

(No Model.)

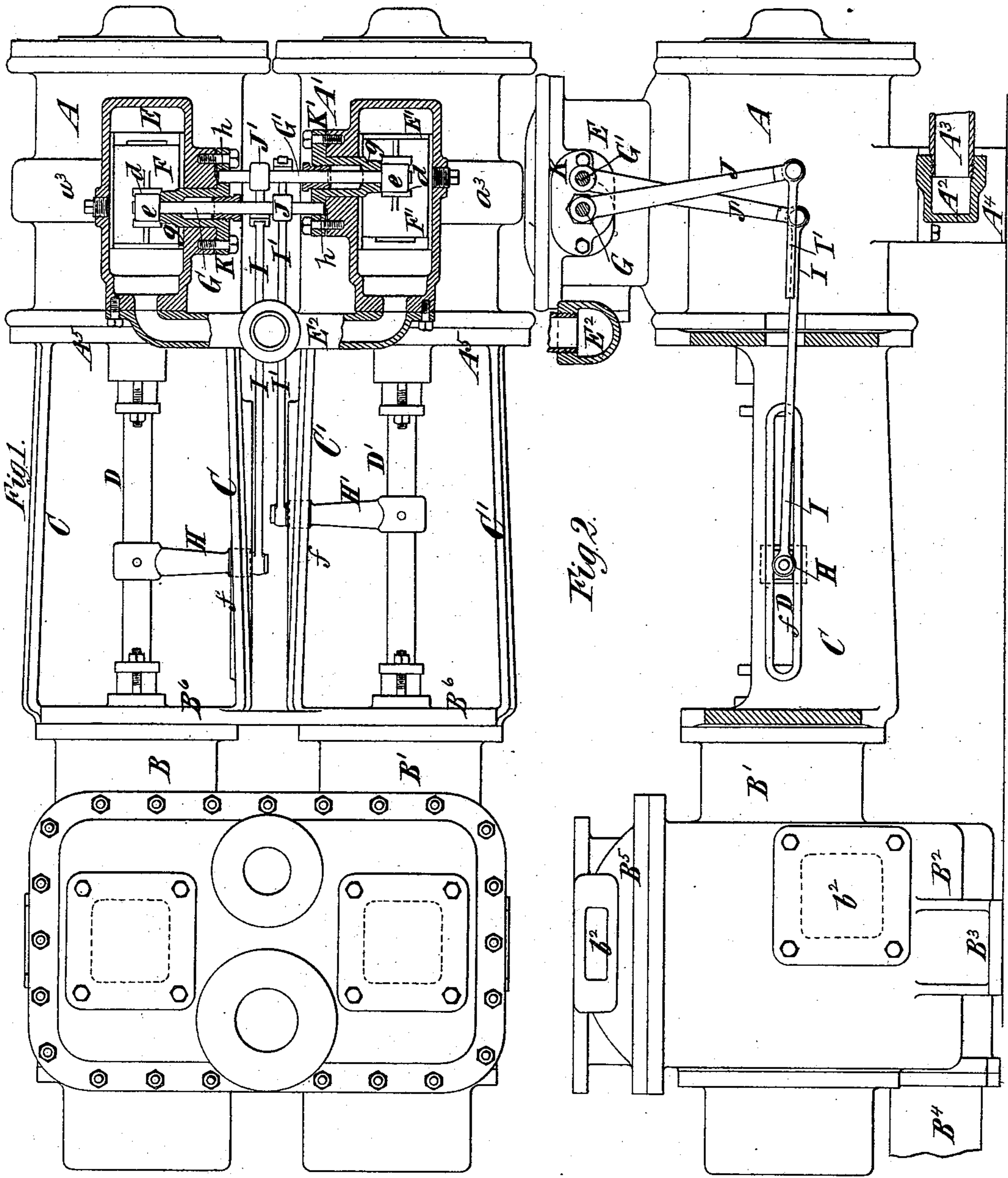
2 Sheets—Sheet 1.

T. J. RIDER.

## DUPLEX PUMPING ENGINE.

No. 324,488.

Patented Aug. 18, 1885.



*Witnesses:*

O. Sundgren  
Emil Herter.

*Inventor:*

Thomas J. Rider  
by his atty  
Brown Hall

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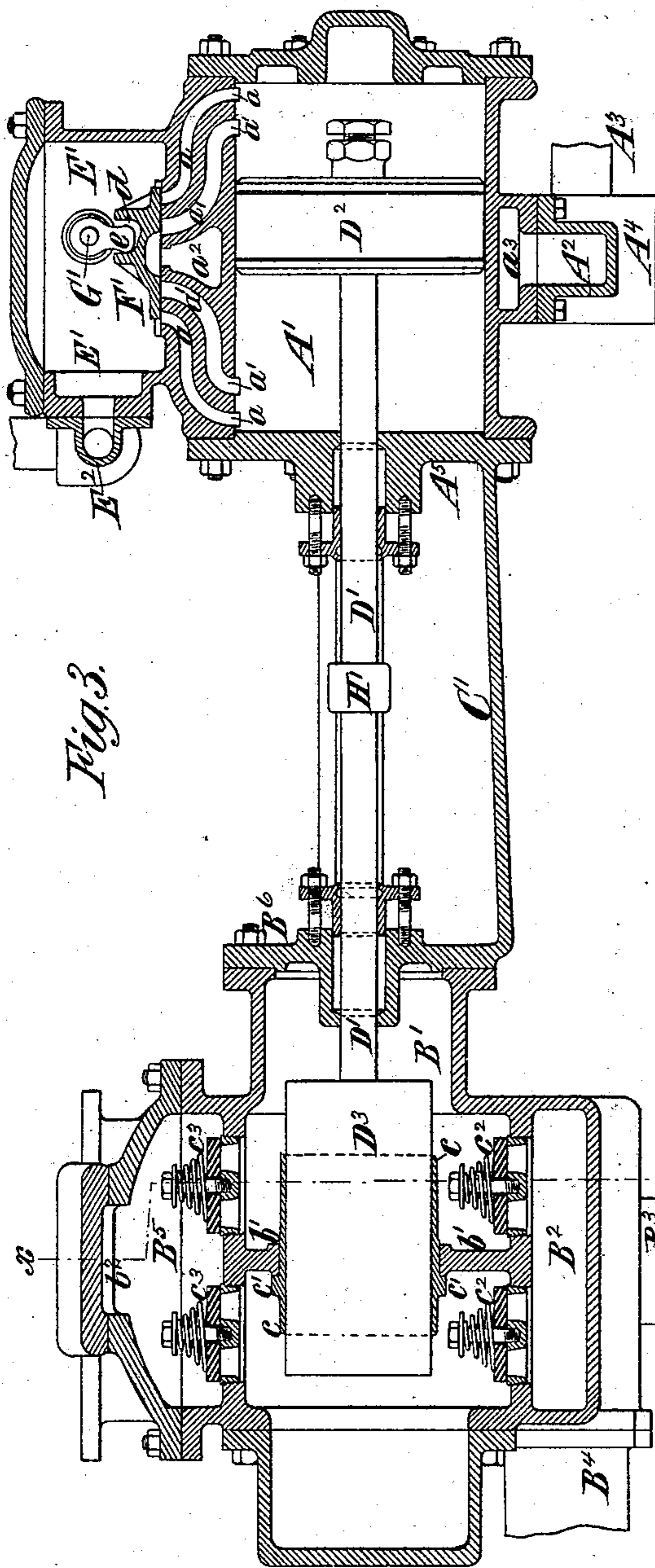


Fig. 3.

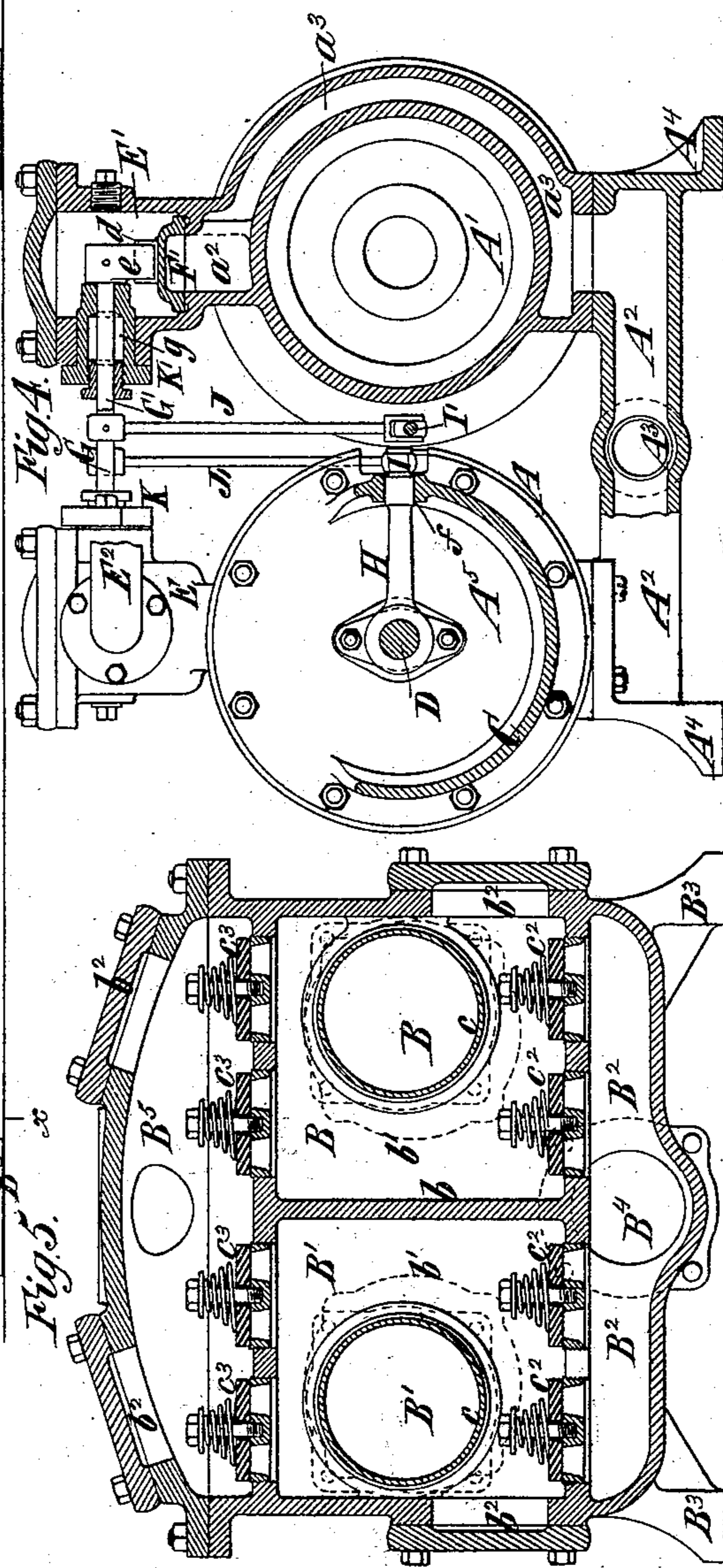


Fig. 4.  
Fig. 5.

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# UNITED STATES PATENT OFFICE.

THOMAS J. RIDER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CORNELIUS H. DE LAMATER, GEORGE H. ROBINSON, AND WILLIAM DE LAMATER, ALL OF SAME PLACE.

## DUPLEX PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 324,488, dated August 18, 1885.

Application filed June 18, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS J. RIDER, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Duplex Pumping-Engines, of which the following is a specification.

My invention relates to duplex steam pumps or pumping-engines wherein the valve of each engine is operated from the piston-rod of the other engine; and it consists in novel combinations of parts, which are hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan of a duplex engine embodying my invention, the steam-chests only of the two engines being shown in horizontal section. Fig. 2 is a vertical longitudinal section in a plane between the two steam-cylinders and the trunks or braces connecting them with the water-cylinders, the water cylinders or chambers being shown in elevation. Fig. 3 is a longitudinal section through one of the engines. Fig. 4 is an irregular transverse section in a plane through the steam-cylinder and valve-chest of one engine, and through the trunk or connecting-brace which extends between the steam and water cylinders of the other engine, and Fig. 5 is a transverse section of the water cylinders or chambers upon the plane of the dotted line *x x*, Fig. 3.

Similar letters of reference designate corresponding parts in all the figures.

A A' designate the steam-cylinders, and B B' designate the water chambers or cylinders, which are connected with the steam-cylinders by braces or trunks C C', having a semicircular or other suitable transverse section, as shown in Fig. 4.

As here represented, the water-chambers B B' are formed in a single casting separated by a longitudinal partition, *b*, and constructed with transverse partitions *b'*, as represented in Fig. 3, wherein is supported a cylinder-lining or tube, *c*, to which the water-piston is fitted.

As here represented, the removable cylinder-lining or tube is inserted in a central opening in the partition *b'*, and has cast upon it a flange, *c'*, through which are inserted bolts for secur-

ing it in place, as shown by dotted lines in Fig. 5.

Below the water chambers or casings B B' is formed a suction chest or passage, B<sup>2</sup>, having feet or flanges B<sup>3</sup>, by which it is supported, and to which water is admitted by a suction-pipe, B<sup>4</sup>.

*c*<sup>2</sup> designates the suction-valves, which may be of any suitable or ordinary character, and *c*<sup>3</sup> designates the discharge-valve, whereby water is delivered into a discharge-chest, B<sup>5</sup>, at the top of the water chamber or casing.

The water chamber or casing has the parts B B' B<sup>2</sup> B<sup>3</sup> B<sup>5</sup> all formed in the same integral casting, with the exception of the cover or top of the discharge-chest B<sup>5</sup>, and is provided with suitable hand-holes and bonnets, *b*<sup>2</sup>, whereby access may be had to its valves.

The steam-cylinders A A' are formed in two separate castings, and are connected at the bottom by an exhaust pipe or trunk, A<sup>2</sup>, from which leads an exhaust-pipe, A<sup>3</sup>, and which is constructed with feet or flanges A<sup>4</sup>, whereon the steam end of the engine is supported.

As here represented, the trunks or braces C C' are formed in the same integral casting with the front heads B<sup>6</sup> of the water end of the engine, and with the front heads A<sup>5</sup> of the steam-cylinders.

The water-chambers for the two pumps may be formed advantageously in the same casting, as here shown; but as the steam-cylinders with their ports are more difficult castings to make it is desirable to make them in separate castings. By this construction I am enabled to provide a pump having any suitable proportions of cylinders, by taking two separate steam-cylinders of the desired size, and making the two trunks or braces in one casting at proper distances apart from center to center, and the water chambers or casings in another casting, with the same proportion from center to center. The water chambers or casings are afforded ample support by the feet or flanges B<sup>3</sup>, and the steam-cylinders are afforded ample support by the exhaust-pipe A<sup>2</sup>, having feet or flanges A<sup>4</sup>.

D D' designate the two piston-rods of the engine, which work through suitable stuffing-boxes provided in the heads A<sup>5</sup> B<sup>6</sup>, and to each of which are attached steam and water pistons.

In Fig. 3 I have shown the steam and water pistons D<sup>2</sup> D<sup>3</sup>, which operate in the cylinders or casings A' B'. These pistons may be of any suitable construction, as they form no part of my present invention.

The two steam-cylinders, A A', are surmounted by steam-chests or valve-chests E E', wherein are slide-valves F F', which control the operation of the two engines. As here represented, the steam-chests are connected by a cross-pipe, E<sup>2</sup>, with which the steam-supply pipe may be connected. Each cylinder has near its ends supply-ports *a* and exhaust-ports *a'*, and between the two exhaust-ports is a main exhaust space or cavity, *a*<sup>2</sup>, which communicates by a passage, *a*<sup>3</sup>, extending circumferentially to the bottom of the cylinder, with the exhaust-pipe A<sup>2</sup>, as shown in Fig. 4. The movement of the slide-valve F or F' controls the admission of steam through the passages *a a* to the cylinder, and also controls the exhaust of steam through the passages *a'* from the ends of the cylinder to the main exhaust space or cavity *a*<sup>2</sup>. Each valve has formed upon its back a fork or yoke, *d*, in which operates a toe, *e*, and the toes which operate the two valves are formed upon or secured to the rock-shafts G G', by the oscillating movement of which said toes are caused to act upon the valves, to shift them in one direction or the other. The piston-rods D D' have secured upon them horizontally-extending arms H H', which project through and work in slots *f*, formed in the inner sides of the trunks or braces C C', and these arms H H' are respectively connected by rods I I' with arms J' J secured to and extending downward from the rock-shafts G' G.

It will be understood from the above description that the arm H on the piston-rod D is connected by the rod I with the arm J', which operates the rock-shaft G' for moving the valve F', and in like manner the arm H' of the piston-rod D' is connected by the rod I' with the arm J, which operates the rock-shaft G and the valve F. The dwell which is necessary at each end of the stroke is obtained by the play which the toe *e* of each rock-shaft G G' has in the fork or yoke *d* on the back of each valve F F'.

I have here represented bonnets K K' as secured to the inner sides of the two steam-chests E E'. Each bonnet has an inwardly-projecting hub, *g*, which forms a stuffing-box for the rock-shaft G G', and each bonnet also has a bearing or socket, *h*, wherein is journaled the outer end of the rock-shaft G G'.

From the above description it will be seen that the connections between the piston-rods and valves are very simple and inexpensive, and that they are all arranged between the

cylinders of the two engines, and do not project outward beyond the cylinder or trunks in any direction.

What I claim as my invention, and desire to secure by Letters Patent, is--

1. In a duplex pumping-engine having separate valve-chests mounted upon its steam-cylinders, the combination, with two valves arranged one in each chest, and rock-shafts for operating the valves extending laterally through the inner sides of the steam-chests and across the space between the chests, of arms depending from said rock-shafts, arms projecting laterally inward from the piston-rods, and rods extending between the two steam-cylinders, and by which the arms upon the two piston-rods are connected each with the rock-shaft arm of the other engine, substantially as herein described.

2. In a duplex engine, the combination, with the two steam-chests, E E', and their valves, of bonnets secured to the inner sides of the steam-chests and constructed with stuffing-boxes, rock-shafts G G', each extending through and journaled in one bonnet, and having its outer end fitting a bearing in the other bonnet, arms J J' depending from the rock-shafts, arms H H' extending laterally from the piston-rods, and rods I I', whereby the arms H H' are respectively connected with the rock-shaft arms J' J, substantially as herein described.

3. In a duplex engine, the combination, with steam-cylinders, each having a circumferential exhaust-passage extending from top to bottom, of a cross exhaust-pipe, A<sup>2</sup>, connecting the cylinders and communicating with the exhaust-passages, and forming feet whereon the cylinders are supported, substantially as herein described.

4. In a duplex engine, the combination, with two steam-cylinders consisting of separate castings, each having an exhaust-passage extending from top to bottom, and an exhaust-pipe connecting the cylinders, and constructed with supporting feet or standards, of two water cylinders or chambers formed in the same integral casting, and trunks or braces connecting the steam-cylinders with their opposite water cylinders or chambers, substantially as herein described.

5. In a duplex engine, the combination, with two steam-cylinders, A A', consisting of separate castings, each having the circumferential exhaust-passage *a*<sup>3</sup>, and the connecting exhaust-pipe A<sup>2</sup>, with its feet or flanges A<sup>4</sup>, of the water chambers or cylinders B B', formed in one integral casting, and the trunks or braces C C', also formed in one integral casting, and connecting the cylinders A A' with the chambers or cylinders B B', substantially as herein described.

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Witnesses:

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HARRY F. LYTLE.