

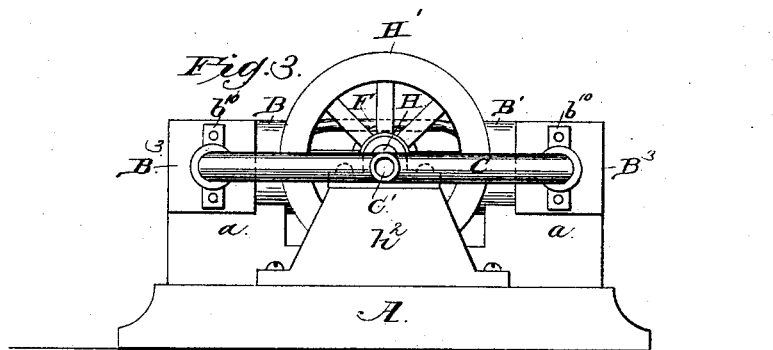
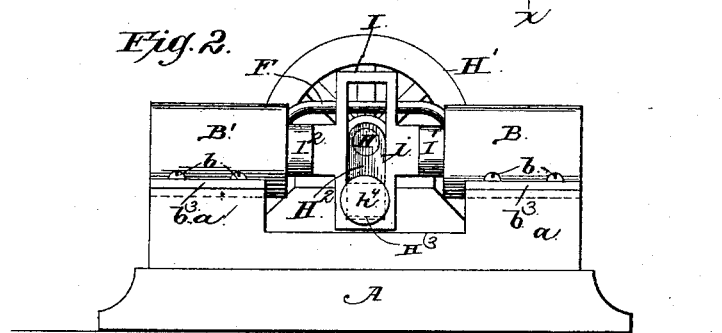
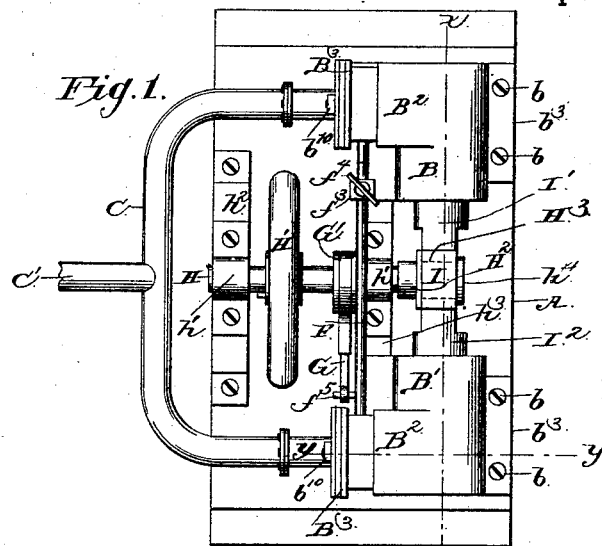
(No Model.)

2 Sheets—Sheet 1.

C. A. JACOBS.  
STEAM ENGINE.

No. 348,563.

Patented Sept. 7, 1886.



Witnesses

M. E. Fowler  
E. G. Siggers

Inventor:

*C. A. Jacobs*

By *his* Attorneys

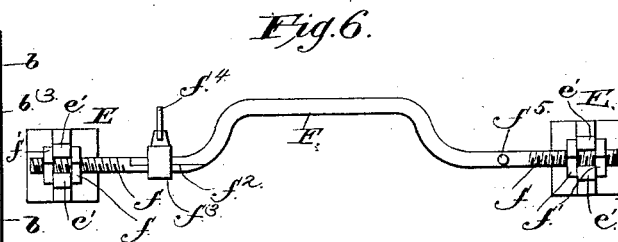
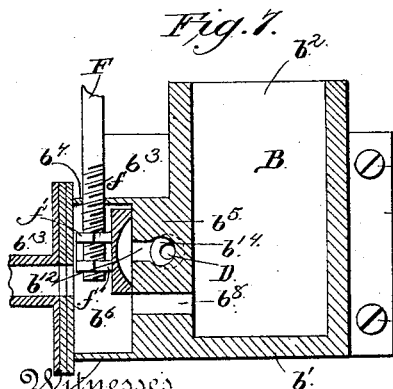
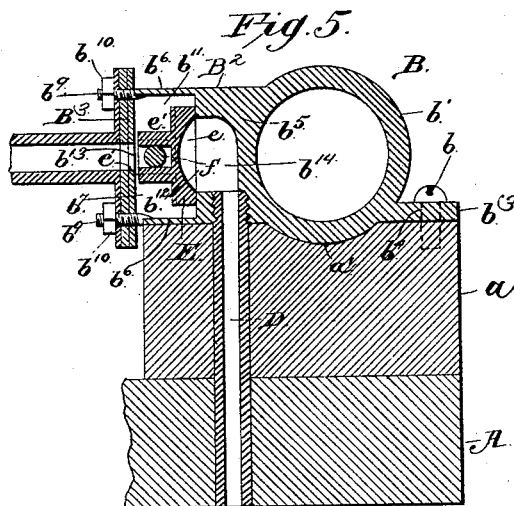
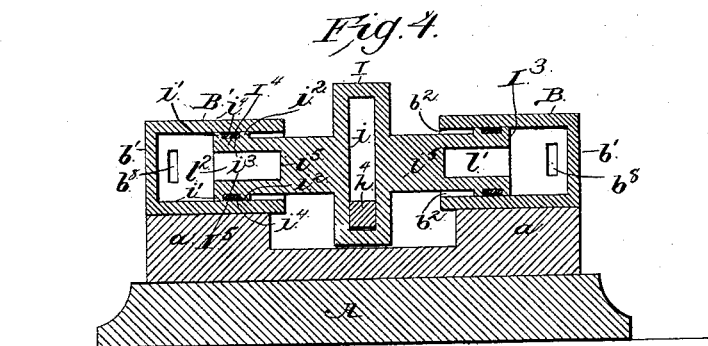
C. N. Shoules



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# UNITED STATES PATENT OFFICE.

CHARLES ARTHUR JACOBS, OF TOLEDO, OHIO, ASSIGNOR TO JESSE E. PATTERSON AND SAMUEL KOHN, OF SAME PLACE.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 348,563, dated September 7, 1886.

Application filed February 18, 1886. Serial No. 192,420. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES ARTHUR JACOBS, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in steam-engines, and has for its object the provision of a machine of the class named adapted to be operated at a very high rate of speed without liability of its several members being misplaced or otherwise damaged thereby.

With this object in view the invention consists of the peculiar combination and novel construction and arrangement of the various parts for service, substantially as hereinafter fully set forth, and particularly pointed out in the claims.

Referring to the drawings, in which similar letters of reference denote similar parts, Figure 1 represents a plan view of a steam-engine embodying my improvement. Figs. 2 and 3 are views in elevation taken from opposite sides of my improved steam-engine. Fig. 4 is a vertical longitudinal section through the cylinders and piston heads and rods, taken on the line *x x* of Fig. 1. Fig. 5 represents a transverse sectional view taken on the line *y y* through the cylinder, its steam-chest, induction and eduction ports, and the valve that alternately opens and closes the same. Fig. 6 represents a detached detail view of the valves and links for operating the same. Fig. 7 is a horizontal section through one of the cylinders, its steam-chest, and valve.

In the drawings, A designates the engine-bed, upon which the several parts of my invention rests and operates.

*a a* designate pillow-blocks, that project upwardly from the opposite ends of the bed A, and are provided with hollowed or grooved upper surfaces *a'*, upon which the cylinders B rest, and are secured by bolts *b*.

B B' designate the cylinders, two in number, placed and held upon the pillow-blocks *a a* in alignment with each other. (See Figs. 1 and 2.) For convenience of description I will hereinafter describe but one of the cylinders, B, it being understood that the remaining cylinder, B', is in all respects similar to the cylinder B.

*b'* designates the body of the cylinder, one end of which, *b<sup>2</sup>*, is open. The other or outer end is integral with the body or sides of the cylinder, whereby simplicity of construction, combined with great strength of parts, is insured to the cylinder, as will be apparent.

*b<sup>3</sup>* designates flanges, that rest upon the upper surface of the pillow-block *a*, and are secured thereto by bolts *b*, that pass through apertures *b<sup>4</sup>* in said flanges *b<sup>3</sup>*.

*B<sup>2</sup>* designates the steam-chest, made integral with and projecting from one side of the cylinder toward its rear end, as shown. The steam-chest *B<sup>2</sup>* consists, first, in a thick upper wall, *b<sup>5</sup>*, in immediate connection with the body of the cylinder; and, secondly, in side and end walls, *b<sup>6</sup> b<sup>7</sup>*, that project outwardly from the bottom *b<sup>5</sup>*, to receive "live steam" from the boilers, and to pass the same through a suitable port, *b<sup>8</sup>*, to the interior of the cylinder B, behind the piston-head operating therein. The steam-chest of each cylinder is cast integral with the cylinder, and projects laterally from the same, the outer end of the chest being left open. A cap or inclosing plate, *B<sup>3</sup>*, is fitted against the outer face of the steam-chest, to close the latter, and the cap-plate is detachably secured in place by threaded bolts or pins *b<sup>9</sup>*, which are permanently and rigidly secured to the steam-chest, and receive securing-nuts *b<sup>10</sup>*, which bear against the cap-plate, an elastic packing, *B<sup>4</sup>*, of leather, rubber, or like material being interposed between the outer faces of the valve-chest and the cap-plate, to effectually prevent the leakage or escape of steam from the chest.

*C* designates the U-shaped supply-pipe, one end of which is connected with the cap or plate *B<sup>3</sup>* at the middle thereof, to pass steam into the steam-chest *B<sup>2</sup>*. The pipe *C* is connected at its middle with a straight pipe, *C'*, that extends to the boiler. A port, *b<sup>11</sup>*, is formed in the cap-plate *B<sup>3</sup>* of the steam-chest, to permit live steam from the supply-pipe *C* to flow through the same into the chamber *b<sup>11</sup>* of the chest, and when the valve in the chest is opened the steam therefrom escapes into the cylinder through the induction-port *b<sup>8</sup>*, as will be readily understood.

*b<sup>12</sup>* designates an opening formed at the side of the port *b<sup>8</sup>* in the bottom *b<sup>5</sup>*, that extends to and opens into a space, *b<sup>14</sup>*, opening through the lower edge of the part *b<sup>5</sup>*, and receives one



end of the exhaust-pipe D, that passes downward through the pillow-block *a* and bed A.

E designates the valve, preferably in shape of an inverted U—that is to say, having a hollow, *e*, upon its surface, that rests upon the bottom *b*<sup>3</sup>, which connects at stated periods the port *b*<sup>8</sup> with the port *b*<sup>12</sup>, to permit the exhaust of steam from the cylinder B to the pipe D. (See Fig. 7.) The valve E is provided upon its outer surface with spurs or lugs *e'*, that project outwardly a short distance to form a connection for the screw-threaded end *f* of a link-rod, F, provided within the steam-chest upon each side of the lugs *e'* with adjusting nuts or burrs *f'*, that secure said rod to the valve E. The rod F extends outwardly through the inner end of the steam-chest B<sup>2</sup>, to and is connected to the valve located in the steam-chest of the cylinder B', as shown.

*f*<sup>2</sup> designates a splice or adjustable joint, formed in the rod F at a short distance from one of the steam-chests B<sup>2</sup>.

*f*<sup>3</sup> designates a clamp used for securing the severed ends of the rod F together at the point *f*<sup>2</sup>, said clamp consisting in an apertured block, in which the ends of the rod are placed in juxtaposition and held by a set-screw, *f*<sup>4</sup>, that projects through the side of the clamp and bears against one of the parts of said rod.

The opposite end of said rod is provided with a laterally-projecting pin, *f*<sup>5</sup>, to which is pivoted one end of an eccentric-rod, G, the opposite end of which is formed into a strap, that surrounds an eccentric, G', secured upon the main driving or crank shaft H. The shaft H is journaled in bearings *h* *h'*, secured to the tops of pillow-blocks *h*<sup>2</sup> *h*<sup>3</sup>, that project outwardly from the bed A.

H' designates a fly or balance wheel, mounted upon the shaft H, between its bearing-blocks, to give steadiness of motion to the several parts of the machine, and also to give through a belt motion of different desired machines. To one end (the front) of the shaft H is secured a crank-arm, H<sup>2</sup>, provided with a crank-pin, *h*<sup>1</sup>, upon which is mounted a block, H<sup>3</sup>, that is placed and slides freely in vertical direction in a slot, *i*, formed in a cross-head, I, to the middle of which, at each side thereof, is connected the piston-rods I<sup>1</sup> I<sup>2</sup>, the outer ends of which terminate in piston-heads I<sup>3</sup> I<sup>4</sup>, each of which is surrounded at its extreme end, at a short distance inward therefrom, with flanges *i'* *i*<sup>2</sup>, between which is placed and held the packing I<sup>5</sup>, which consists of a steel ring, *i*<sup>3</sup>, at the bottom of the groove, formed by the flanges *i'* *i*<sup>2</sup>, covered by different desired packing material, *i*<sup>4</sup>—as, for instance, cotton, twine, or wicking.

*i*<sup>7</sup> *i*<sup>8</sup> designate axial bores formed in the piston heads and rods that extend from the ends thereof inward to points *i*<sup>6</sup>, for the purpose of holding sufficient steam to cushion the return-stroke of the piston-rod, as will be readily understood by those skilled in the art to which my invention appertains.

By reference to the drawings it will be ob-

served that the link-rod connecting the valves E together is bent upwardly at its middle and passes over the box *h'* of the shaft H at the side of the eccentric G'.

Modifications in detail of construction may be made in the within-described invention without departing from the spirit or sacrificing the advantages thereof. The cylinders are each cast in a single piece of metal with one head closed and the other head open, and the open heads are placed in line with each other upon the same vertical and horizontal planes. The cylinders are thus very strong and durable in construction and firmly bolted to the bed-plate, so that they are not liable to displacement. The steam-chests are also cast with the cylinders for strength and durability, and one end of the chest is left open and closed by a cap-piece, which is securely bolted thereto. The pistons and the slotted cross-head are also cast in a single piece of metal, and by these peculiar constructions of parts I am enabled to provide a steam-engine which is very simple, strong, and durable. The valves E are provided with rounded and hollowed out inner faces, *b*<sup>2</sup>, which bear at their edges against the valve-seat, and by means of this peculiar form the valve will slide with less friction, retain or keep its seat better, and is quicker in operation, and but a small area of surface thereof is in contact with the seat, and hence less resistance is offered to its movement, and the friction is lessened.

Having thus described my invention, I claim—

1. In a high-speed engine, cylinders B B', having one open end, said cylinders mounted in the same plane upon opposite ends of a bed, A, and provided upon one side with steam-chests having ports and inverted-U-shaped valves connected together by a two-part link-rod, in combination with said link-rod, a clamp that secures the parts thereof together, a crank-pin that projects from said rod, an eccentric-rod, G', connected at one end to said crank-pin and at its other to an eccentric, G', upon the shaft H, and fly-wheel H', substantially as described.

2. In a high-speed engine, a two-part valve-rod, F, secured together by a clamp, *f*<sup>3</sup>, having a set-screw, *f*<sup>4</sup>, and pin *f*<sup>5</sup>, projecting outwardly from said rod F, in combination with an eccentric-rod, G, connected at one end to said pin *f*<sup>5</sup>, and provided at its opposite end with a strap to encircle an eccentric, G', eccentric G', mounted upon a shaft, H, fly-wheel H', crank-arm H<sup>2</sup>, and cross-head I of the piston-rod, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

CHARLES ARTHUR JACOBS.

Witnesses:

P. HENAHAN,  
J. E. HUNT.