G. W. BAKER.

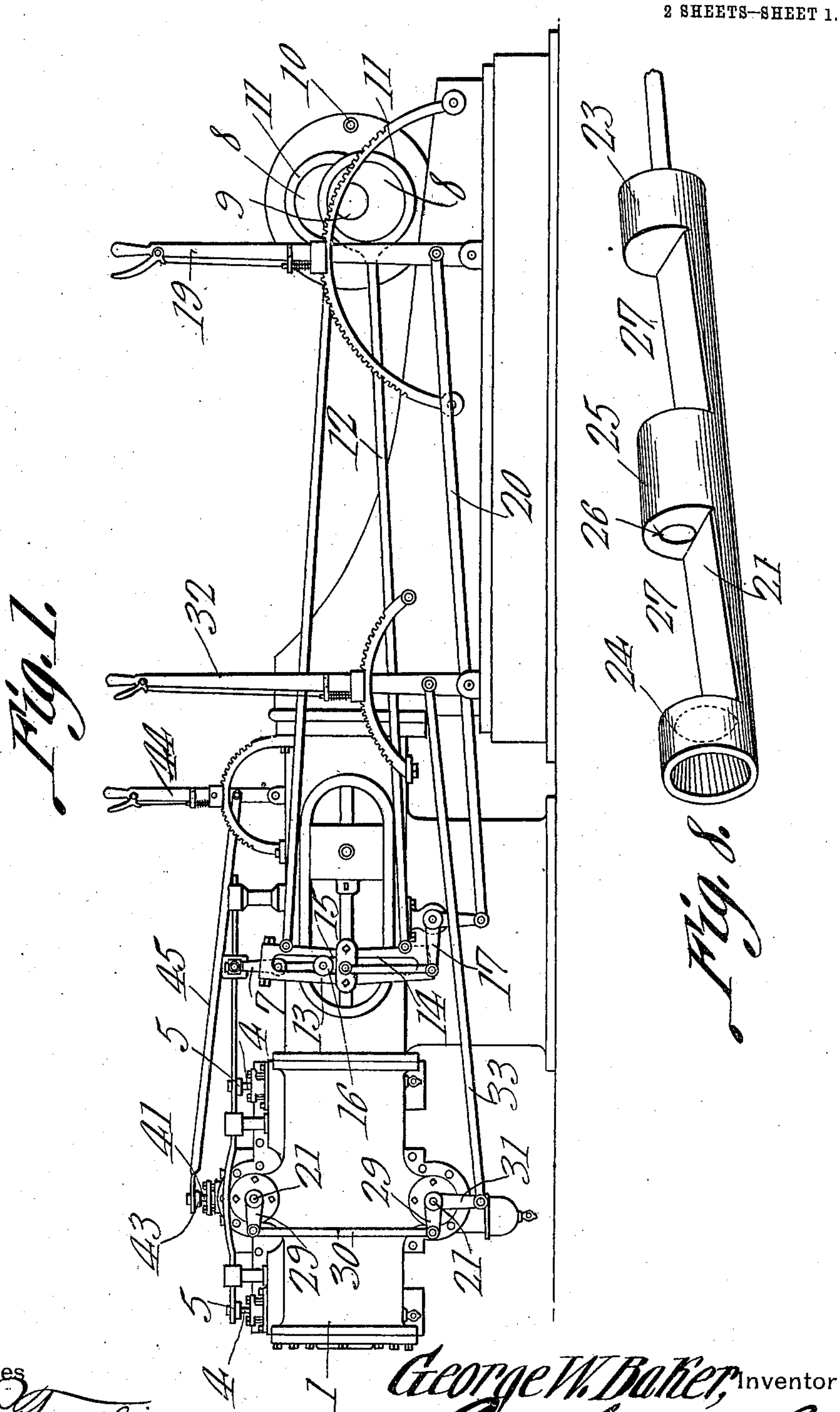
ENGINE.

APPLICATION FILED DEC. 15, 1910.

996,045.

Patented June 27, 1911.

2 SHEETS—SHEET 1.



Witnesses

J. R. Gormley [signature]

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George W. Baker, Inventor

by C. A. Snow & Co. Attorneys

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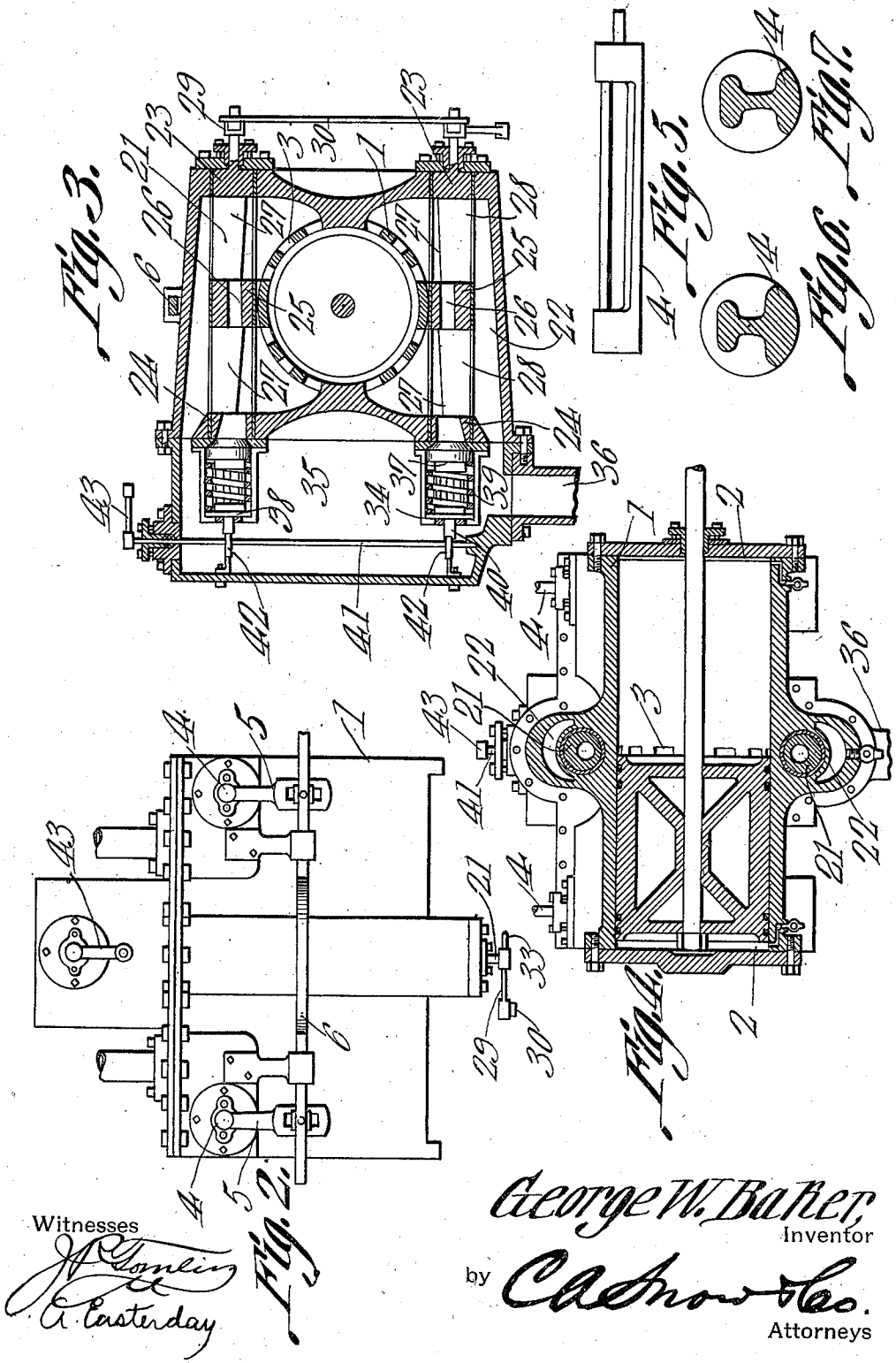

Witnesses

A. Easterday

George W. Baker, Inventor

by Cashow & Co. Attorneys

UNITED STATES PATENT OFFICE.

GEORGE W. BAKER, OF RHEEMS, PENNSYLVANIA.

ENGINE.

996,045. Specification of Letters Patent. Patented June 27, 1911.

Application filed December 15, 1910. Serial No. 597,516.

To all whom it may concern:

Be it known that I, GEORGE W. BAKER, a citizen of the United States, residing at Rheems, in the county of Lancaster and State of Pennsylvania, have invented a new and useful Engine, of which the following is a specification.

This invention has relation to steam engines and consists in the novel construction and arrangement of its parts as hereinafter shown and described.

In the accompanying drawings:—Figure 1 is a side elevation of the engine. Fig. 2 is a top plan view of the cylinder of the engine. Fig. 3 is a transverse sectional view of the cylinder. Fig. 4 is a longitudinal sectional view of the cylinder. Fig. 5 is a side elevation of the induction port valve. Figs. 6 and 7 are transverse sectional views of the induction port valve. Fig 8 is a perspective view of the exhaust valve.

The engine comprises a cylinder 1 having at its ends steam induction ports 2 and at points intermediate its ends steam exhaust ports 3. Induction valves 4 control the induction ports 2 and the said valves 4 are tapered longitudinally whereby as the said valves open the steam is initially admitted in fine streams and these streams increase regularly and gradually until the induction ports 2 are entirely opened. Arms 5 are fixed to the projecting ends of the stems of the valves 4 and are engaged by an operating rod 6 which in turn is operatively engaged by the upper end of rocker 7 pivoted upon the frame of the engine. Eccentrics 8 are fixed to the crank shaft 9 with their deep portions just in advance of a right angle passing through the center of the crank shaft 9 and the crank pin 10. The eccentrics 8 are surrounded by straps 11 and the said straps in turn are connected to the eccentric rods 12. The forward ends of the said rods are pivotally connected with a link 13, the said link 13 is provided with a slot which at its ends is curved in one direction as at 14 and at a point between its ends is curved reversely as at 15. It is this reverse curve 15 provided at the intermediate portion of the link 13 that makes it possible to shift the valves 4 whereby the interval of operation of the said valves may be varied with relation to the interval of operation of the piston in the cylinder, a roller 16 is journaled upon the lower end of the rocker 7 and is received within the slot of the link 13. A bell crank lever 17 is fulcrumed upon the frame of the engine and a link operatively connects one end of the said bell crank lever with the link 13. A lever 19 is fulcrumed upon the frame of the engine and a rod 20 operatively connects one end of the said lever 19 with the other end of the bell crank lever 17. Therefore it will be seen that lever mechanism is provided for shifting the link 13 along the roller 16 carried at the lower end of the rocker 7.

Rotatable exhaust valves 21 are located between the exhaust ports 3 and exhaust channels 22 provided at the upper and lower sides of the cylinder 1 the said valves 21 each consists of an end disk 23 which is solid, an end disk 24 which is provided with an opening and an intermediate disk 25 having a steam passageway 26. The disk 25 separates the end portions of the valve 21 into steam passageways 27 and the said passageways are connected together by the passageway 26, the passageways 27 are provided with ports 28 which have outlets at the periphery of the valves 21 and at times are in register with the steam passageway 22 provided upon the cylinder. Arms 29 are fixed to the projecting end portions of the stems of the valves 21 and the said arms are connected together by a rod 30 which is located exteriorly of the cylinder 1. An arm 31 is fixed to one of the stems of one of the valves 21 and is operatively connected with a lever 32 fulcrumed upon the frame of the engine by a rod 33. Thus it will be seen that lever mechanism is provided for turning the valves 21 so that they may increase or diminish the steam passageways through the openings 27 and 28 and the steam passages 22. The inner walls of the valve 21 are tapered or inclined so that the passageways 27 increase in transverse area toward their delivery ends.

A muffler 35 is located at the side of the cylinder 1 and is provided with an exhaust outlet 36. Cages 34 are housed within the muffler 35 and are located about the ends of the disk portions 24 of the valves 21 as illustrated in Fig. 3 of the drawings. Check valves 37 are located in the cages 34 and are arranged to close the openings through the portion 24 of the valves 21. Abutment disks 38 are slidably mounted in the open sided cages 34 and coil springs 39 are interposed between the said abutment disks and the valves 37. These springs are under tension

with a tendency to hold the valves 37 against their seats. The abutment disks 38 are provided with shanks 40 which project beyond the ends of the cages 34 and a shaft 41 is journaled in the muffler 35. Eccentrics 42 are mounted upon the shaft 41 and bear against the projecting shanks 40 of the abutment disks 38. An arm 43 is fixed to the upper end of the shaft 41 and is operatively connected with a lever 44 which is fulcrumed upon the frame of the engine by a rod 45. Thus it will be seen that a lever mechanism is provided for moving the rod 45 longitudinally whereby the shaft 41 may be swung upon its axis and the eccentrics 42 turned so that their deep or shallow portions may be interposed between the axis of the shaft and the shank portions 40 of the abutment disks 38. By this means the said disks 38 are moved against the tension of the springs 39 and the tension of the said springs may therefore be increased or diminished. This adjustment of the springs may be accomplished while the engine is running or at rest.

In operation when the engine is starting the lever mechanism 32 is operated so that the ports 28 of the exhaust valves 21 are in open relation with the exhaust ports 3 and the steam passages 22. Also the link 13 is moved so that the roller 16 carried by the rocker 7 is in the one of the end portions of the slot in the link 13. Thus the valves 4 operate in relation to the movement of the piston in the cylinder 1 in the usual manner. When the engine attains high speed the lever 32 is operated so that the valves 21 are partially closed and the lever 19 is swung so that the link 13 is shifted with relation to the rocker 7 whereby the roller is carried upon the reverse curved portion of the slot in the said link. This changes the relative movement of the valves 4 with relation to the movement of the piston in the cylinder 1 and the arrangement is such that when the piston approaches the induction port and begins to move away from the same the valve 4 at that end of the cylinder opens but closes before the piston uncovers the exhaust port. Then as the piston comes back toward the induction port a portion of the steam is trapped in the cylinder and compressed. By reason of the fact that the valves 21 are partially closed the entire charge of steam cannot exhaust through the ports 3 when the piston moves beyond the said ports but only so much of the steam will escape through the ports 3 and the steam passages 22 as is at such high pressure as to move the valves 37 away from their seats. As soon as the pressure of the exhaust steam is reduced to certain extent that the valves 37 will not move away from their seats the remaining steam is trapped within the cylinder by the reverse movement of the piston and therefore the pressure at which the steam is trapped may be regulated by increasing or diminishing the tension of the springs 39 in the manner as above described. By providing the passageway 26 and the disk 25 the steam may pass freely from one of the chambers 27 to the other and therefore the valve 21 is not subjected to unequal pressure at its end portions, and consequently the possibility of the valve tending to bind in its bearings is eliminated. Again by reason of the fact that the walls of the passageways 27 taper toward the steam outlets of the said passageways the steam is unobstructed in its course to pass from the ports 3 through the said passageways toward the valves 37.

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

In combination with a cylinder having an exhaust port, a stationary valve located at the exhaust port and manually operable to increase or diminish the passageway through said port, said valve consisting of a body having at one end a closed disk and at the other end a disk provided with an opening and an intermediate disk provided with a passageway, said valve having steam passageways between the end disk and the intermediate disk which increase in transverse sectional area from their ends toward the closed disk to their ends toward the open disk, and a spring pressed valve normally closing the opening of the open disk, the tension of said spring being opposed to pressure from the cylinder.

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

GEORGE W. BAKER.

Witnesses:
F. D. OCHSENREITER,
N. L. COLLAMER.