

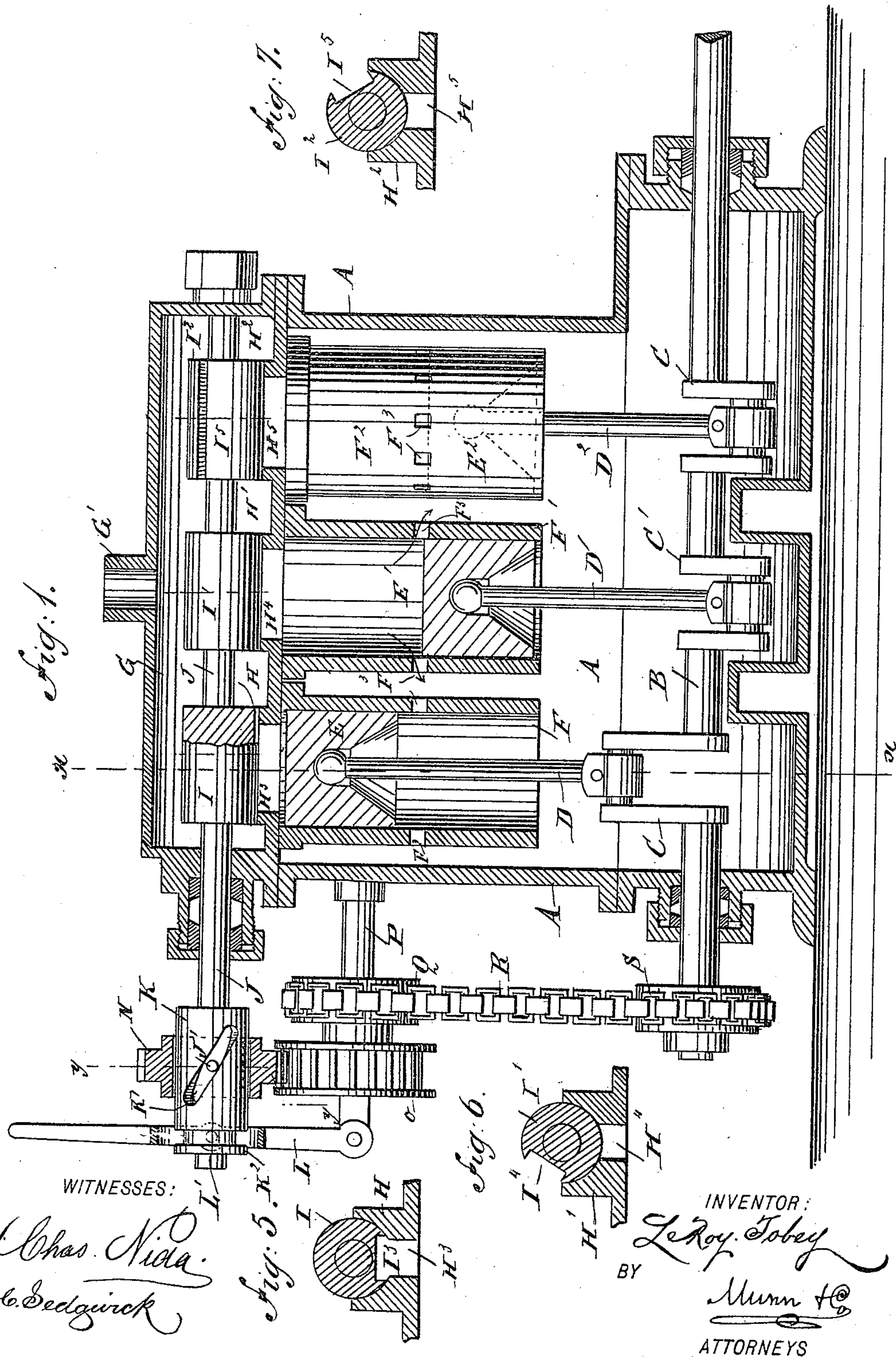
(No Model.)

2 Sheets—Sheet 1.

LE ROY TOBEY. ENGINE.

No. 438,034.

Patented Oct. 7, 1890.



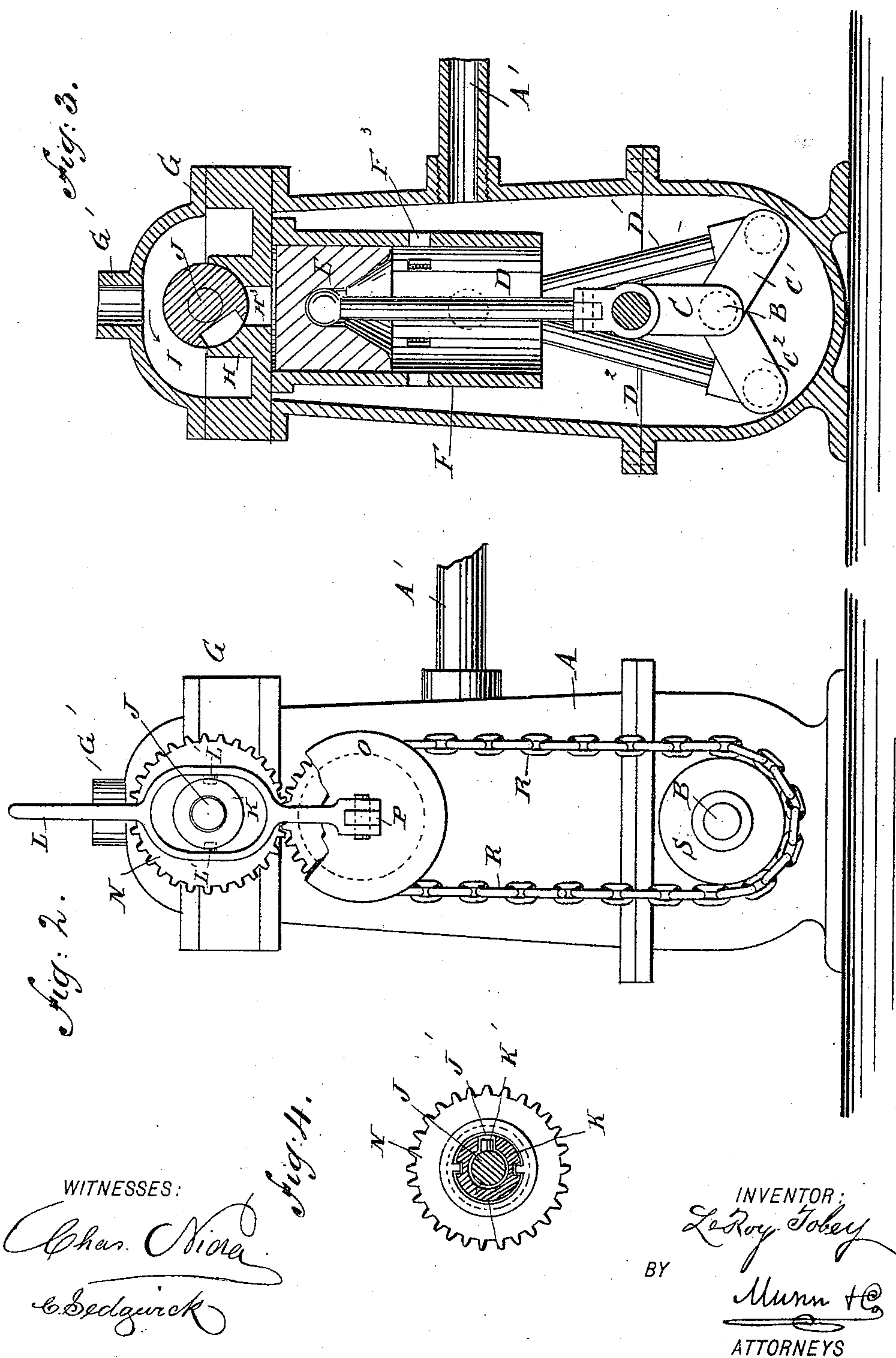
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2 Sheets—Sheet 2.

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Patented Oct. 7, 1890.



UNITED STATES PATENT OFFICE.

LE ROY TOBEY, OF PENN YAN, NEW YORK, ASSIGNOR TO HIMSELF AND
GEORGE S. SHEPPARD, OF SAME PLACE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 438,034, dated October 7, 1890.

Application filed December 18, 1889. Serial No. 334,189. (No model.)

To all whom it may concern:

Be it known that I, LE ROY TOBEY, of Penn Yan, in the county of Yates and State of New York, have invented a new and Improved Engine, of which the following is a full, clear, and exact description.

The invention relates to that class of engines known as "three-cylinder engines;" and its object is to provide a new and improved engine which is simple and durable in construction, very effective in operation, and can be easily and quickly reversed whenever desired.

The invention consists in the construction of the rotary valves and the particular construction and combination of parts, whereby a continuous rotary motion is imparted to the valves while they are being shifted for reversing the engine, as hereinafter described.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of the improvement. Fig. 2 is an end elevation of the same with part broken out. Fig. 3 is a transverse section of the same on the line $x x$ of Fig. 1. Fig. 4 is a transverse section of part of the reversing mechanism on the line $y y$ of Fig. 1; and Figs. 5, 6, and 7 are transverse sections of the valves, showing their relative positions.

The improved engine is provided with a suitably-constructed closed casing A, in the lower part of which is mounted to turn in suitable bearings a main driving-shaft B, having three crank-arms C, C', and C², respectively, extending at angles of about one hundred and twenty degrees in relation to each other, as is plainly shown in Fig. 3. The crank-arms C, C', and C² are inside of the casing A, and are connected by the pitmen D, D', and D², respectively, with the pistons E, E', and E², respectively, mounted to slide in the cylinders F, F', and F², respectively, open at both ends, and secured at their upper ends to the under side of the steam-chest G, secured on top of the casing A.

In the steam-chest G are arranged the valve-seats H, H', and H², provided with the ports

H³, H⁴, and H⁵, respectively, connecting the interior of the steam-chest G with the upper open ends of the cylinders F, F', and F², respectively. On top of the valve-seats H, H', and H² are mounted to turn the valves I, I', and I², respectively, all three being secured on a longitudinally-extending shaft J, mounted to turn in suitable bearings in the steam-chest G and extending at one end to the outside of the steam-chest, as is plainly shown in Figs. 1 and 2. Each of the valves I, I', and I² is made in the form of a cylinder, and has in its periphery a longitudinally-extending groove I³, I⁴, or I⁵, respectively, preferably of the same length as the valve-seat H, H', or H², respectively, but somewhat longer and wider than the respective ports H³, H⁴, or H⁵ in the valve-seat H. About one-half of each valve extends above its respective valve-seat, so that when the shaft J is rotated the grooves I³, I⁴, and I⁵ of the several valves are alternately exposed to the inside of the steam-chest, and then pass onto the respective valve-seats, so that the motive agent from the steam-chest G can only pass through the ends of the grooves I³, I⁴, and I⁵ to pass into the ports H³, H⁴, and H⁵, respectively, leading to the cylinders F' and D², respectively. It is understood that the longitudinal grooves in the several valves I, I', and I² are placed in the same relative position as the crank-arms C, C', and C², previously mentioned, so that when the first valve I takes steam, as shown in Fig. 5, the groove I⁴ of the second valve is uncovered on the outside of its seat H', and the other groove I⁵ of the third valve I² is also uncovered and on the rear side of its respective valve-seat H².

The motive agent enters the steam-chest G through the usual inlet-opening G', and the motive agent is exhausted from the cylinders F, F', and F² when the respective pistons E, E', and E² are in their lowermost position, so as to uncover openings F³, arranged in the walls of the cylinders F, F', and F², respectively, as is plainly shown in Fig. 1. The exhaust is thus discharged from the cylinders F, F', and F² into the casing A, and passed from the latter through an exhaust-pipe A' to the outside.

A reversing mechanism is connected with the valve-shaft J and is provided with a sleeve

K, having a diagonal groove K', engaged by a pin J', secured on the shaft J, as is plainly shown in Figs. 1 and 4, the outer end of the sleeve K being provided with an annular groove K², engaged by pins I', projecting from a forked shifting-lever L, which when moved slides the sleeve K on the shaft J and turns the latter by the pin J' of the said shaft engaging the diagonal or spiral groove K' of the said sleeve.

On the sleeve K is held to turn and to slide a gear-wheel N in mesh with a gear-wheel O, mounted to turn on a stud P, projecting from the casing A. On the hub of the gear-wheel O is secured a sprocket-wheel Q, over which passes a sprocket-chain R, also passing over a sprocket-wheel S, secured on one outer end of the main driving-shaft B. When the latter is rotated, the sprocket-wheels S and Q and the sprocket-chain R impart a rotary motion to the gear-wheel O, which turns the gear-wheel N, thus turning the shaft J, carrying the valves I, I', and I².

The operation is as follows: When a motive agent is admitted to the steam-chest G, it passes alternately through the several cylinders F, F', and F² by means of the valves I, I', and I², respectively, when the latter are alternately in such a position that their respective grooves I³, I⁴, and I⁵ are over the openings H³, H⁴, and H⁵, respectively, in the valve-seats H, H', and H², so that the motive agent can pass from the ends of each valve through the grooves I³, I⁴, and I⁵ into the openings H³, H⁴, and H⁵ to the upper ends of the cylinders F, F', and F². The pressure exerted by the motive agent against the respective pistons E, E', and E² forces the same downward, the motive agent being cut off at or about two-thirds of the downward stroke. When the pistons E, E', and E² are nearly in their lowermost position, then the upper ends of the said pis-

tons uncover the exhaust-openings F³ of the respective cylinders F, F', and F², so as to exhaust into the casing A, from which the exhaust can pass to the outside by the exhaust-pipe A'. It is understood that the lower part of the casing A is usually filled with oil or other suitable lubricant. When the operator desires to reverse the engine, he shifts, by means of the lever L, the sleeve K, so that the shaft J is rotated, and the position of the grooves I³, I⁴, and I⁵ of the valves I, I', and I² is changed to first admit steam alternately to the cylinders F², F', and F, thus reversing the motion of the engine. Thus it will be seen that the engine is very simple and durable in construction, effectively transmits the force of the motive power to the main driving-shaft, and also permits of reversing whenever desired.

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

In a three-cylinder engine, the combination, with the three-crank driving-shaft, the pistons and cylinders having ports, as specified, the valve-seats, the cylindrical rotary valves each having an open-ended longitudinal groove, and the valve-shaft having a lateral pin J', of the sleeve K, having diagonal and annular grooves, the hand shifting-lever L, connected with the sleeve, and a gear-wheel N, mounted on the latter, the gear O and sprocket-wheel Q, rigidly connected and mounted together on a stud P, the sprocket-wheel S, mounted on the driving-shaft, and a chain running on said sprocket-wheels, all as shown and described.

LE ROY TOBEY.

Witnesses:

WM. T. MORRIS,
C. V. BUSH.