

Mar. 27, 1923.

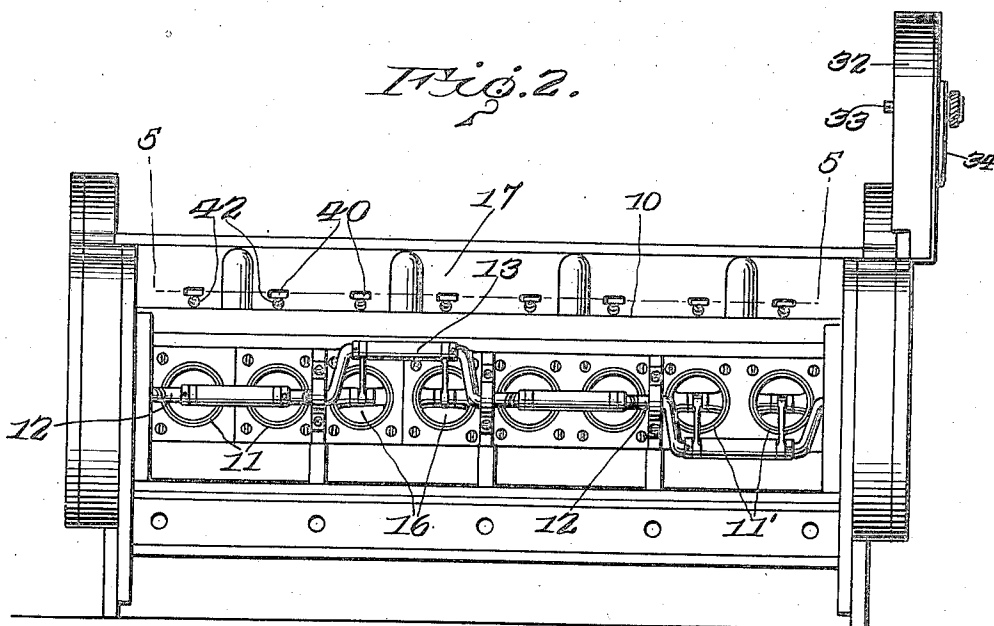
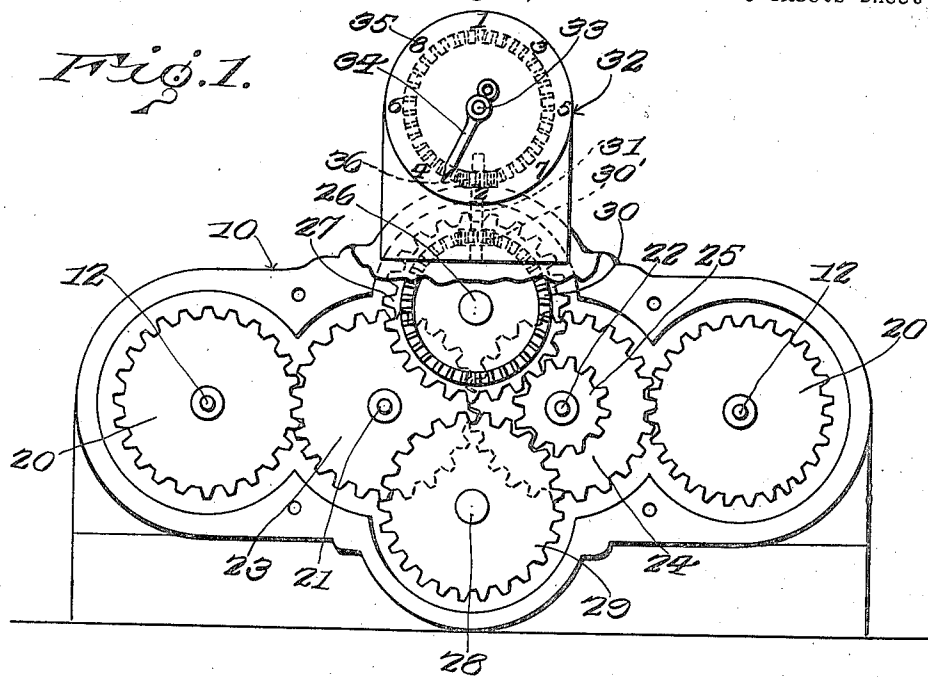
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W. L. SCHOONOVER

PISTON POSITION INDICATOR FOR ENGINES

Filed Aug. 1, 1921

3 sheets-sheet 1



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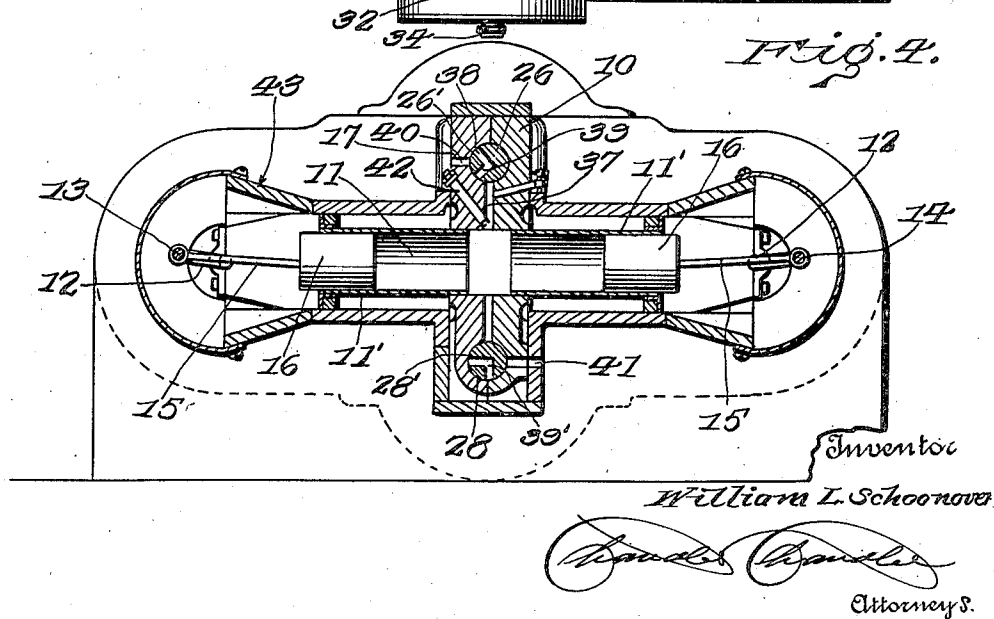
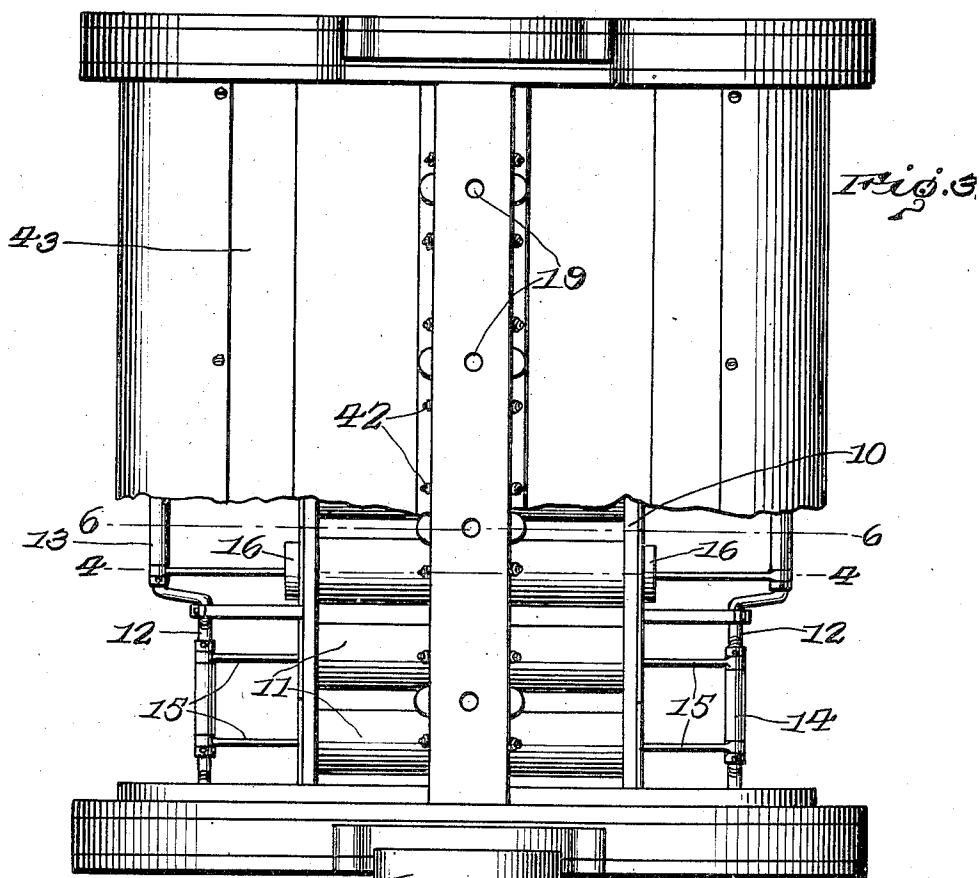
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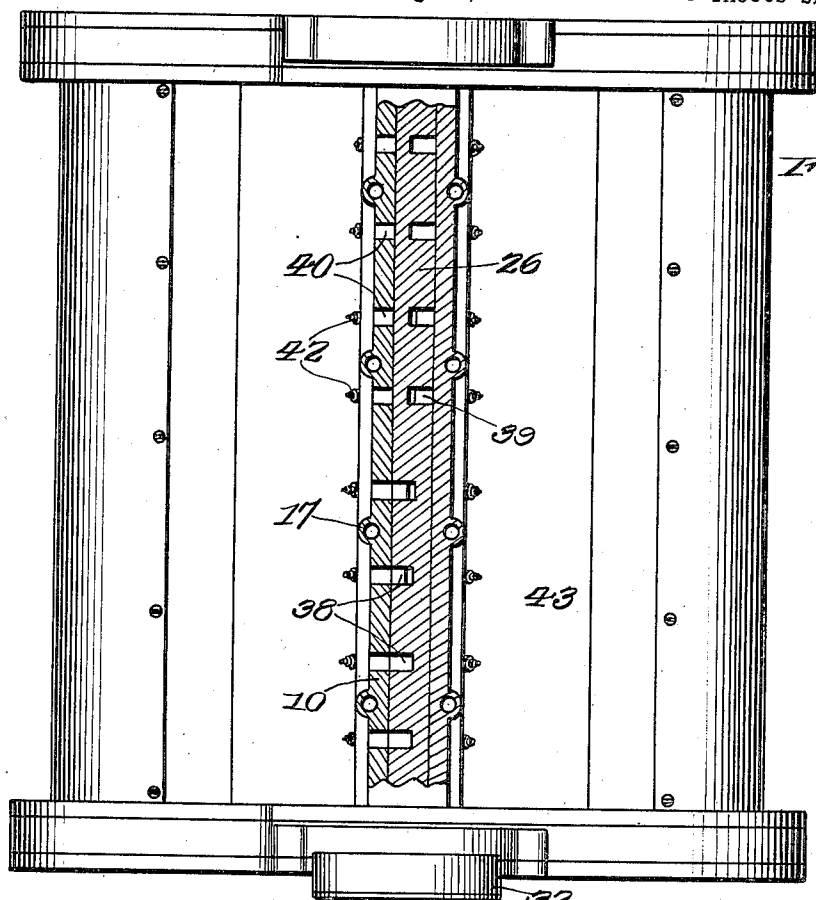


Fig. 5.

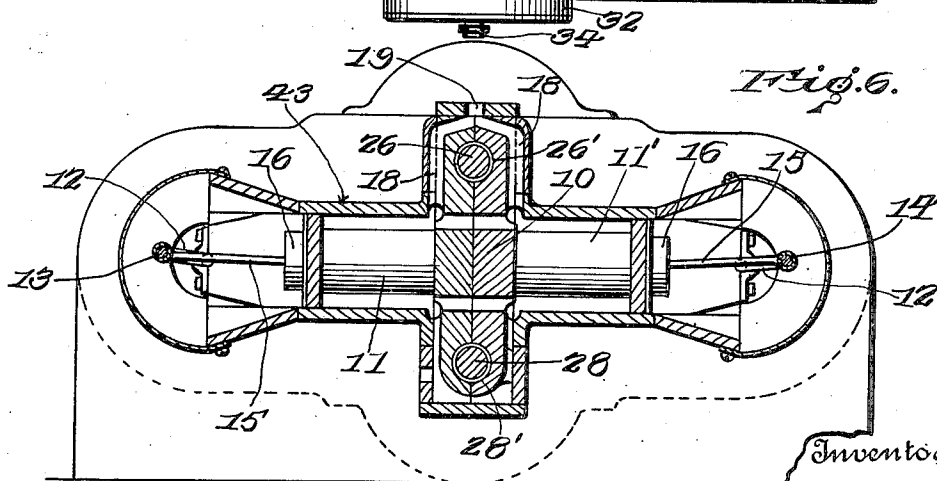


Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM L. SCHOONOVER, OF LIND, WASHINGTON, ASSIGNOR OF ONE-SIXTH TO DAN E. WORKLAND, OF SPOKANE, WASHINGTON.

PISTON-POSITION INDICATOR FOR ENGINES.

Application filed August 1, 1921. Serial No. 488,967.

To all whom it may concern:

Be it known that I, WILLIAM L. SCHOONOVER, a citizen of the United States, residing at Lind, in the county of Adams, State of Washington, have invented certain new and useful Improvements in Piston-Position Indicators for 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.

This invention relates to new and useful improvements in engines, and particularly to engines of the reciprocating piston type, the principle being readily applicable to steam or gas engines.

One object of the invention is to provide an engine having cylinders with opposing reciprocating pistons therein, the pistons and cylinders being arranged in simultaneously operating pairs, and a means for indicating which pair of pistons are in position to be primed in starting the engine.

Another object resides in the provision of means for simultaneously driving the pistons, the indicator, and the inlet and exhaust valves, in such relation that the valves will operate in proper time.

Other objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings.

In the drawings:

Figure 1 is an end view of the engine, a portion of the casing being broken away to expose the gearing.

Figure 2 is a side elevation of the engine.

Figure 3 is a top plan view of the engine, with portions of the casing broken away to expose the cylinders and pistons.

Figure 4 is a vertical transverse sectional view through the engine, longitudinally of a pair of opposite cylinders, on line 4—4 of Figure 3.

Figure 5 is a horizontal longitudinal sectional view taken on the line 5—5 of Figure 2 through the inlet valve.

Figure 6 is a vertical transverse sectional view on the line 6—6 of Figure 3, passing between adjacent cylinders.

Referring particularly to the accompanying drawing, 10 represents the block of the engine which has the horizontal, transverse cylinders 11 arranged in a longitudinal

series. Mounted in the ends of the casing or block, and at the opposite ends of the cylinders, are the crank shafts 12, each having crank portions 13 and 14, each of which is arranged to connect with the pitmen rods or piston rods 15 of the pistons 16, arranged in an adjacent pair of cylinders, whereby said pair of pistons will travel or reciprocate in the cylinders synchronously.

Formed on the center of the upper face of the block 10, and extending the length of the block, is an upwardly extending rib 17 having the vertical water passages 18 formed in its sides, the water entering from the lower ends and passing out through the upper ends, at the top of the block, as shown at 19. Each end of each of the shafts 12 has a gear 20 fixed thereon, and between the shafts 12 are mounted the stub shafts 21 and 22, carrying the gears 23 and 24, which mesh, respectively, with the gears 20 of the shafts 12. The gear 24 has a smaller integral gear portion 25, the purpose of which will appear later herein.

Extending longitudinally through the upper portion of the rib 17, and rotatable therein, is a shaft 26, the opposite ends of which have the gears 27 which mesh with the smaller gears 25. Also extending longitudinally through the lower portion of the block 10, and rotatable therein, is a similar shaft 28, the opposite ends of which have the gears 29 thereon which mesh with the smaller gears 25. On the outer face of one of the gears 27 is formed a bevel gear portion 30 which meshes with a smaller bevel gear 30' on the lower end of a short vertical shaft 31, mounted in the end of the block 10. A casing 32 is mounted on the block 10, to cover the shaft 31, and its gear 30', and in this casing is a horizontal shaft 33, carrying on its forward or outer end a hand 34 arranged to traverse the dial 35. The inner end of the shaft 33 is provided with a small bevel gear 35 which meshes with a similar gear 36 on the upper end of the vertical shaft 31. On the face of the dial are arranged a circular series of numbers in the following order, in a clockwise direction, 1, 3, 5, 7, 2, 4, 6, 8, representing the order of the cylinders of the engine. The hand 34 travels around the dial, while the engine is in operation, and comes to rest when the engine stops, the point on the dial where the hand stops designating the par-

5 ticular cylinder which has stopped on the beginning of its power stroke. The engine will thus always stop off dead center, and by consulting the dial, and noting the position of the hand, the operator can prime the cylinder corresponding to the number at which the hand has stopped.

Formed vertically in the center of the rib 17, at points traversing the center of each of the cylinders, and terminating at the upper and lower ends, at the bores 26' and 28', in which the shafts 26 and 28 are rotatably disposed, are the gas passages 37. The shafts 26 and 28 are formed with the transverse L-shaped passages 38 and 39, respectively, arranged around the shafts at points equally spaced, circularly, from each other, with the result that one end of each passage registers with a passage 37 at regular successive intervals. Through the side wall of the bore 26', and at points corresponding to the positions of the vertical passages 37, are the gas inlet openings 40, while in the other side wall of the lower bore 28', and at corresponding positions, with respect to the lower ends of the passages 37, are the exhaust openings 41. Extending into the center of the upper side of each of the cylinders, through each of the vertical passages, from without the rib 17, is a spark plug 42.

Each of the cylinders has a removable wall 11', so that when worn, it may be readily taken out and a new wall substituted, thus obviating the necessity of reboring the cylinders.

A casing 43 is provided to enclose the mechanism of the engine, as clearly shown in the drawings.

In the operation of the engine, the shafts 12 being rotated, the gearing therebetween will produce a synchronous movement thereof, the cranks of the shafts causing the pairs of pistons which are connected to one shaft, to move in the cylinders in opposition to the corresponding pistons in the other ends of the cylinders and which are connected to the other shaft. The shafts 26 and 28 being also rotating, the inlet passages of the former will successively register with the inlet passages of the bore 26' to deliver charges of gas through the passages 37, to the centers of the cylinders. The pistons move toward each other to compress the charges of gas, after which the gas is exploded by the sparking means, resulting in the pistons being driven away from each other. At this time the shaft

28 has turned to register its L-shaped passages with the exhaust ports and permitted the exploded gases to escape to the atmosphere.

The hand of the indicator travels around the dial while the engine is in motion, and when the engine is stopped, the hand will rest at or near a number on the dial, which will indicate which cylinder has stopped on the power stroke, thus enabling the operator to quickly locate the cylinder to be primed for again starting the engine.

What is claimed is:

1. An engine including a plurality of pistons, a crank shaft for reciprocating the pistons, and means operable by the pistons for indicating which of the shafts are in their power positions when the engine is at rest.

2. An engine including a plurality of pistons, rotary valves, crank shafts to which the pistons are connected, an indicator for showing the power stroke position of certain of the pistons when the engine is at rest, and operative connections between the crank shafts and valves and the valves and indicator.

3. An engine including cylinders and pistons arranged in a longitudinal series, a crank shaft for reciprocating the pistons in the cylinders, a valve for delivering gas to the cylinders, and means operating synchronously with the pistons and valve and actuated by the crank shaft for indicating which of the pistons are in their power stroke positions and the corresponding position of the valve.

4. The combination with the crank shaft and valve shaft of an engine, of an indicator including a rotary indicating means, and intergeared connections between the engine shaft and valve shaft and the indicating means.

5. The combination with the crank shaft and valve shaft of an engine, of an indicator for showing the positions of the cranks of the shaft at all times and including gear and an indicating hand operable by a gear, intermeshing gears on the valve shaft and crank shaft and geared connections between the valve shaft and the indicating means.

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

WILLIAM L. SCHOONOVER.

Witnesses:

WALTER STASER,
MAUDE FAHEY.