E. JAMES.

ENGINE.

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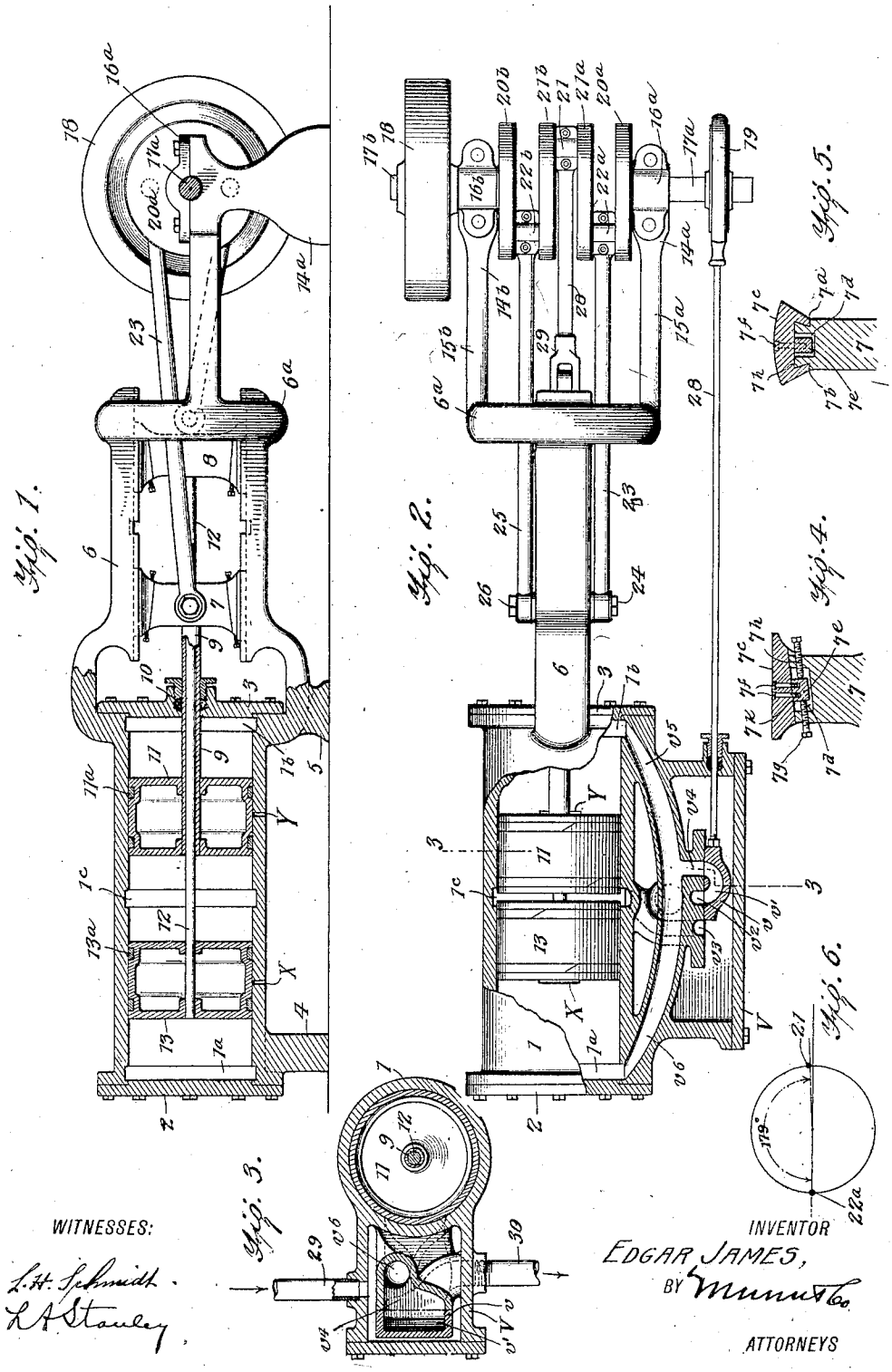
996,648. Patented July 4, 1911.



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ENGINE.

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To all whom it may concern:

Be it known that I, EDGAR JAMES, a citizen of the United States, and a resident of Lincolnton, in the county of Lincoln and State of North Carolina, have made certain new and useful Improvements in Engines, of which the following is a specification.

My invention relates to steam engines, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of my invention is to provide a novel form of double-acting engine, in which the working parts are inclosed in a frame, which is of the simplest construction, yet being strong and durable.

A further object of my invention is to provide a device in which a slide valve of the ordinary form may be used in operating the two pistons.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application in which similar reference characters indicate like parts in the several views, and in which—

Figure 1 is a side view, showing one embodiment of my device, the cylinder and pistons being shown in section, Fig. 2 is a plan view of the device, a portion of the cylinder and valve chest being shown in section, Fig. 3 is a sectional view on the line 3—3 of Fig. 2, Fig. 4 is a section through the cross-head longitudinally of the adjustable shoes, Fig. 5 is a section through the cross-head transverse of the adjustable shoes, and Fig. 6 is a diagrammatical view showing the relation of the pivot pins of the eccentrics.

In carrying out my invention, I provide a cylinder 1, having the usual heads 2 and 3 secured thereto. The cylinder is carried by the supports 4 and 5, as shown in Fig. 1. Secured to the cylinder and cast integrally therewith is a frame 6, which serves as a guide way for the cross-heads 7 and 8. The cross-head 7 is secured to a hollow piston rod 9, which passes through a stuffing box 10 in the head 3 and to which is secured a piston 11. The cross-head 8 is secured to a piston rod 12, which passes through the cross-head 7 and through the hollow piston rod 9, and is secured to a piston 13 within the cylinder 1. The frame 6 is provided with a ring-shaped end 6^a. The supports 14^a on one side and 14^b on the other have integral extensions 15^a and 15^b, which join the ring 6^a of the frame 6 thereby supporting the latter. The supports 14^a and 14^b are provided with the bearings 16^a and 16^b. The bearing 16^a carries the shaft 17^a and the bearing 16^b carries the shaft 17^b. Upon the shaft 17^b is disposed a fly wheel 18, while upon the shaft 17^a is an eccentric 19 which operates the slide valve.

Secured to the end of the shaft 17^a is a circular plate 20^a, while the shaft 17^b has a similar plate 20^b secured to its end. The plates 21^a and 21^b are similar to their companion plates 20^a and 20^b. The plates 20^a and 21^a are connected by a pin 22^a which forms a pivotal connection for a rod 23, which is pivotally attached to one side of the cross-head 7 at 24. The plates 20^b and 21^b are connected by means of a pin 22^b which forms a pivotal connection for the rod 25. The rod 25 is also pivotally connected to the other side of the cross-head 7 at 26. The plates 21^a and 21^b are connected by a pin 21, which forms a pivotal connection for the rod 28, the latter being pivotally connected to the cross-head 8 at 29. It will be observed that the pin 21 is disposed on the opposite side of the disks 21^a and 21^b from the pins 22^a and 22^b, at approximately 179° from the latter; or just off a diametrical line.

A valve chest is shown at V. It contains a slide valve v, which is connected with the eccentric 19 by means of the valve rod 28. The valve has a passage v^1 adapted to communicate with the exhaust passage v^2 in the center and with the passages v^3 and v^4 on each side thereof. The latter passage communicates, by means of the passages v^5 and v^6, with the channels 1^a and 1^b in the ends of the cylinder 1. The passage v^3 communicates with a channel 1^c at the center of the cylinder. In Fig. 3, I have shown an inlet pipe 29 and an outlet pipe 30.

As stated before, the cross-heads 7 and 8 slide in the frame 6. The construction of these cross-heads is best shown in Figs. 4 and 5. A description of the extension feature of one of the cross-heads will suffice for both, since they are both provided with these extensions. Considering, then the

cross-head 7, it will be seen that the end of the cross-head is provided with dovetailed channels 7^a and 7^b on opposite sides thereof, arranged to receive the inclined sides of a slidable shoe 7^c. The head 7 has a recess 7^d in which is a block 7^e which is secured to the shoe 7^c by means of the screws 7^f. At each end of the block 7^e are adjustable screws 7^g and 7^h, which are adapted to bear against the block, so as to move the shoe. It will be seen that a movement of the screws 7^g or 7^h will cause a bodily movement of the shoe 7^c up or down the inclined plane 7^k, thereby bringing the shoe nearer to, or farther away from, the sides of the run-way 6, in order to compensate for any wear of the cross-head. The pistons 11 and 13 are made hollow for the sake of lightness, and are provided with the packing rings 11^a and 13^a, respectively.

From the foregoing description of the various parts of the device the operation thereof will be readily understood. The steam enters the inlet pipe 29, thereby communicating with the interior of the valve chest V. In the position shown in Fig. 2, the pistons 11 and 13 are relatively near to each other. The steam passing through the passage v^3 and the channel 1^c expands and drives the pistons in opposite directions. This will tend to turn the eccentrics formed by the double plates 20^a, 21^a and 20^b and 21^b, thereby turning the shafts 17^a and 17^b. The spent gases will be exhausted now through the end channels 1^a and 1^b through the passages v^5, v^6, v^4, v^1 and v^2. In order to facilitate the exhaust of the engine without interfering in any way with its efficiency, I provide exhaust openings X and Y directly in the cylinder frame 1. In the position of the piston, shown in Fig. 2, it will be seen that some of the spent gases will be forced directly through the exhaust openings X and Y, the exhaust then continuing, by means of the end channels, as described. When the pistons are at the ends of their strokes the exhaust ports X and Y are again opened. When the return stroke is to be made part of the spent gases are forced out through the exhaust openings X and Y, the remainder being forced out through the central channel 1^c, and passages v^3, v^1 and v^2, since the slide valve has moved.

I regard the use of the exhaust ports X and Y as an important feature of this invention, since it decreases the back pressure of the spent gases when the pistons first start. I accomplish this as shown above by using pistons, which are a fraction shorter than the length of the stroke.

I claim:

1. In an engine, a cylinder, a pair of pistons in said cylinder, each of said pistons having a length slightly shorter than the stroke of the piston, means for delivering steam at the center of the cylinder between the pistons, means for delivering steam at the ends of the cylinder, a slide valve for directing the steam toward the center of the cylinder or toward the ends, said means for delivering steam at the ends and at the center of the cylinder serving alternately as exhaust passages, and an additional exhaust port disposed between the center of the cylinder and each end thereof, said port being arranged to be just cleared by the passage of its respective piston in the travel of said piston in each direction.

2. In an engine, a cylinder, a pair of pistons in said cylinder, each of said pistons having a length slightly shorter than the stroke of the piston, means for delivering steam at the center of the cylinder between the pistons, means for delivering steam at the ends of the cylinder, a slide valve for directing the steam toward the center of the cylinder or toward the ends, said means for delivering steam at the ends and at the center of the cylinder serving alternately as exhaust passages, and auxiliary exhaust passages leading directly through the side of the cylinder, said auxiliary passages being so disposed between the center of the cylinder and each end thereof as to be cleared by the respective pistons in their movement in either direction.

3. In an engine, a horizontal cylinder provided with supports at each end thereof, an integral frame at the end of said cylinder, said frame having a ring shaped end and serving as a guide way, end supports, side braces connecting said end supports with said ring shaped end, a piston arranged to reciprocate within said cylinder, a cross head carried by said frame and adapted to slide therein, a crank shaft carried by said end supports, and connections between said crank shaft and said cross head, said connections passing through and working in said ring shaped end.

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Witnesses:
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