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J. W. McQUAY.

STEAM ENGINE.

APPLICATION FILED JUNE 21, 1901.

NO MODEL.

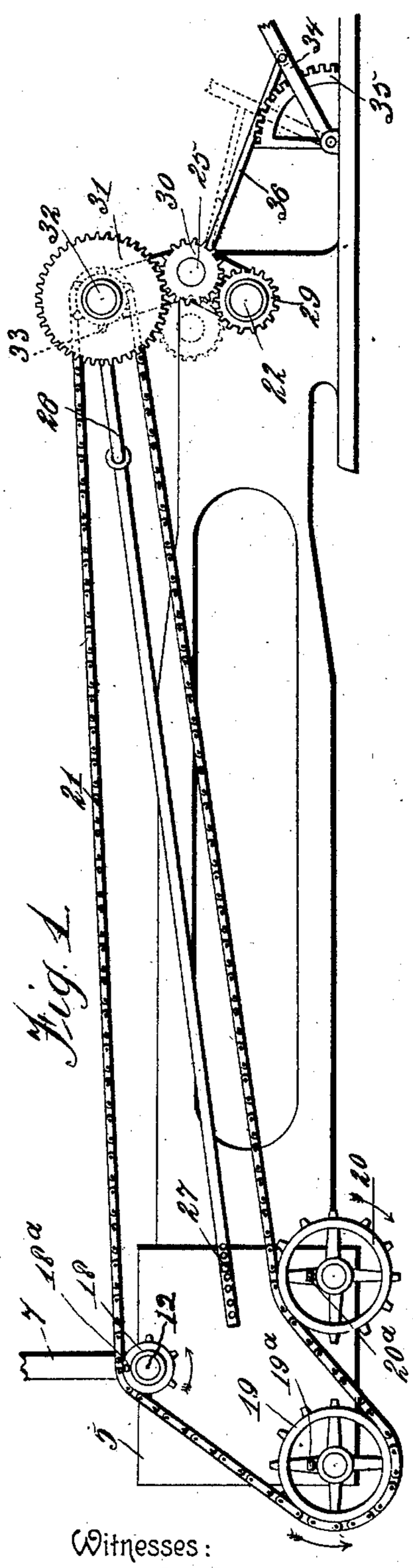

Fig. 1.

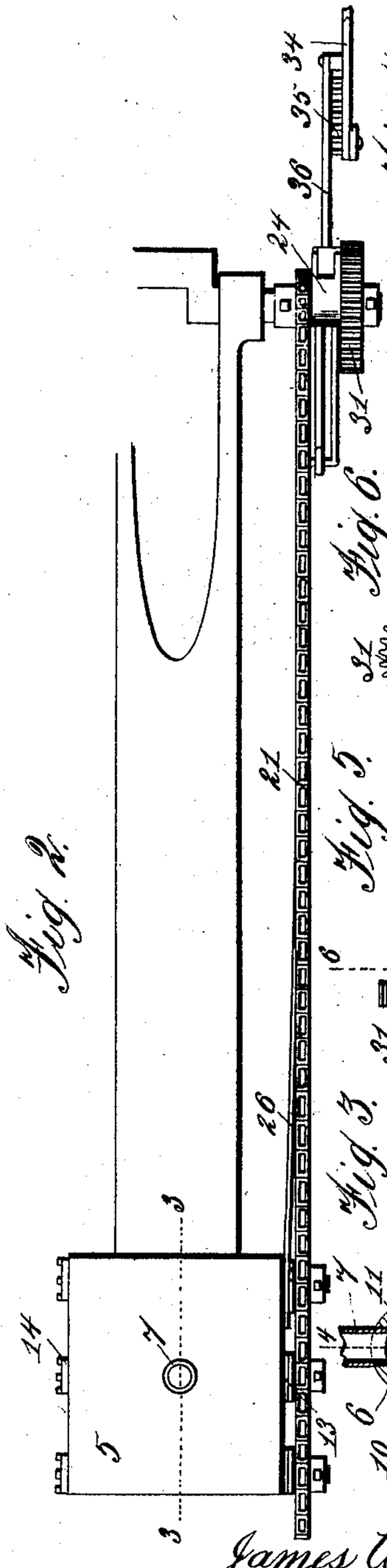

Fig. 2.

Fig. 4.

Fig. 6.

Fig. 5.

Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES WILLIAM McQUAY, OF VALLEY RIVER, CANADA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 719,493, dated February 3, 1903.

Application filed June 21, 1901. Serial No. 65,411. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILLIAM McQUAY, a subject of the King of Great Britain, residing at Valley River, county of Marquette, Province of Manitoba, Canada, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is 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 pertains to steam-engines. The use of cylinder-cocks is obviated.

A further object is to provide a simple reversing mechanism in which the elements are held locked firmly in their adjusted positions, so that the lead can be reversed by a simple movement of the lever.

With these ends in view the invention consists in the novel construction, combination, and arrangement of parts, as will be hereinafter fully described and claimed.

In the drawings, forming a part of this specification, Figure 1 is a side elevation of my invention. Fig. 2 is a plan view thereof. Fig. 3 is a longitudinal section through the piston-cylinder on the line 3 3 of Fig. 2. Fig. 4 is a transverse section through the inlet-valve on the line 4 4 of Fig. 3. Fig. 5 is a detail edge view of the train of driving-gears. Fig 6 is a vertical section on the line 6 6 of Fig. 5.

The same numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

5 designates a piston-cylinder having a feed-chamber 6, to which motive fluid—such as steam, compressed air, or the like—is supplied by a pipe 7. From this feed-chamber lead the inlet-ports 8, arranged to supply the motive fluid to opposite ends of the piston-chamber 9, and in the feed-chamber is seated a revoluble inlet-valve 10, the same having a single transverse passage 11, all as more clearly shown by Fig. 3. The inlet-valve 10 is arranged in the feed-chamber 6 so as to rotate on its longitudinal axis, and said valve is furnished at one end with a projecting spindle 12, the same passing through a stuffing-box 13, which is provided at one end of the feed-chamber 6, the other end of said feed-chamber being closed by a head 14, which is bolted to the cylinder. (See Fig. 4.)

In the bottom of the piston-cylinder are provided the exhaust-ports 15 15, which are located on opposite sides of the travel of the piston therein (the latter being indicated by dotted lines in Fig. 3) and adapted to alternately exhaust motive fluid from opposite sides of the piston. These exhaust-passages are controlled by the revoluble exhaust-valves 16 17, the former having the intersecting passages 16^a 16^b and the latter having similar intersecting passages 17^a 17^b. (See Fig. 3.) Each revoluble exhaust-valve has a stem which passes through a stuffing-box, similar to the inlet-valve, but as the construction and arrangement of the parts are the same I have not considered it necessary to illustrate such construction and arrangement by the drawings.

The spindle 12 of the inlet-valve 10 has a sprocket-gear 18, secured thereon by means of a set-screw 18^a. The spindle of the exhaust-valve 16 has a large sprocket-gear 19, fastened thereon by means of a clamping-screw 19^a, and the spindle of the other exhaust-valve 17 has a sprocket-gear 20, fastened thereto by a set-screw 20^a. (See Figs. 1 and 2.) The sprocket-wheels 19 20 are of the same diameter and have the same number of teeth, whereas the sprocket-gear 18 of the inlet-valve is one-half the diameter of either sprocket-wheel 19 or 20 and has one-half the number of teeth thereon, whereby the inlet-valve is adapted to be driven at twice the speed of either exhaust-valve. It is evident that the set-screw of either sprocket-wheel may be released for the purpose of adjusting the valve to the required position.

In lieu of an eccentric-rod, the eccentric and the strap commonly employed in engines, and the well-known means for reversing the engine, I employ an endless driving-chain and a train of gears adapted to be shifted by a lever and to be driven positively by suitable means from the engine-shaft. The endless sprocket-chain 21 is arranged to drive the gears of the inlet and exhaust valves, and, as shown by Fig. 1, this chain passes over the sprocket-gear 18 of the inlet-valve, below the sprocket-gear 19 of the exhaust-valve 16, and

above the sprocket-gear 20 of the exhaust-valve 17, whereby the exhaust-valves 16 17 will be driven in opposite directions, as indicated by the arrows in Fig. 1.

22 designates a fixed arbor which is supported in a horizontal position on the framework of the engine, and on this arbor is loosely fitted the lower portion of a sectional post or standard, the same comprising the members 23 24, which are connected pivotally together by a movable fulcrum-shaft 25. This shaft is long enough to extend beyond the sectional post and through the overlapping ends of the members 23 24 thereof, and the lower end of this post is loosely fitted on the fixed arbor 22, so as to turn back and forth thereon. The upper post member 24 is stayed by means of a brace-rod 26, which has an adjustable connection at 27 to a part of the engine-framework—as, for instance, to the piston-cylinder, as shown by Fig. 1—and when the post is adjusted, as will presently appear, this stay-rod should also be moved to accommodate the same to the different positions assumed by the standard.

A compound gear element is loosely fitted on the fixed arbor 22 at a point adjacent to the standard, said compound gear element consisting of a pulley 28 and a gear-pinion 29, the same being integral or united for simultaneous rotation. This compound gear element is adapted to have the pulley 28 encompassed by a belt (not shown) which may be driven from the engine-shaft or other part of the engine, and the gear 29 of the compound element has intermeshing engagement with a spur gear-pinion 30, the latter being secured to one end of the movable fulcrum-shaft 25. This intermediate gear 30 in turn has intermeshing engagement with a gear-wheel 31, which is secured to a shaft 32, the latter being journaled in the upper portion of the post member 24, said shaft 32 having a sprocket-wheel 33 made fast thereon by means of the set-screw 33ª. This sprocket-wheel 33 is engaged by the endless drive-chain 21, which derives its motion from the train of gears for the operation of the series of valves.

34 designates the reversing-lever, which is adapted to be held in place by a pawl which engages with the segment 35, and to this lever is pivoted a link 36, which has pivotal connection at 37 with the lower member 23 of the sectional post, whereby the lever may be operated to reverse the standard and make the train of gears shift the valves, so as to reverse the lead of the engine independently of the motion derived from the compound gear element.

From the exhaust-passages 15 in the bottom of the piston-cylinder lead the exhaust-passages 38, having communication with a single exhaust-pipe 39, whereby the exhausted motive fluid may be carried away from the engine.

The valve mechanism herein described may be adapted as an expansion cut-off engine by variation in the size of the port of the inlet-valve, as will be readily understood.

The location of the exhaust-valves at the lower side of the piston-chamber obviates the employment of the cylinder-cocks ordinarily used, because the steam and water of condensation will be discharged from the bottom of the cylinder.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts, while their essential features are retained and the spirit of the invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Having now particularly described my invention, what I claim as new is—

1. The combination with the piston-cylinder provided at one side with feed-chamber and at the other side oppositely-disposed ports, exhaust-valves rotatably mounted to control the exhaust-ports, a rotatable valve controlling the flow from the said feed-chamber to the opposite ends of the cylinder, sprocket-gears on the extended ends of the shafts of the exhaust-valves, a sprocket-gear of half the diameter thereof on the shaft of the inlet-valve, an endless sprocket-chain passed over the gear of the inlet-valve, under one of the gears of the exhaust-valves and over the other, to revolve said valves in opposite directions at one-half the speed of the inlet-valve, as set forth.

2. The combination with the piston-cylinder having at its upper side a feed-chamber with passages therefrom to opposite ends of the cylinder, exhaust-ports at opposite ends of the bottom of the said cylinder upon opposite sides of the travel of the piston, revoluble valves controlling the exhaust-ports, a revoluble valve controlling the inlet, sprocket-gears on the extended ends of the shafts of said valves, the gear on the shaft of the inlet-valve being of one-half the diameter of those on the shafts of the exhaust-valves, an endless sprocket-chain engaging said gears to revolve the exhaust-valves in opposite directions at one-half the speed of the inlet-valve, and an exhaust-pipe having common outlet and connected with the exhaust-ports at opposite ends of the said cylinder, substantially as shown and described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES WILLIAM McQUAY.

Witnesses:
SAM. MURRAY,
JACOB CATHERS.