

No. 681,180.

Patented Aug. 27, 1901.

J. C. BAKER.
ENGINE.

(Application filed Sept. 5, 1900.)

(No Model.)

3 Sheets—Sheet 1.

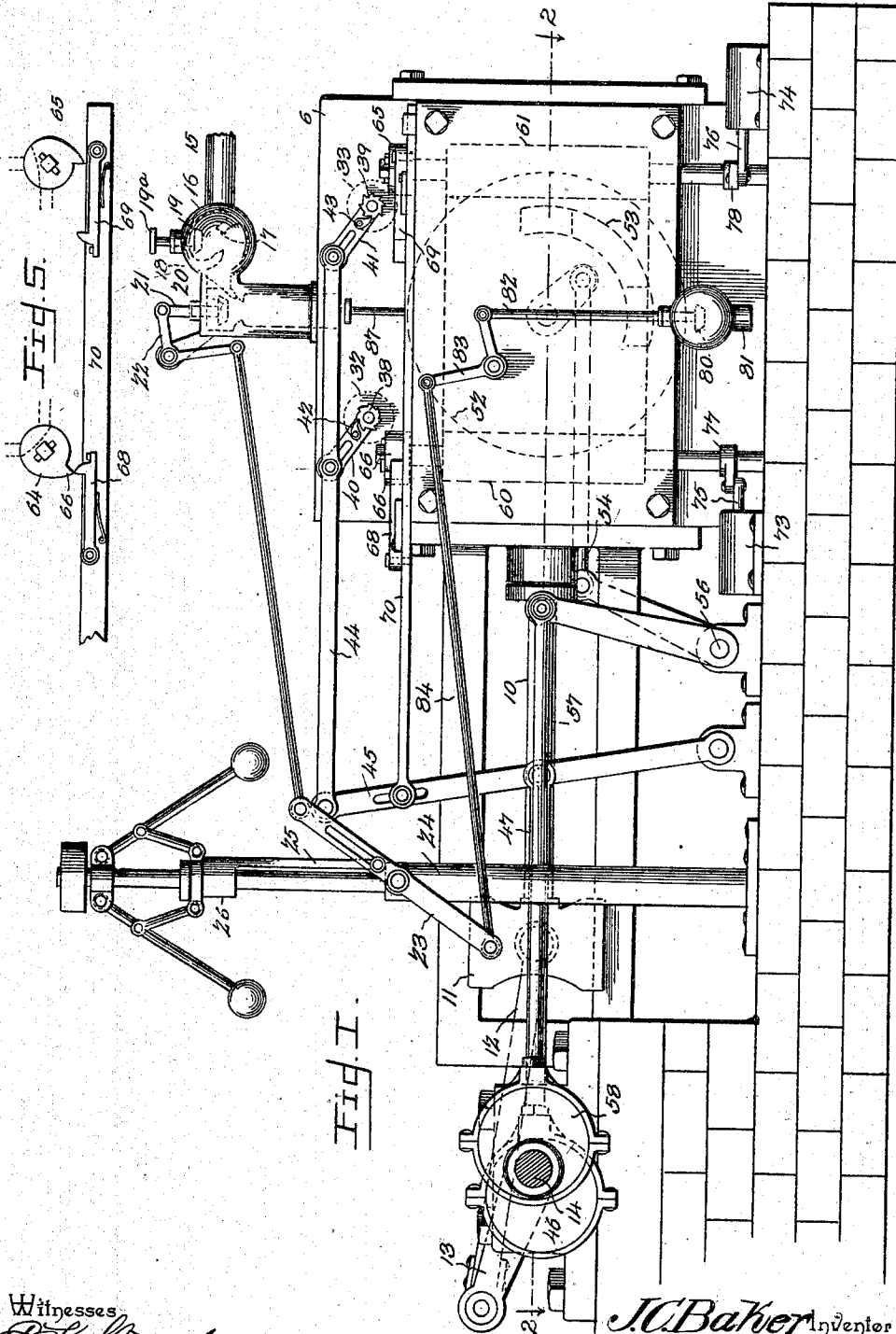


Fig. 5.

Fig. 1.

Witnesses
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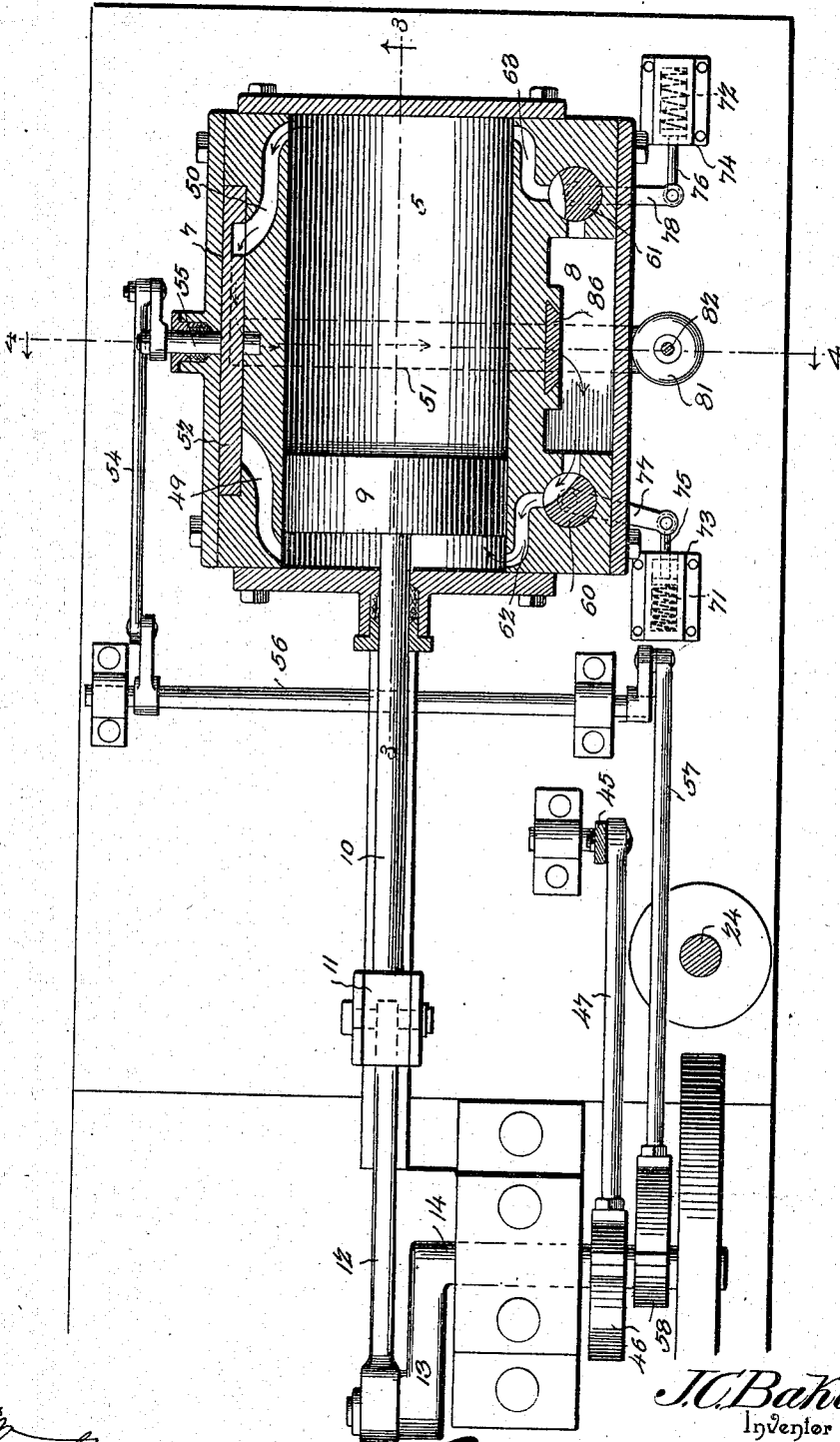
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Fig. 2.



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Fig. 3.

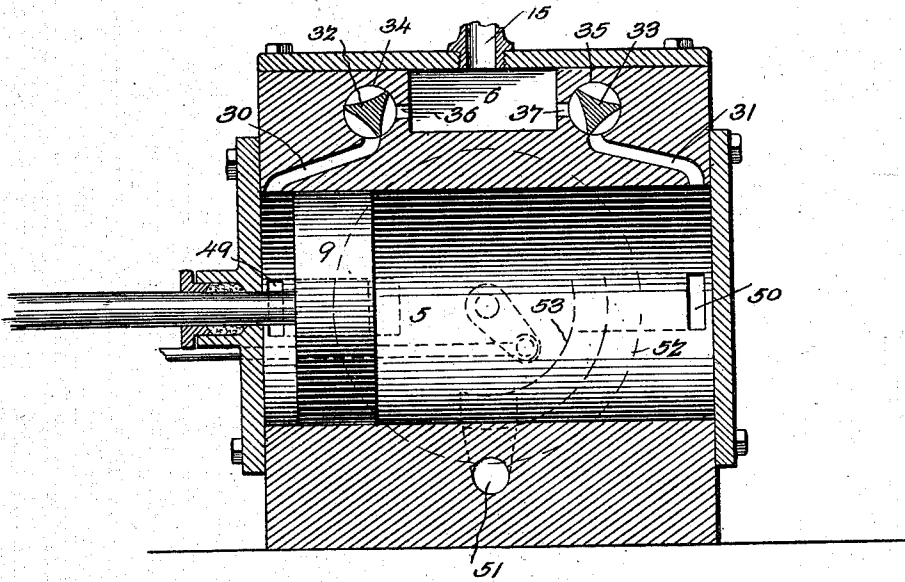
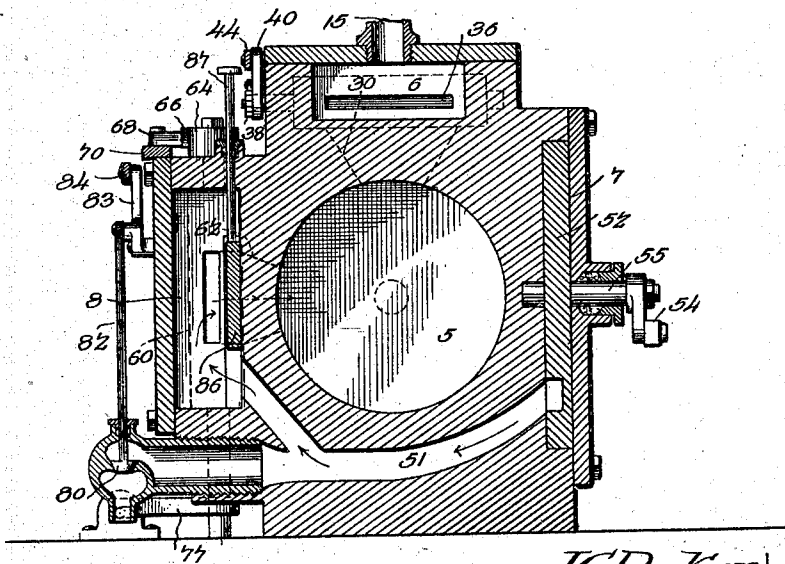


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH CLARK BAKER, OF WARREN, TEXAS.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 681,180, dated August 27, 1901.

Application filed September 5, 1900. Serial No. 29,065. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CLARK BAKER, a citizen of the United States, residing at Warren, in the county of Tyler and State of Texas, have invented a new and useful Engine, of which the following is a specification.

This invention relates to steam-engines in general, and more particularly to the class of reciprocating steam-engines, although the invention is equally applicable to engines driven by any fluid-pressure, the object of the invention being to construct an engine in which both live steam and exhaust-steam may be utilized against a single piston to reciprocate it.

Further objects and advantages of the invention will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation showing the complete engine, the shaft being shown in section and the fly-wheel omitted. Fig. 2 is a section on line 2 2 of Fig. 1, the piston and its rod, with the shaft, eccentrics, and some of the connected parts, being in elevation. Fig. 3 is a section on line 3 3 of Fig. 2. Fig. 4 is a section on line 4 4 of Fig. 2. Fig. 5 is an elevation showing one of the valve-operating mechanisms.

Referring now to the drawings, the engine of the present invention consists of a cylinder 5, having three steam-chests 6, 7, and 8, and in this cylinder is disposed a reciprocating piston 9, having a rod 10, which connects with a cross-head 11, with which is connected a connecting-rod 12, leading to the crank 13 of the engine-shaft 14.

Leading to the steam-chest 6 is a feed-pipe 15, including a valve 16, the casing of which contains two valve-seats 17 and 18, of which the former is the throttle-seat and receives the throttle-valve head 19, operated by a screw-stem in the usual manner. The valve-seat 18 is located between the seat 17 and the steam-chest and is adapted to receive a reciprocating valve-head 20, the stem 21 of which is pivoted to a bell-crank lever 22, which is in turn connected with an operating-rocker 23. This rocker 23 is pivoted upon a standard 24 and has a connecting-rod 25 ad-

justably connected therewith and leading to the collar 26 of a common form of ballast-ball device. Thus as the collar is raised by the outward swinging of the ballast-balls the rocker is moved pivotally to close the governing-valve and cut off the supply of steam.

Steam-ports 30 and 31 lead from the chest 6 to the front and rear ends of the cylinder, respectively, and these ports are opened and closed alternately by means of rotary valves 32 and 33, disposed in cylindrical casings 34 and 35, which communicate with the ports and the steam-chest, these rotary valves being substantially triangular and having their edges snugly fitting against the inner faces of the casings. The casings 34 and 35 communicate with the chest 6 through ports 36 and 37, which lie at right angles to the ports 30 and 31, so that for each rotation of one hundred and twenty degrees the ports 36 and 37 will be brought into communication and then out of communication. To operate these valves to bring their respective ends of the cylinder into communication with the chest 6 alternately, the end of each valve exterior to the chest is provided with a ratchet-wheel, (shown at 38 and 39,) and upon the projecting ends of the valves are pivotally mounted rockers 40 and 41, carrying pawls 42 and 43, the pawls and ratchets being oppositely disposed and the rockers being connected with a common rod 44, so that as the rod is reciprocated the rockers will be operated to engage their pawls with the ratchets and rotate the valves alternately to communicate the ports governed thereby. The rod 44 is connected with a rock-lever 45, which is operated from an eccentric 46 upon shaft 14 through an eccentric-rod 47.

The chest 7 is connected with the ends of the cylinder 5 by means of exhaust-ports 49 and 50, and leading from the chest 7 to the chest 8 is an exhaust-passage 51, the ports 49 and 50 being brought alternately into communication with the passage 51 through the medium of an oscillatory valve 52, of disk shape to fit snugly in chest 7, this valve 52 having a recess 53 in its inner face, which covers first port 49 and the passage 51 and then port 50 and passage 51. This valve is oscillated by means of a connecting-rod 54, attached to the crank-shaft 55 of the valve

and leading to a rock-shaft 56, which is in turn connected with an eccentric-rod 57, connected with an eccentric 58 upon shaft 14. Thus as the engine is operated the ends of the cylinder are alternately exhausted, the parts being 5 so set that the admission of steam begins after the piston has traversed a portion of the length of the cylinder, while the exhaust at the opposite side of the piston is continuous 10 during the entire stroke of the piston. The object in admitting the live steam after a portion of the stroke has been completed is in order that the exhaust-steam may be utilized over again on the face of the piston by returning 15 it from the exhaust side to the feed side of the piston during the initial movement of the piston. To thus supply exhaust-steam to the feed side of the piston at both strokes of the piston, the chest 8 and its cooperating 20 valves 60 and 61 are provided. The valves 60 and 61 are cylindrical rotary valves, and each has a passage cut in its face, these passages of the valves being adapted to communicate the feed-ports 62 and 63 alternately 25 with the chest 8, which communicates with the chest 7 through the exhaust-passage 51.

Each of the valves 60 and 61 has a disk 64 and 65, respectively, upon the exposed end of its stem, said disks having lugs 66 and 67, respectively, each having a flat face and a 30 curved face, the flat faces being disposed toward each other or in opposite directions, as shown in Fig. 6. These lugs are adapted for engagement alternately by oppositely-disposed triggers 68 and 69, which are spring-pressed and are mounted upon a reciprocatory 35 rod 70, operatively connected with the rocker 45. Thus as the rod 70 is reciprocated its triggers alternately engage and release the 40 lugs to open the valves and permit them to close, the closing of the valves being accomplished by means of springs 71 and 72, disposed in casings 73 and 74, and against which 45 press pistons having rods 75 and 76, pivotally connected with crank-arms 77 and 78, fixed to the valves.

The operation of the engine is as follows: The valves being in the positions shown, the piston is traveling toward the rear of the cylinder and the exhaust-port 50 is in communication with the exhaust-passage 51, as indicated in dotted lines in Fig. 1 of the drawings, the chest 8 being in communication with the front end of the cylinder through the 50 port 62. The exhaust-steam from the rear end of the cylinder then runs to the front end of the cylinder and feeds thereinto during a portion of the stroke of the piston, the ports 30 and 31 being at this time cut off. 55 When the stroke is partly completed, the valve 60 is closed and valve 32 is opened, when the live steam enters through port 30 to the front side of the piston and drives the

latter rearwardly. The excess of exhaust-steam after the closing of the valve 60 must 65 be exhausted from chest 8, and for this purpose a valve 80 is provided in the exhaust-pipe 81, which leads from the exhaust-passage 51, said valve having its stem 82 connected with a bell-crank lever 83, which is in 70 turn connected with rocker 23 by means of a rod 84. Thus when there is an excessive accumulation of steam in chest 8 the speed of the engine decreases, when the ballast-balls drop and open the valve 81 to permit exhaust 75 of steam, the governor-valve being at the same time opened to admit more steam.

When the engine is to be used without utilizing the exhaust-steam in the manner above described, a gate-valve 86, which governs the 80 end of the exhaust-passage 51 where it enters chest 8, is closed and the stem of valve 80 is released from its operating mechanism and is opened to permit the exhaust to pass directly from the exhaust-passage through 85 the valve. The gate-valve has a rod 87, through the medium of which said valve may be operated by hand.

What is claimed is—

1. A steam-engine comprising a cylinder 90 having a piston therein, a steam-chest for live steam having ports communicating with the ends of the cylinder, valves adapted to open and close said ports alternately, exhaust-ports for the cylinder, an exhaust-passage, 95 a valve adapted to communicate the exhaust-passage with the exhaust-ports alternately, a chest communicating with the exhaust-passage, and valved ports communicating the last-named chest with the ends of 100 the cylinder, said last-named valves being adapted for operation alternately and in advance of the valve of the live-steam chest.

2. A steam-engine comprising a cylinder 105 having a piston therein, a steam-chest for live steam, valved ports connecting said chest with opposite ends of the cylinder and adapted for alternate operation, exhaust-ports for the cylinder, an exhaust-passage, a valve for communicating the exhaust-passage with the 110 exhaust-ports alternately, a chest connected with the exhaust-passage, valved ports leading from the last-named chest to the ends of the cylinder to supply exhaust-steam thereto alternately, a relief-valve, a governor connected 115 with the relief-valve for operating it, and means for opening the live-steam feed-ports subsequent to the opening of the exhaust-steam feed-ports.

In testimony that I claim the foregoing as 120 my own I have hereto affixed my signature in the presence of two witnesses.

JOSEPH CLARK BAKER.

Witnesses:

T. B. BEATY,
C. Y. GREGORY.