

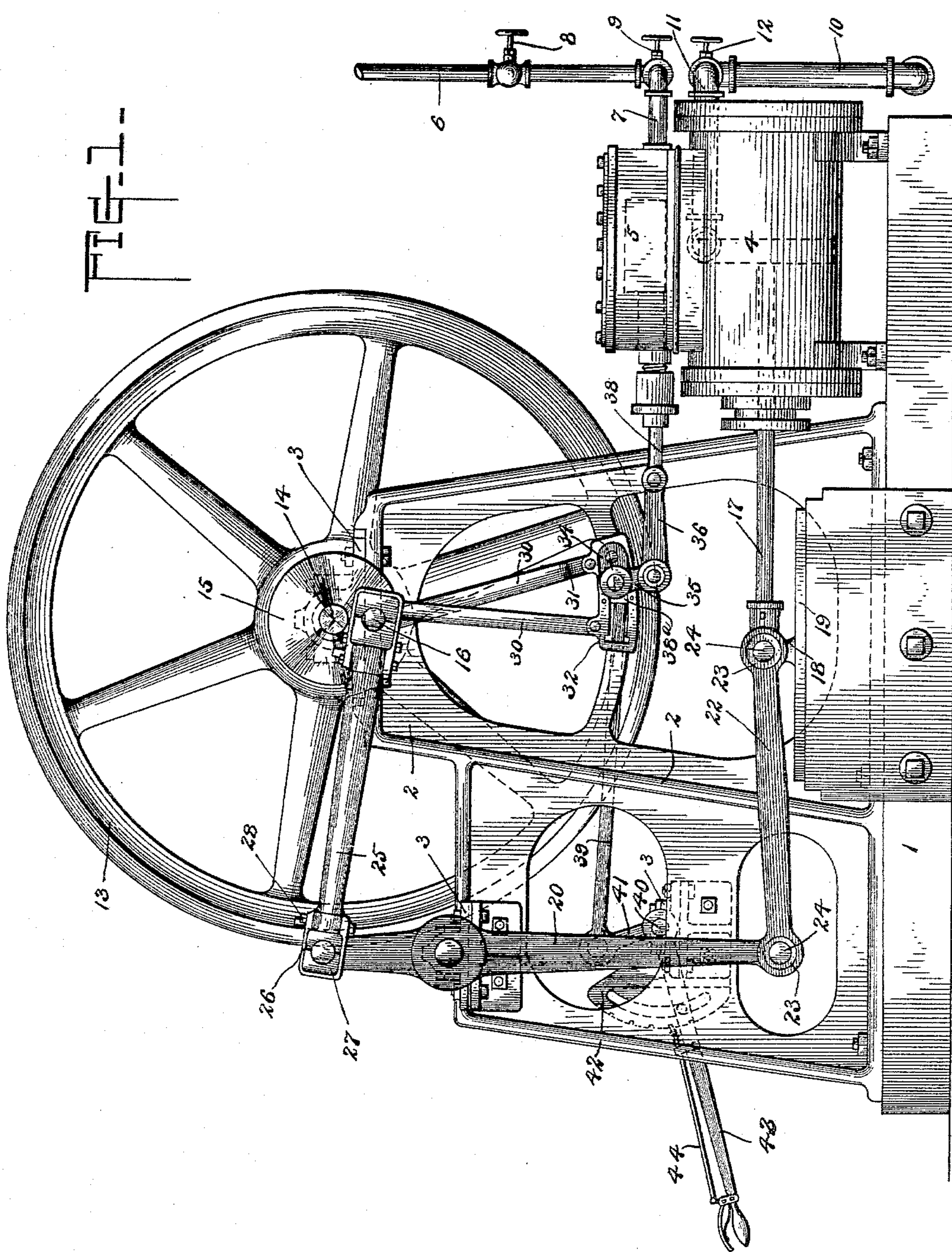
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3 Sheets—Sheet 1.

J. PORRITT.
ENGINE.

No. 602,794.

Patented Apr. 19, 1898.



WITNESSES
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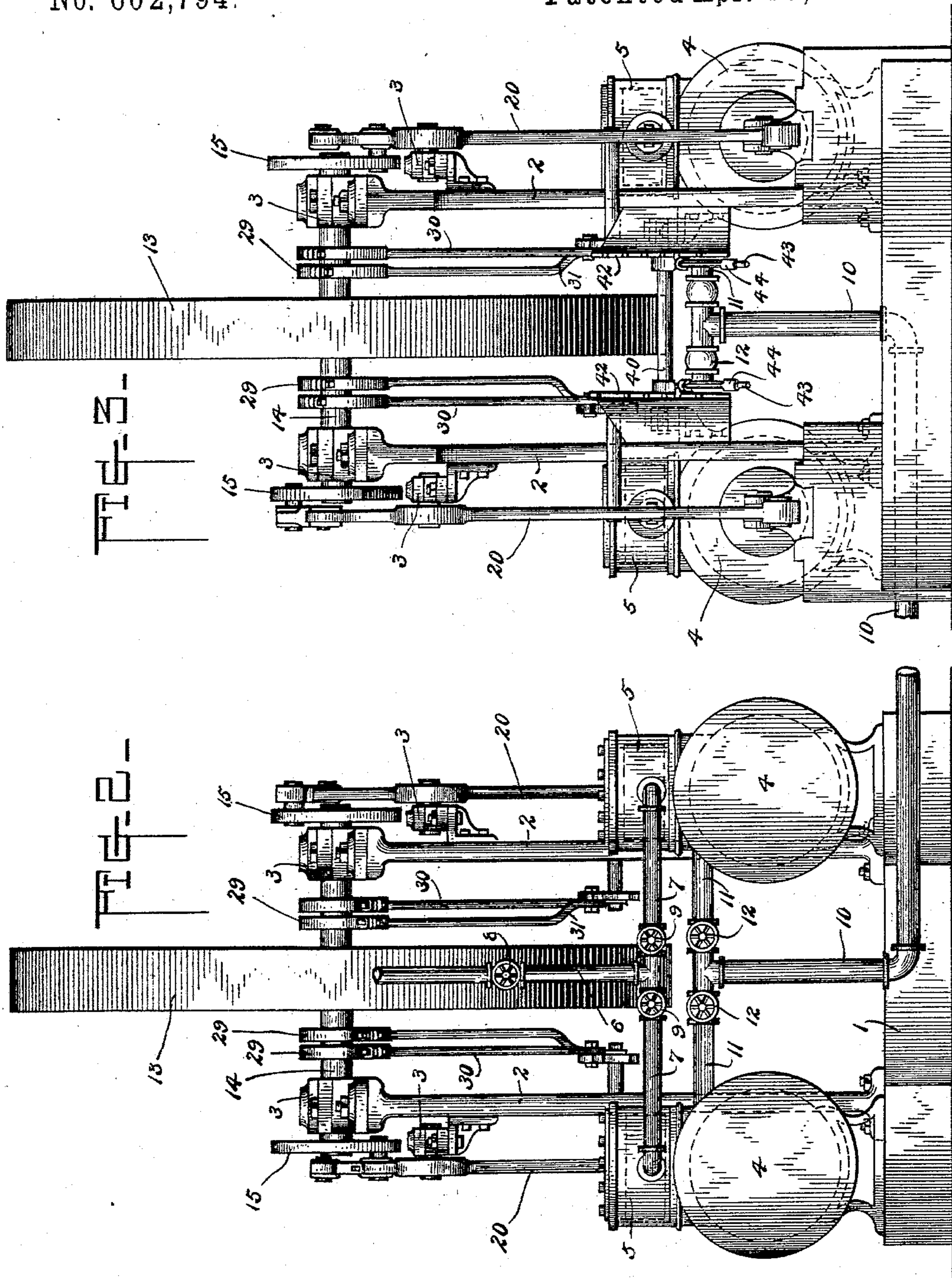
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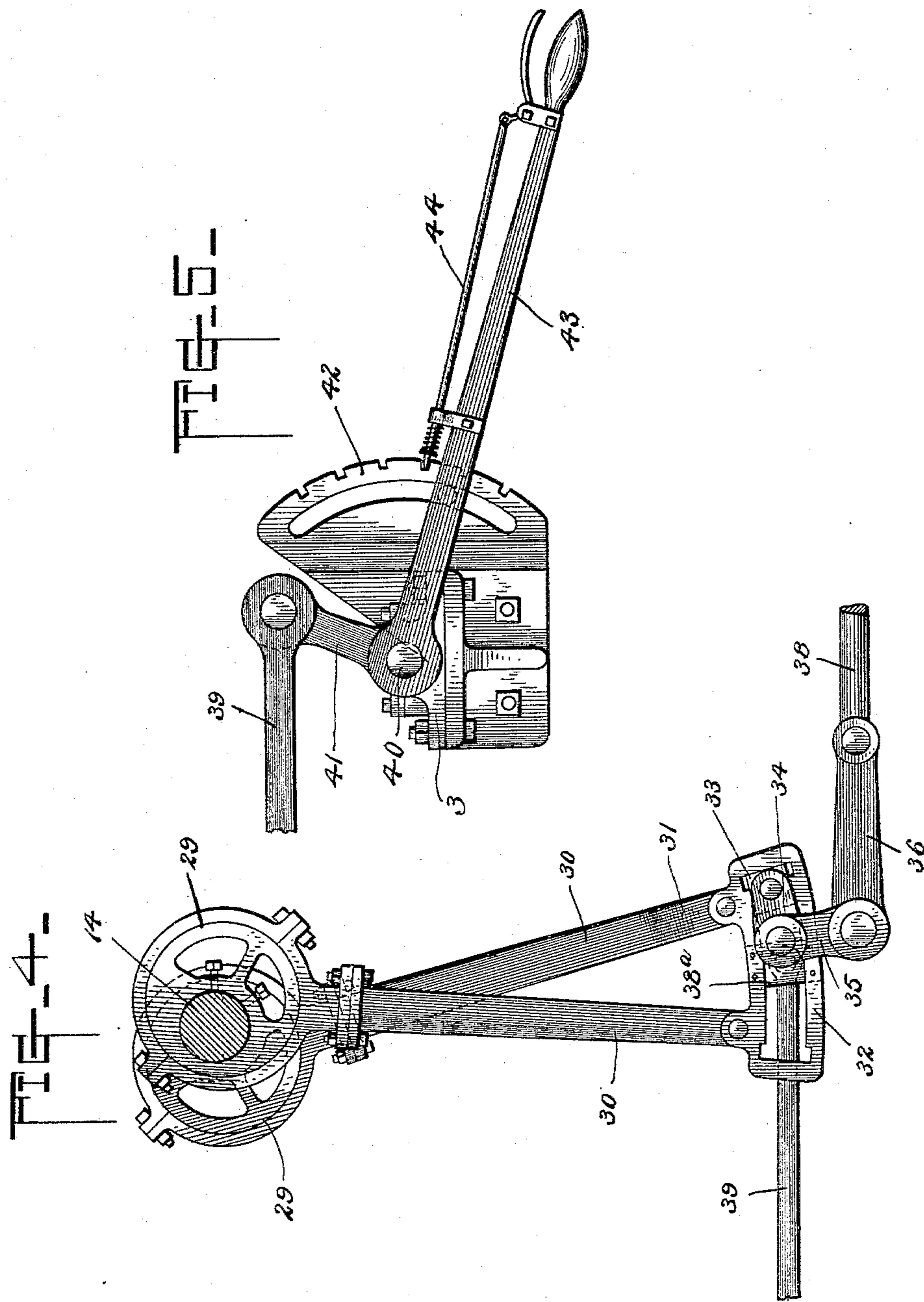
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UNITED STATES PATENT OFFICE.

JOSIAH PORRITT, OF SAN FRANCISCO, CALIFORNIA.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 602,794, dated April 19, 1898.

Application filed December 31, 1896. Serial No. 617,613. (No model.)

To all whom it may concern:

Be it known that I, JOSIAH PORRITT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in 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.

My invention relates to steam-engines; and its object is to provide a steam-engine in which the steam will be more fully expanded while in the cylinder and an increase in power obtained.

My invention consists of a framework supporting a fly-wheel and one or more steam-cylinders adapted to operate said fly-wheel by suitable mechanism, the novel features of construction and combination of parts of which are hereinafter fully described, and pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved steam-engine. Fig. 2 is an elevation from the back end of the cylinders. Fig. 3 is a similar view from the front ends thereof. Fig. 4 is a detail of eccentric-rods, and Fig. 5 is a detail of operating-lever.

The numeral 1 indicates a base of the usual form, which may be either constructed integrally with or attached to the frame of the engine. The frame 2 is designed to support the various parts of the engine, and, as indicated above, this may be integral with or attached to the base. Bearings 3 are supported where needed upon the frame. It will be obvious from what will hereinafter appear that this frame may be made in a variety of forms, according to the different sizes and proportions of the parts of my device. Cylinders 4, provided with steam-chests 5, are firmly attached by any suitable means to the base 1. These cylinders in my preferred form are two in number; but it will be obvious that one may be dispensed with or that one or more may be added, as this will simply entail the dispensing with or duplicating of certain operating parts to be hereinafter described. It is also obvious that these cylinders may be arranged for use as a simple engine, as shown, or they may be for double, triple, or higher

expansions. In the frame herein illustrated I have shown two cylinders used as for a simple engine, and when so used I provide a steam-pipe 6, divided into two portions 7, each of which connects with one of the steam-chests 5. The usual throttle-valve 8 controls the admission of steam in the main pipe, and I further provide valves 9, located in the branches thereof, thus rendering it possible to dispense with the use of one of the cylinders. An exhaust-pipe 10 receives the exhaust from the cylinders 4 and is divided into two branches 11, each of which is controlled by a valve 12 for the same purpose as the valves 9 in the steam-pipe. It is not deemed necessary to show the valves in the steam-chests, nor the piston in the cylinder, as these may be of any type, and in my present invention I do not claim any novelty in the construction of either. A fly-wheel 13 is carried upon a shaft 14, held to revolve in suitable bearings, as shown. This fly-wheel may be of any preferred form of construction and power may be taken from a belt running thereon, or the shaft 14 may be extended and provided with a belt-pulley. (Not deemed necessary to be here shown.) Upon the shaft 14 are located crank-disks 15, provided with the crank-pins 16. This fly-wheel is operated by means of a system of levers which will now be described. The pistons above referred to have attached thereto piston-rods 17, which are provided with cross-heads 18, adapted to slide in the guides 19. Vertical walking-beams 20 are provided with stub-shafts, which rotate within proper bearings upon the frame. The lower ends of these walking-beams are here shown as being about twice the length of the upper end thereof; but it is obvious that this proportion may be varied at pleasure. Connecting the lower ends of these walking-beams to the cross-heads 18 are side rods 22. These rods are shown as provided with ordinary brass bushings 23 and pin connections 24; but it will be plain to any one skilled in the art that any form of rod may be here substituted. The upper ends of the walking-beams are connected to the crank-pin 16 by means of the connecting-rods 25. These connecting-rods are provided with the usual straps 26, embracing brasses 27, and these straps are adapted to be tightened by any

suitable means—as, for instance, a gib and a cotter, as shown at 28. These walking-beams are so mounted that at the extremity of the stroke in either direction the side rods and the piston-rods will be in alinement. This construction will prevent upward pressure of the piston-rods. By this means also the lower or under surfaces of the cross-heads are adapted to form a broad wearing-surface, which may be easily lubricated and readily kept in alinement. It is now evident that the reciprocatory movement of the pistons within the cylinders will cause the fly-wheel to revolve. It is further evident that the crank-pin throw is of small length compared with the piston stroke. From this it is plain that the steam in the cylinders will have a greater chance of expansion than were the pistons directly connected to the fly-wheel.

I will now explain the manner in which I operate my valve-gear.

Upon the shaft 14 are firmly keyed eccentrics 29, and I preferably employ two of these upon each side of the fly-wheel, thus forming a separate valve-gear for each of the valves. To the eccentrics are firmly connected eccentric-rods 30, one of which has an offset portion, as shown at 31. Links 32 of the usual form are attached in the ordinary manner to these eccentric-rods. Within each link moves a link-block 33, having rotatably attached thereto an angled rocker-arm 34, mounted on a rock-shaft 35. To the lower end of the rocker-arm is attached a radius-rod 36, connecting with the valve-stem 38. In order to shift the link, I provide a saddle 38^a upon the back thereof, to which is attached a rod 39. The numeral 40 designates a tumbling-shaft which is provided with radial arms 41, to which the rods 39 are connected. This tumbling-shaft extends from one side of the frame to the other and is adapted to operate both links simultaneously. In order to regulate the cut-off, I provide the slotted segment 42, lever 43, connected to the tumbling-shaft 40, and latch 44, carried by said lever and adapted to engage the slots in the segment 42. I commonly employ but one of these levers; but when my engine is of large size two may be employed at the opposite ends of the tumbling-shaft.

It will be perfectly evident that many modifications may be made of my engine without departing from the spirit of the invention, since it may be used, as heretofore stated, as either a simple or compound engine. It may be used also for marine purposes, in which case the fly-wheel is dispensed with and the shaft 14 forms a part of the propeller-shaft, the remainder of the engine being inverted or turned vertically instead of horizontally, and by other modifications can be used as well for locomotive purposes. My special purpose, however, is for use in small engines where the great power gained with the small use of steam makes it extremely desirable. From experiment I have determined that in

this device great power can be developed with small steam expenditure, and I herein provide a construction that is easily repaired, of cheap first cost, and extremely efficient and thoroughly adapted for the purposes described.

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

1. In an engine, the combination with a base and frame consisting of side plates or standards, of horizontally-disposed cylinders mounted on said base and arranged on opposite sides of the standards, pistons moving within said cylinders, valves directly over and controlling the supply of steam to said cylinders, piston-rods connected to the pistons, a vertical walking-beam mounted on a stub-shaft on the exterior side of each standard, side rods connecting the lower ends of the said beams with the piston-rods, a horizontal shaft mounted in bearings in the upper ends of the standards and located between the said cylinders and beams, a fly-wheel mounted on said shaft between the standards, connecting-rods attached to the upper ends of the walking-beams and to the said horizontal shaft and adapted to rotate said fly-wheel, and valve-operating mechanism connected to the opposite ends of the said horizontal shaft for operating both of said steam-controlling valves simultaneously, substantially as described.

2. In an engine of the type described, the combination of a base and frame consisting of two side plates or standards rising therefrom, horizontally-disposed cylinders mounted on said base at opposite sides of the standards, pistons reciprocating within said cylinders, rods attached to said pistons, a vertical walking-beam mounted on a stub-shaft on the exterior side of each standard and having arms of unequal length, side rods connected to the lower ends of the longer arms of the said walking-beams and to the piston-rods, a horizontal shaft located between the cylinders and beams and mounted in bearings in the upper ends of the standards and carrying intermediate of its length between said standards a fly-wheel, a crank-disk secured upon each end of the shaft and provided with crank-pins, and connecting-rods between the crank-disks and the upper ends of the short arms of the walking-beam, said crank-disks and connecting-rods being arranged exteriorly of each standard, substantially as described.

3. In an engine of the type described, the combination of a base and a frame comprising two side standards rising therefrom, a pair of horizontally-disposed cylinders mounted on said base at opposite sides of the standards, cross-heads carried by the piston-rods, horizontally-disposed cross-head guides in which the said cross-heads operate, a pair of vertical walking-beams arranged at opposite sides of the base and mounted on stub-shafts projecting from exterior sides of the frame—

standards, valves controlling the steam-supply to said cylinders, side rods connecting said cross-heads and the lower ends of said walking-beams, a horizontal shaft mounted in the upper ends of said standards between the cylinders and beams, a fly-wheel on the said shaft between the standards, crank-disks on the opposite end of the said shaft, rods connecting the upper ends of the walking-beams with said crank-disks, eccentrics mounted on the horizontal shaft inside of the standards, a fly-wheel on the said shaft between the eccentrics, and means operatively connecting the said eccentrics and controlling-valves, substantially as described.

4. In an engine of the type described, the combination of a base and frame consisting of two side standards rising therefrom, a pair of horizontally-disposed cylinders mounted on said base at opposite sides of the standards, each cylinder being provided with a steam-chest, steam-supply pipes connecting the steam-supply chest with a common steam-supply, a piston in said cylinders provided with piston-rods, a valve operating within each steam-supply chest and adapted to control the supply of steam to the cylinders, said valves being provided with exteriorly-projecting stems or rods, cross-heads attached to the rods and moving in cross-head guides, a pair of vertically-disposed walking-beams having arms of unequal length and mounted on stub-shafts projecting from the opposite exterior sides of said standards, side rods connecting the longer lower arms of said beams and the cross-heads, a horizontal shaft rotatably mounted in bearings in the upper ends of said standards and located between the beams and cylinders, crank-disks attached to the ends of the shaft and arranged on the exterior sides of the standards, rods connecting said disks to the shorter upper arms of the walking-beams, a fly-wheel mounted on the horizontal shaft between said standards, a pair of eccentrics also mounted on said shaft between the frame and standards on opposite sides of the fly-wheel, a pair of depending eccentric-rods attached to each pair of eccentrics, links carried at the lower ends of said eccentric-rods, and connections between said links and valve stems or rods, substantially as described.

5. In an engine of the type described, the combination of a base, a frame consisting of two standards rising therefrom, a pair of horizontal cylinders mounted on said base at opposite sides of the frame, each cylinder being provided with a steam-chest, valves in said steam-chests provided with exteriorly-projecting valve-rods, a piston in each cylinder provided with a piston-rod carrying a cross-head movable in cross-head guides on the frame, a pair of vertical walking-beams having arms of unequal length and mounted on stub-shafts projecting from the exterior sides of the frame-standards, side rods connecting the lower or longer arms of said

walking-beams with the cross-heads, a horizontal shaft mounted in bearings in the upper ends of the frame-standards and located between said cylinders and beams, crank-disks secured to the outer ends of said shaft, rods connecting said disks with the upper shorter arms of said walking-beams, a pair of eccentrics attached to said shaft between the frame-standards and provided with depending arms or rods arranged in pairs, a single link located on the exterior side of the frame-standards and connected to the lower ends of the arms or rods depending from the eccentrics, a link-block held to slide within each of said links, a rock-shaft mounted in the frame-standards and provided with bell-crank rocker-arms secured to the valve-stems, and means located between the said standards for shifting said links, substantially as described.

6. In an engine of the type described, the combination of a base, a frame consisting of two side standards rising therefrom, a pair of horizontally-disposed cylinders mounted on said base at opposite sides of said standards, said cylinders each being provided with a steam-chest and valves therein for controlling the supply of steam, a piston in each cylinder provided with a piston-rod, a cross-head secured to each piston-rod and operating in cross-head guides on the frame, a pair of vertical walking-beams at opposite sides of the engine and mounted on stub-shafts projecting from the exterior sides of each frame-standard, side rods connecting the lower arm of each walking-beam with the adjoining cross-head, a horizontal shaft rotatably mounted in bearings in the upper ends of said standards and located between the cylinders and said beams, cranks secured to the outer projecting ends of said shaft, rods connecting said crank-disks with the upper ends of said walking-beams, eccentrics mounted on the shaft between the said frame-standards and provided with depending eccentric arms or rods arranged in pairs on opposite sides, a single link located on the exterior side of each frame and connected to the lower ends of each pair of eccentric arms or rods, link-blocks sliding in said links, a rock-shaft arranged between the frame-standards and provided with rocker-arms rotatable thereon, radius-rods connecting the rocker-arms to said valves, a tumbling-shaft provided with a plurality of rocker-arms, saddles carried by said links, rods connecting said saddles to the rocker-arms upon the tumbling-shaft, a lever connected with said shaft between the frame-standards, and means to lock the lever for regulating the cut-off of the valves, substantially as described.

7. In an engine of the type described, the combination of a base, a frame consisting of side standards rising therefrom, a pair of horizontally-disposed cylinders mounted on said base at opposite sides of the standards, each cylinder being provided with a steam-chest and controlling-valve operating therein and

also with a valve-stem, pistons operating in
said cylinders and provided with rods con-
nected to cross-heads movable in cross-head
guides on the frame, a pair of vertical walk-
5 ing-beams having arms of unequal length,
said beams being mounted on stub-shafts pro-
jecting from the exterior side of each frame-
standard, side rods connecting the lower
longer arms of the beams to said cross-heads,
10 a horizontal shaft rotatably mounted in bear-
ings in the upper ends of said frame-stand-
ards between the cylinders and said beams,
crank-disks attached to the projecting ends
of said shaft, rods connecting said crank-
15 disks with the upper shorter arms of the walk-
ing-beams, a fly-wheel mounted on said hori-
zontal shaft between the frame-standards, a
pair of eccentrics also mounted on said shaft
and on each side of the fly-wheel and between
20 the same and the standards, crank-disks se-
cured to the outer projecting ends of said
walking-beams, eccentrics mounted on the
shaft between the said frame-standards and
provided with depending pairs of eccentric

arms or rods having a single link connected 25
to the lower ends of each pair, link-blocks
sliding in said links, a rock-shaft mounted
between said standards and provided with
rocker-arms, radius-rods connecting said
rocker-arms and valve-stems, a tumbling- 30
shaft also provided with rocker-arms, saddles
carried by the links, rods connecting said sad-
dles with the rocker-arms of the tumbling-
shaft, a lever adapted to rotate said rocker-
shaft and arranged between said frame-stand- 35
ards, a segmental rack carried by one of said
standards, and a pawl or latch carried by the
lever adapted to engage with the teeth of said
rack and thus regulate the cut-off valves, sub-
stantially as described. 40

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

JOSIAH PORRITT.

Witnesses:

THOS. E. CURRAN,

JOSEPH D. FLAHERTY.