5.

8 is a cylinder of the reciprocating type mounted in a bearing in the plate 2 opposite the drive-shaft bearing and eccentric thereto or out of axial line therewith.

Piston 9 of cylinder 8 has a reciprocating movement, and the cylinder itself has a rotary motion upon the spindle or shaft bearing 10 in the plate 2. Spindle 10 has longitudinal channels 11 and 12, communicating with passages 13 and 14, leading to ports 15 and 16 in the opposite ends of the cylinder 8. Channels 11 and 12 serve to alternately admit and exhaust steam from either side of the piston 9.

17 is a channel in spindle 10 between channels 11 and 12, which communicates with the exhaust of the engine, it being provided with an opening or openings 18, leading to the annular channel 19, communicating at all times with the exhaust-pipe 20.

21 is a steam-chest provided with the oscillating valve 22, which valve is provided with a live-steam port 23 and an exhaust-channel 24.

25 is a valve-spindle rigid with valve 22.

26 is the valve-stem, which is preferably cylindrical upon its inner end and adapted to interlock with the valve-stem 25 to control the action of the valve 22.

27 is a spring interposed between the stem 25 and spindle 26 to hold the valve against its seat at all times. The hollow portion of valve-spindle 26 is preferably perforated at 28 to permit the actuating-steam to pass freely through upon either side of the spindle. The spindle 26 is held in place by a suitable stop, such as 50, engaging a portion of the spindle-casing.

29 is the live-steam inlet-pipe and enters the steam-chest alongside the valve-spindle.

The valve-operating wheel or handle 30 is rigid with the spindle 26 and carries a finger or stop 31, adapted to be controlled by stops 32 and 33 for the purpose of limiting the throw of the valve in reversing the engine. An intermediate position of the wheel 30 and finger 31 shuts off the supply of steam and stops the engine.

The various operative parts are provided

with stuffing-boxes and packing in the usual way.

The outer end of the piston-rod 34 is secured to a wrist-pin 35, having a suitable journal 36, the wrist-pin being securely fastened to the disk or wheel 7.

The bearing for the drive-shaft 5 has its under section 37 supported by threaded bolts 38 and plate 39, so that the weight of the shaft 5 is carried on the bearing 37 and may be adjustably set up toward the upper bearing 41 by means of the adjusting-nuts 40. The upper bearing 41 is rigid with and carried by the plate 3. By this means a very delicate adjustment of the shaft-bearing 5 is obtained. In like manner the sleeve 42 of the bearing 43 upon the opposite side of the cylinder is split transversely at 44 for about half of its circumference, and a longitudinal split 45 is made from the transverse split 44 to the outer end of the sleeve 42. Adjusting-screws 46 are placed in an annular ring 47 upon either side of the split 45 and serves to adjustably bear down upon the spring-sections of the sleeve 42, and as a result a very sensitive and delicate adjustment of this bearing is obtained.

Interposed between the valve 22 and its valve-seat is the usual packing and adjustment common to valves.

In operation if the engine is desired to be run to the left the valve-wheel 30 is turned to the left, and if desired to run to the right wheel-finger 31 is turned to the right. An intermediate position stops the engine. Variations in the speed of the engine are governed by the valve in the usual way. In Fig. 1 the piston 9 has just completed its outward stroke and the valve has been shifted so that its live-steam port 23 registers with the channel 11 and its exhaust-channel 24 establishes a communication between the channel 12 and the exhaust-channel 17. Steam thereupon enters the channel 11 and forces the piston to the opposite end of the cylinder and the steam in the cylinder exhausted through channel 12 out through exhaust-pipe 20. The opposite position of the valve when live steam enters channel 12 and exhausts through channel 11, is shown in Fig. 3. The continuous rotary motion of the cylinder and spindle 10 brings the live-steam and exhaust channels of the valve alternatively in register with the channels 11 and 12 and the continuous rotary motion of the cylinder is had in either direction. The rotary motion of the cylinder and the reciprocating motion of its piston through the wrist-pin 35 and the wheel 7 serves to impart a continuous rotary motion to the wheel 7 and drives the rotary shaft 5 and its connections.

The drawings herein referred to exemplify simply the means of carrying out my invention. It will be understood that the principle of my invention may be embodied in many different and specific ways. For instance, the wheel 7 may be simply a crank-arm and

another pulley may be provided to give steadiness of motion to the engine. The casing of the engine may likewise be designed in various ways, as well as the particular valve apparatus or other parts of the device.

I contemplate providing this engine with a governor device of any suitable type.

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

1. The combination of a cylinder, a cylinder-spindle upon which the cylinder rotates having a central exhaust-channel and inlet-channels upon either side thereof, a reciprocating piston and piston-rod, a drive-shaft, an arm or wheel upon the drive-shaft, a journal connection between the piston-rod and arm or wheel, and a valve having ports for opening and closing the channels in said spindle.

2. The combination of a cylinder, a cylinder-spindle upon which the cylinder rotates having a central exhaust-channel and inlet-channels upon either side thereof, a valve upon the end of the cylinder-spindle and a spindle-bearing having an annular exhaust-chamber in communication with the central exhaust-channel.

3. A rotary-spindle bearing for a rotary cylinder provided with a central exhaust-channel, and oppositely-disposed inlet and outlet channels a valve upon the end of the cylinder-spindle combined with a spindle-bearing having an annular exhaust-chamber therein, the central exhaust-channel being provided with the transverse channel leading therefrom into the exhaust-chamber.

4. The combination of a rotary cylinder, a rotary-cylinder spindle secured thereto having a central exhaust-channel and inlet-channels upon either side thereof, and an oscillating valve having an inlet-port adapted to communicate alternately with the inlet-channels, and having also a passage or channel adapted to alternately communicate with the inlet-channels and the exhaust-channel.

5. The combination of a rotary cylinder, a rotary-cylinder spindle secured thereto having a central exhaust and inlet channels upon either side thereof, and a spring-pressed valve adapted to register with the inlet and exhaust channels.

6. The combination of a rotary cylinder, a cylinder-spindle secured thereto having a central exhaust-channel and inlet-channels upon either side thereof, an oscillating valve adapted to control said channels provided with a valve-stem, a valve-spindle adapted to interlock with the valve-stem and a spring connection between the valve-stem and the valve-spindle.

7. The combination of a rotary cylinder, a rotary spindle secured thereto having inlet and exhaust channels, an oscillating valve adapted to control said channels having a valve-stem, a valve-spindle adapted to interlock with said valve-stem, said spindle being hollow and provided with perforations, and a

spring interposed between the valve-stem and spindle.

5 8. A disk valve provided with a segmental steam-inlet port upon one side of the center and an exhaust-port channel upon the other, both ports being on the same side of the valve, said channel being a segmental-shaped recess with an intermediate extension extending into the axial center of the valve.

10 9. In an engine, the combination of a cylinder, a valve provided with a valve-spindle

adapted to interlock with the valve-stem, a spindle-casing having stops thereon, and a valve-handle secured to the valve-spindle carrying a finger adapted to oscillate between said stops. 15

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

WILLIAM LAWRENCE.

Witnesses:

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CHRISTOPHER J. CRONIN.