

(No Model.)

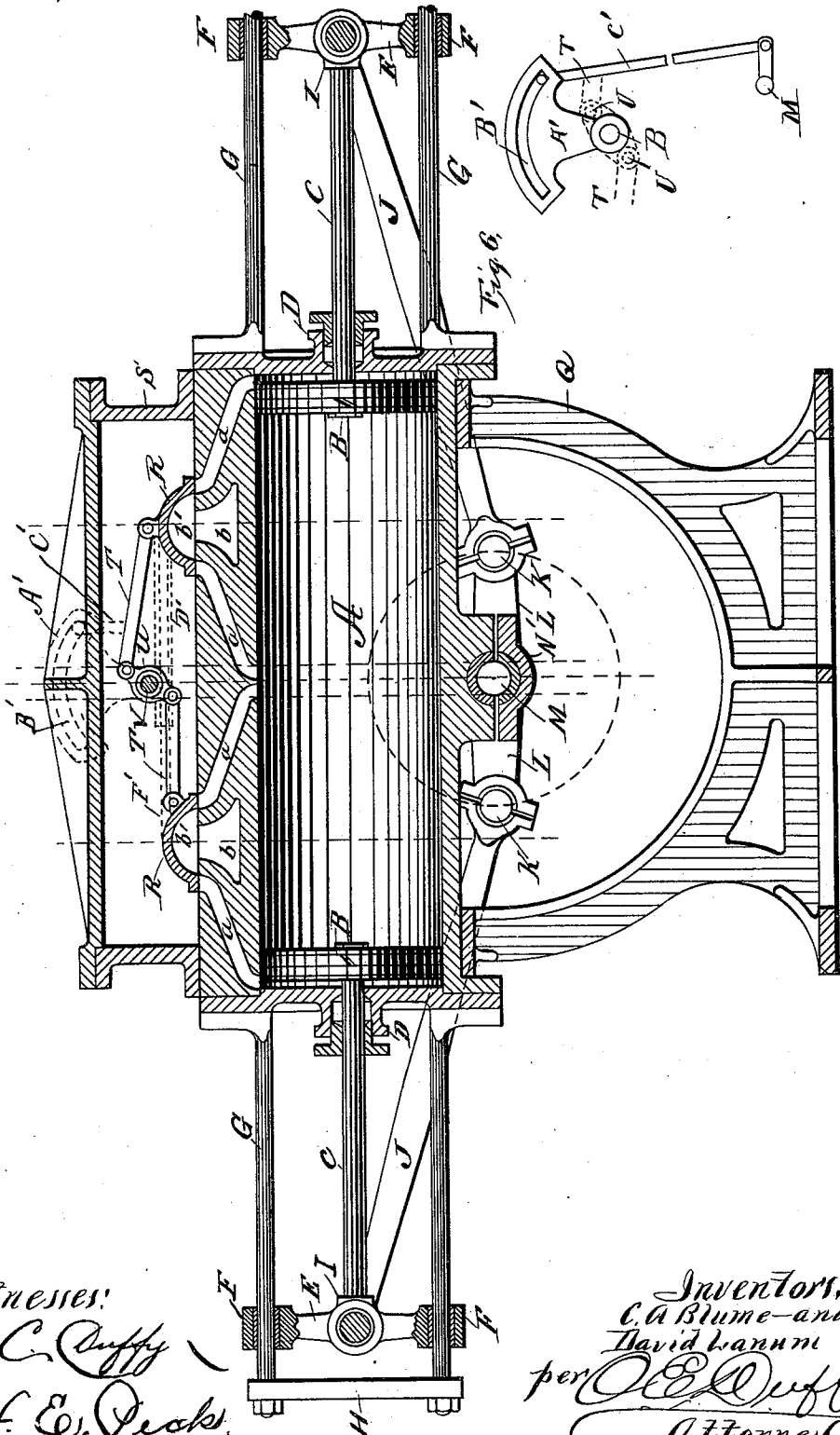
3 Sheets—Sheet 1.

C. A. BLUME & D. LANUM. STEAM ENGINE.

No. 447,292.

Patented Mar. 3, 1891.

Fig. 1.



Witnesses:
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J. E. Peck

Inventors:
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 Attorney

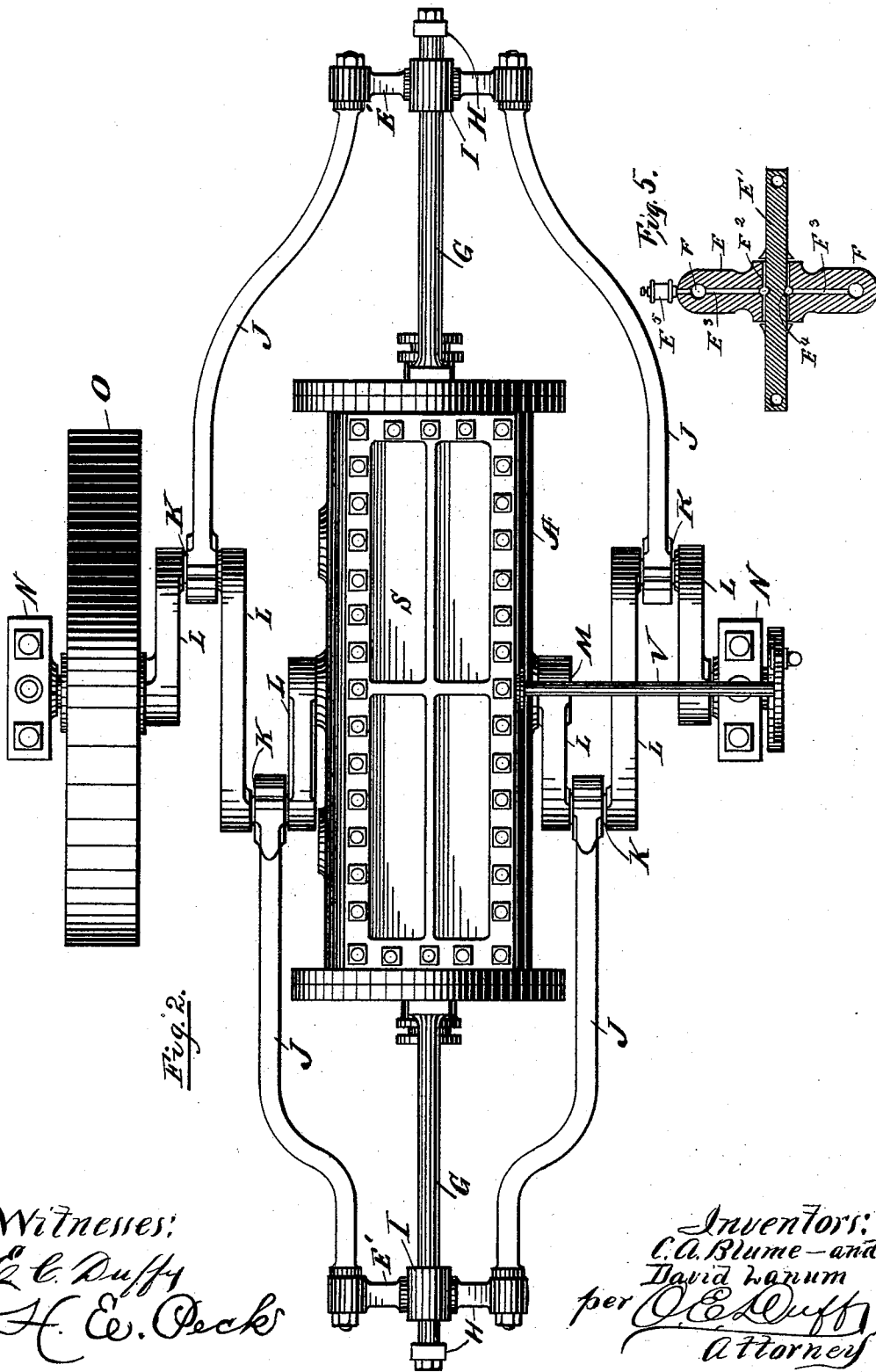
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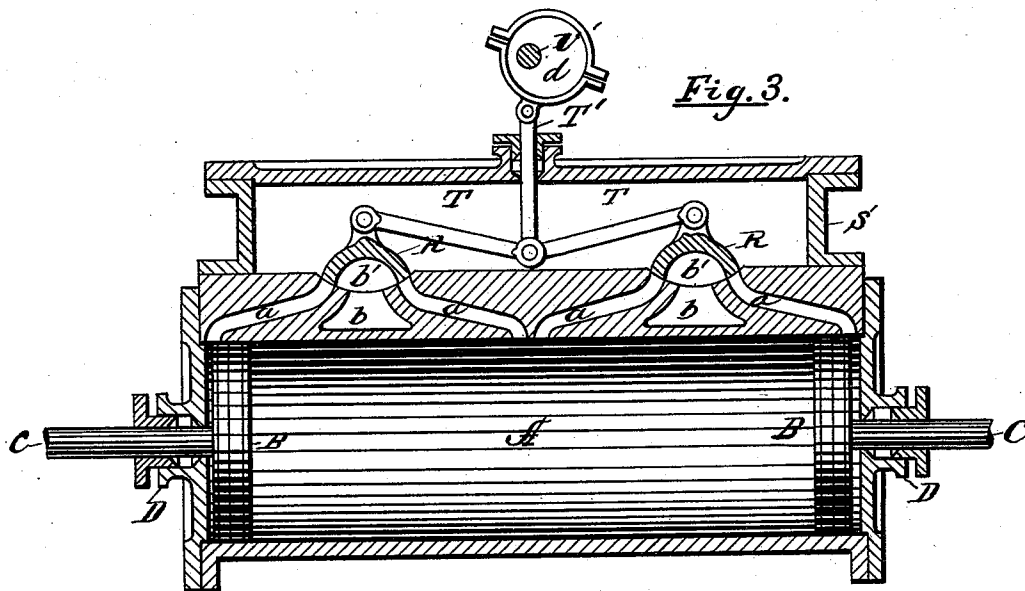


Fig. 3.

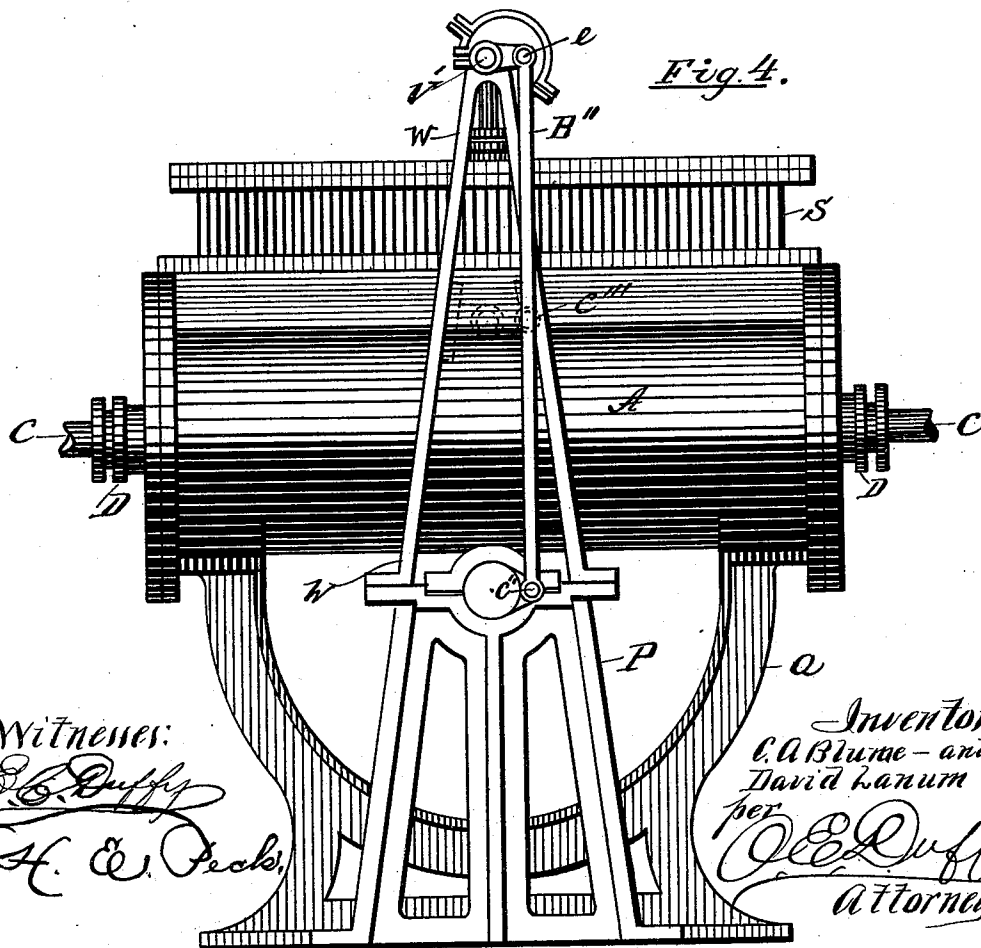


Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES A. BLUME AND DAVID LANUM, OF COLFAX, INDIANA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 447,292, dated March 3, 1891.

Application filed April 23, 1890. Serial No. 349,091. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. BLUME and DAVID LANUM, of Colfax, in the county of Clinton and State of Indiana, have invented certain new and useful Improvements in Steam-Engines; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The object of our invention is to make a high-speed engine of few and compact parts, light in structure, easily accessible for repairs, and cheap in first cost; and the nature of the invention will be fully described in the following specification, reference being had to the accompanying drawings, which form a part thereof, and in which similar letters of reference relate to the same parts in all the views, of which—

Figure 1 is a vertical longitudinal section. Fig. 2 is a plan. Fig. 3 is a vertical longitudinal section showing a modification in the form of the valve-operating gear. Fig. 4 is a side elevation showing the gear for operating the valves shown in Fig. 3. Fig. 5 is a detail section of one of the cross-heads and its rocking bar. Fig. 6 is an elevation showing the connections between the engine-shaft and the valve-operating mechanism.

As shown in the several views, A is a cylinder, which is slightly more than the length of an ordinary engine-cylinder, and two pistons B operate therein, each having a stroke of half the length of the cylinder between heads less the usual amount of clearance-space between the pistons and the cylinder-heads at the respective ends of the strokes. The pistons are provided with the usual piston-rods C, which work in stuffing-boxes D, and which connect with cross-heads E. The cross-heads E have bearings F at their ends, which slide upon the guide-rods G, bolted to the cylinder-heads. The guide-bars G are stayed together at their ends by cross-bars H. Secondary cross-bars E' are journaled in bearings I, which form the part of cross-heads E, to which the piston-rods are rigidly secured.

Connecting-rods J are bolted to the cross-

bars E', and reach downward to crank-pins K, secured in or forged integral with the cranks L and shaft M. The shaft M is journaled at its ends in bearings N, and preferably by a bearing N' bolted beneath the cylinder. A fly-wheel O is keyed to the shaft and may be on either side of the cylinder, or two may be used, one on each side thereof. The bearings N are formed in the standards P, and a main frame Q forms the support for the cylinders.

The movements of each of the pistons B are governed by a separate slide-valve of the ordinary D-type, which may be either of the ordinary form having a rectilinear reciprocating motion, as best seen in Fig. 1, or of the oscillating type shown in Fig. 3. The valves R operate in the usual chest S, which receives steam from the boiler.

Four steam-ports *a* lead the steam to the respective sides of the two pistons to cause them to make their reciprocations within the cylinder, and two exhaust-ports *b* are provided to permit the exit of the steam after it has done its work in the cylinder. The valves R are provided with the exhaust-cavities *b'*, and, as shown in the several views, are in their mid-position, ready to begin to admit steam to either side of the piston, according to the direction in which the engine is intended to be run.

As shown in Fig. 1, where the ordinary reciprocating slide-valves R are used the valve is connected by links T with the arms U of a rock-shaft, which is keyed to a shaft V, which serves to reciprocate the valves R the required distance in either direction to open and close the steam-ports *a*, and then to make connection between these ports and the exhaust-cavities *b b'* during the return-strokes of the pistons. The shaft V is journaled in a standard W, as shown in Fig. 4, which is itself secured to the standard P or to any other suitable support.

As shown in the drawings, the valves R are what are called "square valves" of the ordinary D type; but it is obvious that they may be given "lap" and "lead" when it is desired to cut off the steam and have expansion and to give preadmission.

As shown in Fig. 6 in dotted lines, the shaft V is connected rigidly with a link-sector A',

in the slotted arc B' of which the end of the rod C' can be moved to the right or left, so that the engine may be reversed by shifting the position of this link and then clamping it. The link C' receives a reciprocating movement from the crank-shaft and communicates it to the sector and to the rocker-arms U and valve-stems T. The valves are held to their seats by steam-pressure, and to prevent any possibility of their tilting, a guide-sleeve D', attached to the right-hand valve, into which fits a plunger-rod F', attached to the left-hand valve, may be used. The tube D' and the plunger F' are shown in dotted lines in Fig. 1.

Each sliding vertical cross-head E is provided with boxes at its ends, which slide and are confined on the guide-bars G. At its center the vertical cross-head is provided with a transverse horizontal bearing E², in which the rocking cross-head E' is journaled at its center. This cross-head E' is provided with a peripheral groove E⁴ within said bearing, and a duct E³ extends from the under side of the upper bearing F down to the bearing E² and from the under side of bearing E² to the lower bearing F, so that the lubricating material can flow from the cup E⁵ to and through the upper bearing F, the bearing E², and the lower bearing F, and thereby thoroughly and economically lubricate all the parts and bearings of the cross-heads.

The operation of the device so far as described is as follows: The valves and pistons being in the positions shown in Fig. 1, an upward movement of the rod C' oscillates the sector A' to the left and causes the valves R to open the steam-ports at their outer edges, admitting steam between the two cylinder-heads and pistons. At the same time the inner edges of the exhaust-cavities in the valves open the two ports leading from the center of the cylinder, thus permitting the steam between the pistons to escape to the exhaust-cavities b', and thus to the atmosphere or condenser. On the downward stroke of the rod C' the valves are shifted, so that steam is admitted between the pistons, and the steam on the outer sides of the pistons escapes to the exhaust. By shifting the rod C' to the left of the sector A' in the slot the engine is reversed, as the valves then receive a movement opposed to the former one. To permit this shifting, the slot B' should have a radius equal to the length of the rod C', and C' is provided with a suitable handle. (Not shown.)

In the modification shown in Figs. 3 and 4 the valves R are also "square D-valves" of the oscillating type, and the links or valve-stems T receive their reciprocating movements from a vertically-reciprocating rod T', which is operated by an eccentric d, keyed to the shaft V'. The shaft V' receives a revolving motion by means of a crank-pin e and a rod B'', which connects with the crank-pin C'' or the main shaft. To prevent any uncertainty as to which direction the crank-pin e will turn

when on its centers, a third crank C''' may be introduced at the middle of the length of the rod B'', having the same throw as e, and C'' C''' is shown dotted in Fig. 4.

In operation the device shown in Figs. 3 and 4 is the same as those shown in Fig. 1, the rods T, by their reciprocations, causing the valves R to perform the same functions in admitting and exhausting steam from the opposite sides of the two pistons in the manner already described.

Having fully set forth the nature of our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an engine, the combination of the horizontal cylinder, the two oppositely-moving pistons therein provided with piston-rods extending through the opposite heads, steam-chest on said cylinder, two sets of ports from the chest to the cylinder for admitting and exhausting steam from opposite sides of said pistons, two valves in said chest respectively governing a set of said ports, the main engine-shaft connected with and driven by said piston-rods, the shaft for operating said valves parallel with said engine-shaft and connected therewith to be rocked thereby, and the links connecting said valve-shaft and said two valves to operate the same simultaneously, substantially as described.

2. In combination, the horizontal cylinder, the continuous steam-chest thereon, the two oppositely-moving pistons in said cylinder having their rods extending through opposite cylinder-heads, the horizontal engine-shaft mounted horizontally and transversely beneath and journaled to the center of said cylinder, connections from the piston-rods to drive said shaft, the ports from said chest into the cylinder, the valves to control said ports, the counter-shaft above said cylinder and to which said valves are connected so as to be simultaneously operated thereby, and means connecting the engine and said counter-shaft to rock said counter-shaft.

3. In combination, the horizontal cylinder, two horizontal parallel guide-rods rigid with each cylinder-head and secured together and extending out therefrom, the two oppositely-moving pistons in said cylinder having rods extending through opposite heads and each between a pair of guide-rods, vertical cross-heads sliding on said guides, each having a piston-rod secured thereto, the engine crank-shaft horizontally mounted in a plane passing transversely through said cylinder, and the horizontal rocking cross-heads, each journaled in and extending through a vertical cross-head and connected with said shaft to rotate the same.

4. The combination of a continuous cylinder A, having two pistons B, a continuous steam-chest, valves R, governing two sets of ports a a b, links T, reciprocating said valves and connected to a rocker-arm U, a shaft V, secured to the rocker-arm U, and a rod C', oscillating the shaft V and operated

by connection with the main engine-shaft, substantially as described.

5 5. In combination, a continuous cylinder provided with two sets of ports *a a b*, two pistons B, working in opposite directions therein, two valves R, provided with the exhaust-cavities *b'*, controlling the two sets of ports, links T, connecting the valves with a rock-shaft V, a sector A', oscillating the rock-shaft, a link
10 C', operated from the engine-shaft oscillating said sector, and a slot in the sector, whereby the link C' may be shifted so as to reverse the motion of the valves, substantially as described.

15 6. The combination of the cylinder, the two horizontal guide-rods, the vertical cross-head secured to the piston-rod of the cylinder-piston and having boxes at its ends sliding on

said guide-rods, and provided with a horizontal bearing, a horizontal rocking cross-head 20 at its center mounted in said bearing, the connecting-rods or pitmen secured to its opposite ends, and the oil-cup on the upper box of said vertical cross-head, said head being provided with an oil-duct from said upper 25 bearing into and through the horizontal bearing to the lower box, as set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

CHARLES A. BLUME.
DAVID LANUM.

Witnesses:

J. C. HARLAN,
LUTE B. MOORE.