No. 859,864. PATENTED JULY 9, 1907.

A. ZEGAROW.

STEAM ENGINE.

APPLICATION FILED OCT. 31, 1906.

2 SHEETS—SHEET 1.

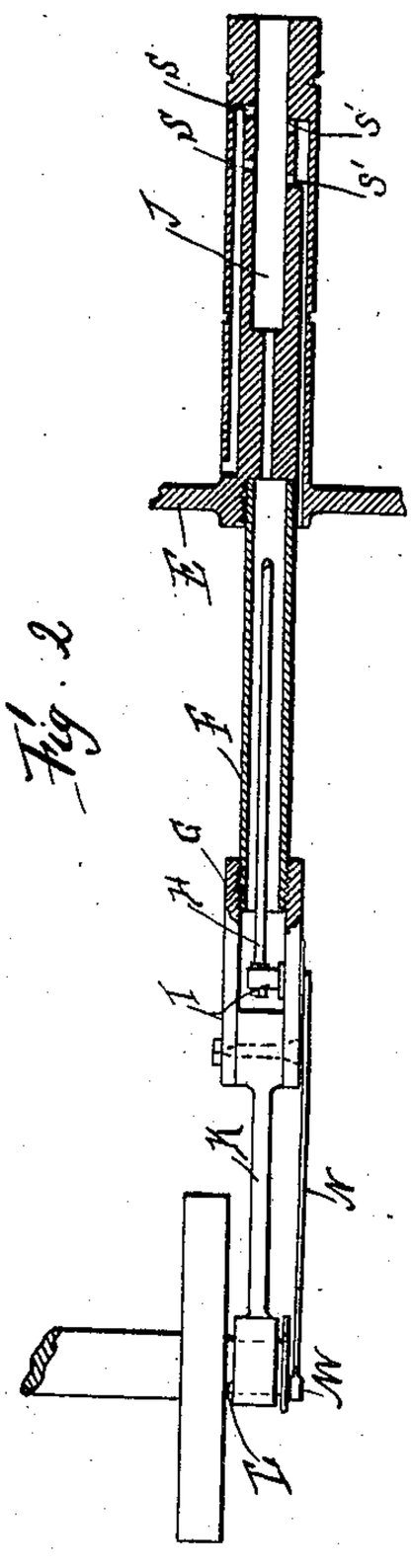

Fig. 2

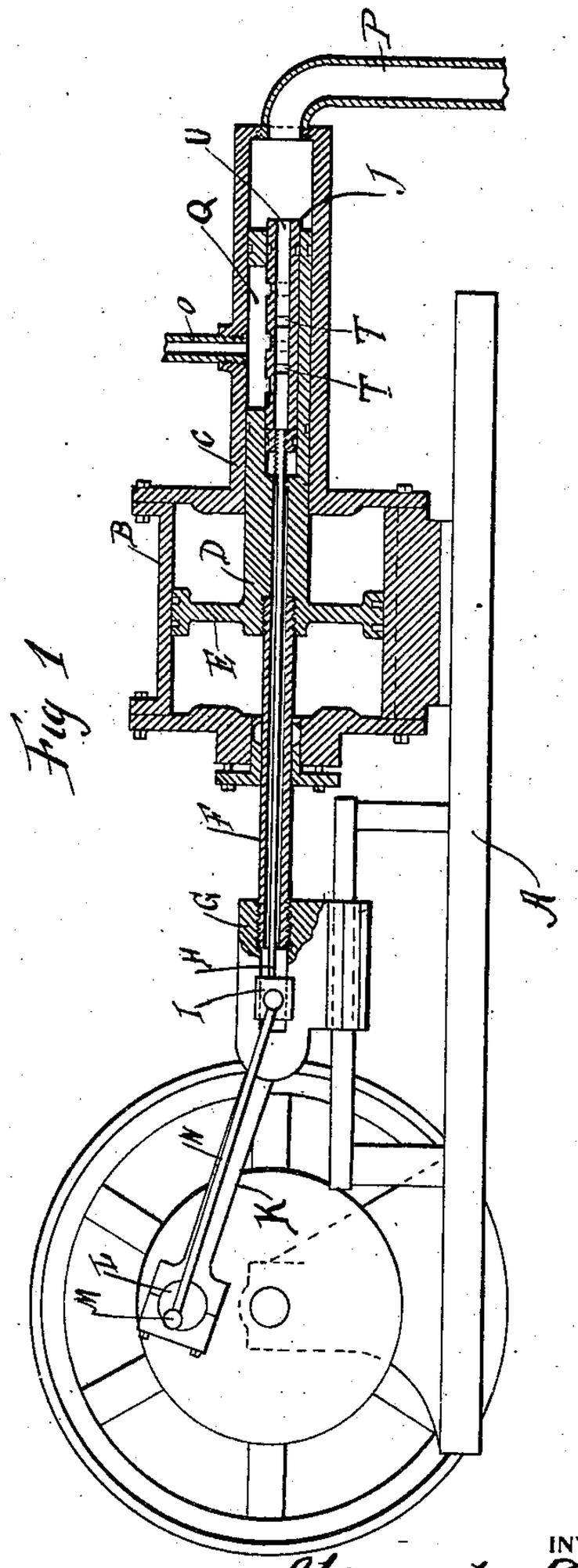

Fig. 1

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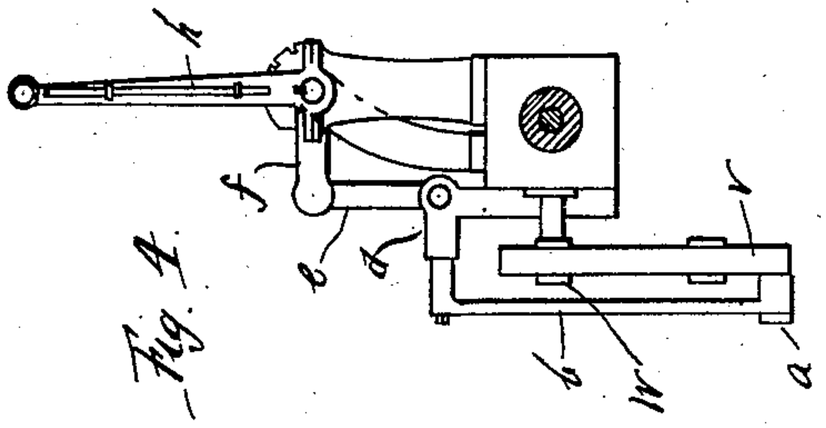

Fig. 4.

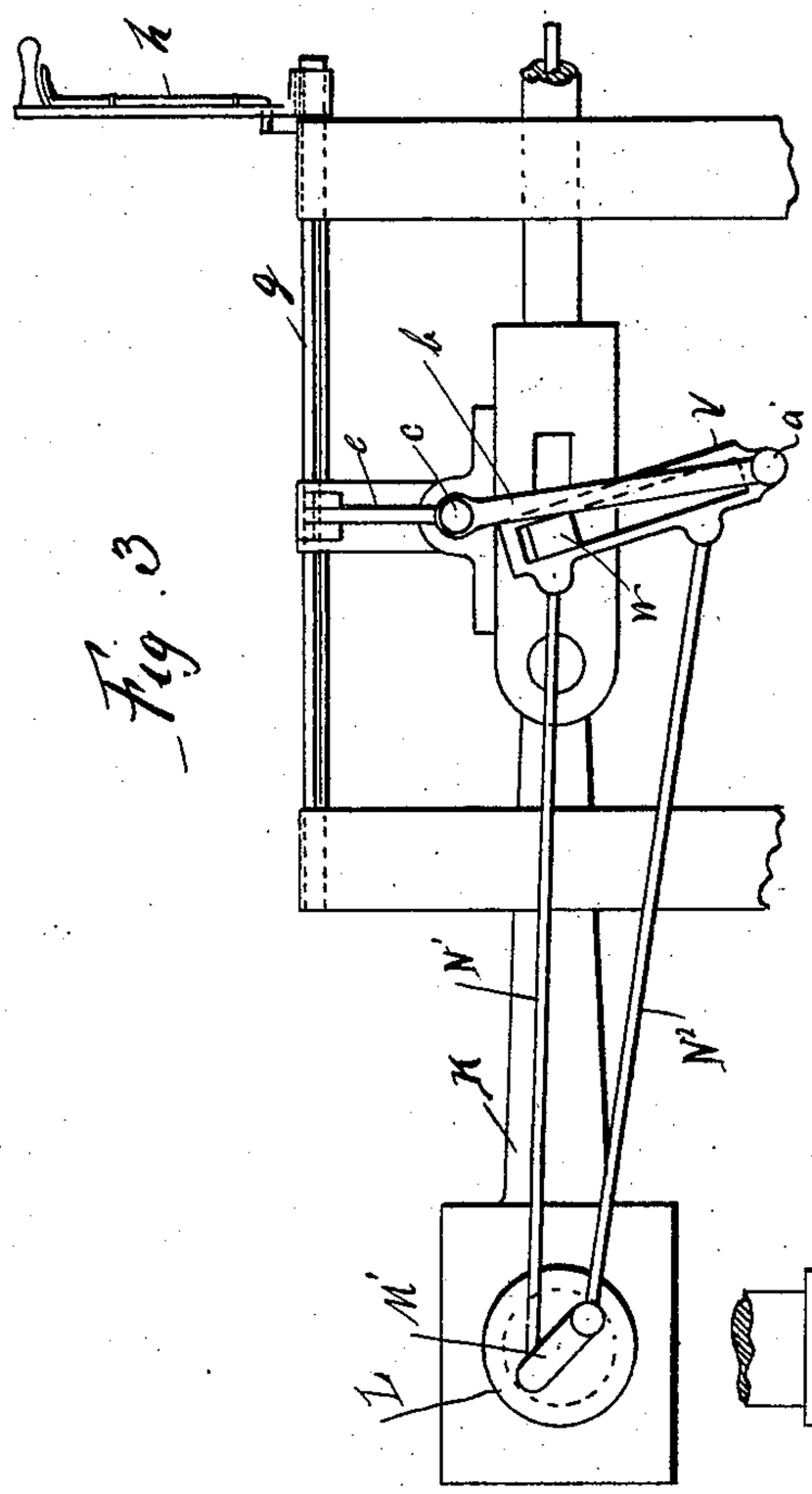

Fig. 3.

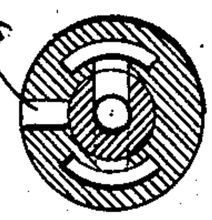

Fig. 7.

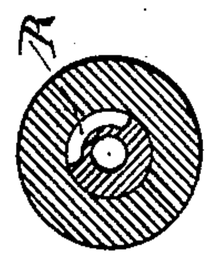

Fig. 8.

Fig. 9.

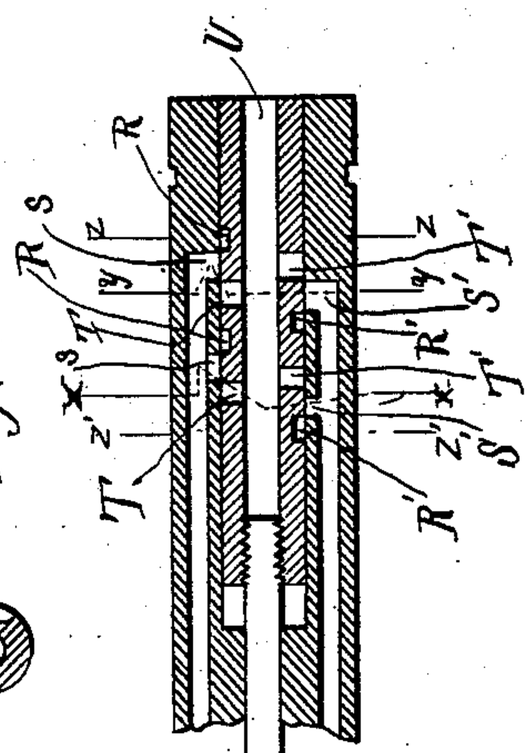

Fig. 5.

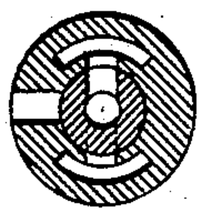

Fig. 6.

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ALEXANDER ZEGAROW, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-THIRD TO JOSEPH STASINSKI, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-ENGINE.

No. 859,864. Specification of Letters Patent. Patented July 9, 1907.

Application filed October 31, 1906. Serial No. 341,379.

To all whom it may concern:

Be it known that I, ALEXANDER ZEGAROW, a subject of the Czar of Russia, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Steam-Engines, of which the following is a specification.

My invention relates to a new and useful improvement in steam engines, and has for its object to construct such an engine without any outside valves, the admission and exhaust of the steam to and from each side of the piston being accomplished by a piston valve located within an extension of the piston.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawing forming a part of this specification, in which—

Figure 1 is an elevation of an engine made in accordance with my improvement showing the cylinder and piston in section. Fig. 2, a broken away plan showing a portion of the piston and the valve extension thereof in section. Fig. 3, an elevation of the reversing gear for reversing the engine. Fig. 4, a rear view thereof. Fig. 5, an enlarged section of the valve extension and valve. Fig. 6, a section at the line *x*—*x* of Fig. 5. Fig. 7, a section at the line *y*—*y* of Fig. 5. Fig. 8, a section at the line *z*—*z* of Fig. 5. Fig. 9, a detail section of the valve at the line *x*—*x*.

In carrying out my invention as here embodied, A represents the base of the engine, which may be of any size and design, and upon which is mounted the cylinder B, said cylinder having a tubular extension C projecting from its rear head, and in this extension is fitted to slide the valve extension D, carried by the piston E, the latter being fitted to slide within the cylinder in the usual manner. The piston E is connected by the hollow piston rod F to the cross-head G, and through this hollow piston rod runs the valve rod H, connecting the block I, which is fitted to slide in a suitable groove in the cross-head with the valve J, the latter being fitted to slide within the valve extension D.

K is the pitman connecting the crank pin L with the cross-head, and this pin is of sufficient diameter to have set therein the eccentric pin M which is connected by the valve pitman N with the block; thus when the engine is in operation the valve, valve rod and block I will be carried with the piston and cross-head, while a short independent movement will be given to the block I from the eccentric pin M, and this movement will be transmitted to the valve through the valve rod H.

The extension C has leading thereto the steam admission pipe O, and the exhaust pipe P leading from its rear end. The extension D has a slot Q formed therein so as to freely admit steam from the pipe O to the valve, which latter has formed therein the cross-grooves R and R′, there being two of each, by means of which steam may be conveyed from the slot Q to the ports S and S′, and this valve also has the holes T and T′ formed therein which lead from the circumference to the center bore or exhaust channel U, thus when the valve is reciprocated by the eccentric independent of its movement with the piston extension D, steam will first be admitted through the ports S and S′ to one side or the other of the piston and then exhausted through the holes T and T′ into the channel U, from whence it will flow outward through the exhaust pipe P after the manner of a slide valve.

Where the engine is to be used as a reversing engine, a double crank M′ is carried by the crank pin L, to which two connecting rods N′ and N² are attached, their opposite ends being pivoted to the link V fitted to slide upon the stud W projecting from the valve rod block, and this link is pivoted at *a* to the rod *b*, the latter being pivoted at *c* to the sliding bracket *d*, carried by the cross head and in turn is connected by the rod *e* to the heel end of the lever *f* splined upon the shaft *g*, to which the reversing lever *h* is also secured, thus enabling the link to be raised or lowered so as to bring the pivot point of one or the other of the rods N′ or N² in alinement with the stud W so as to transmit the motion of one or the other of the rods N′ or N² directly to the valve, as will be readily understood.

In my improved engine great efficiency will be had on account of the valve being inclosed within the piston extension, the latter also being inclosed in the extension C, thus reducing to a minimum the loss of heat from the valve and the steam passing therethrough by radiation, and the cost of building an engine of given horse power in accordance with my improvement will be much less than as has heretofore been the case, since all the parts fitted to the cylinder including the valve work may be made upon rotary machines, such as lathes and boring tools.

Having thus fully described my invention, what I claim as new and useful, is—

1. In an engine of the character described, the combination of a cylinder, a tubular extension C projecting from the rear head thereof, an admission pipe leading to the outer end of said extension, an exhaust pipe leading from the extension, a piston, a tubular extension D projecting from said piston and adapted to slide in the extension C, said extension D having a slot Q adapted to

register with the inner end of the admission pipe, channels leading to each side of the piston, a hollow piston valve fitted within the extension D, passages formed in the piston for controlling the inflow and outflow of steam, a hollow piston rod, a cross-head connected by said piston rod with the piston, a block having an independent sliding movement upon the cross-head while moving to and fro therewith, a rod connecting the valve with said block and means for imparting a movement to the block independent of the cross-head, as and for the purpose set forth.

2. In combination with an engine of the character described, a cross-head adapted to slide to and fro with the piston of the engine, a block carried by the cross-head in its to and fro movement, but having a sliding movement independent of the movement of said cross-head, a double crank carried by the crank pin of the engine, a reversing link fitted to slide upon a stud projecting from the block, pitmen connecting the double crank with the link and means for raising and lowering the link, as and for the purpose set forth.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

ALEXANDER ZEGAROW.

Witnesses:
MARTIN WAYSHNAR,
FRANK CHWIEROTT.