

(No Model.)

3 Sheets—Sheet 1.

L. B. CARRICABURU.

STEAM ACTUATED VALVE.

No. 321,085.

Patented June 30, 1885.

Fig. 4.

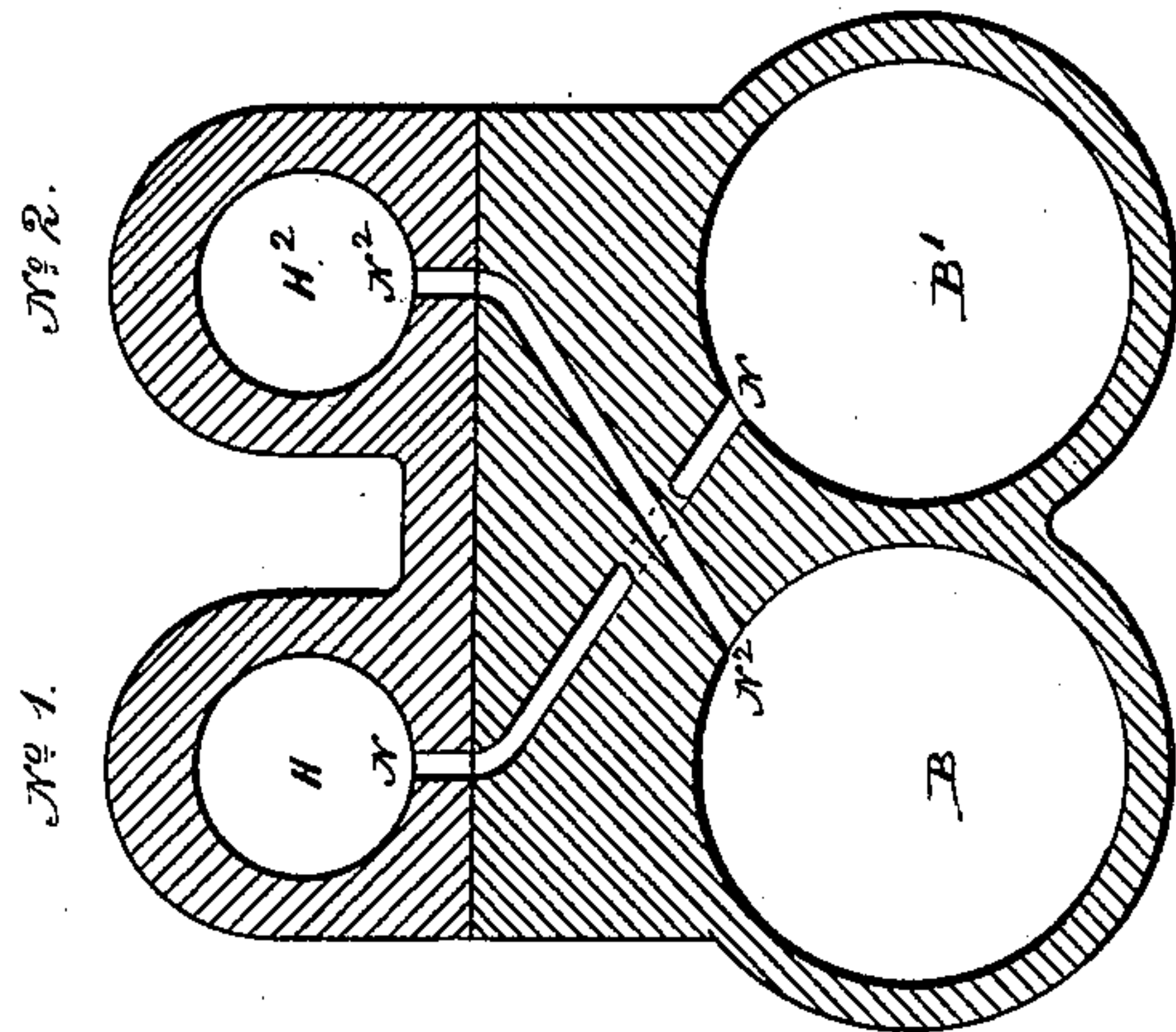
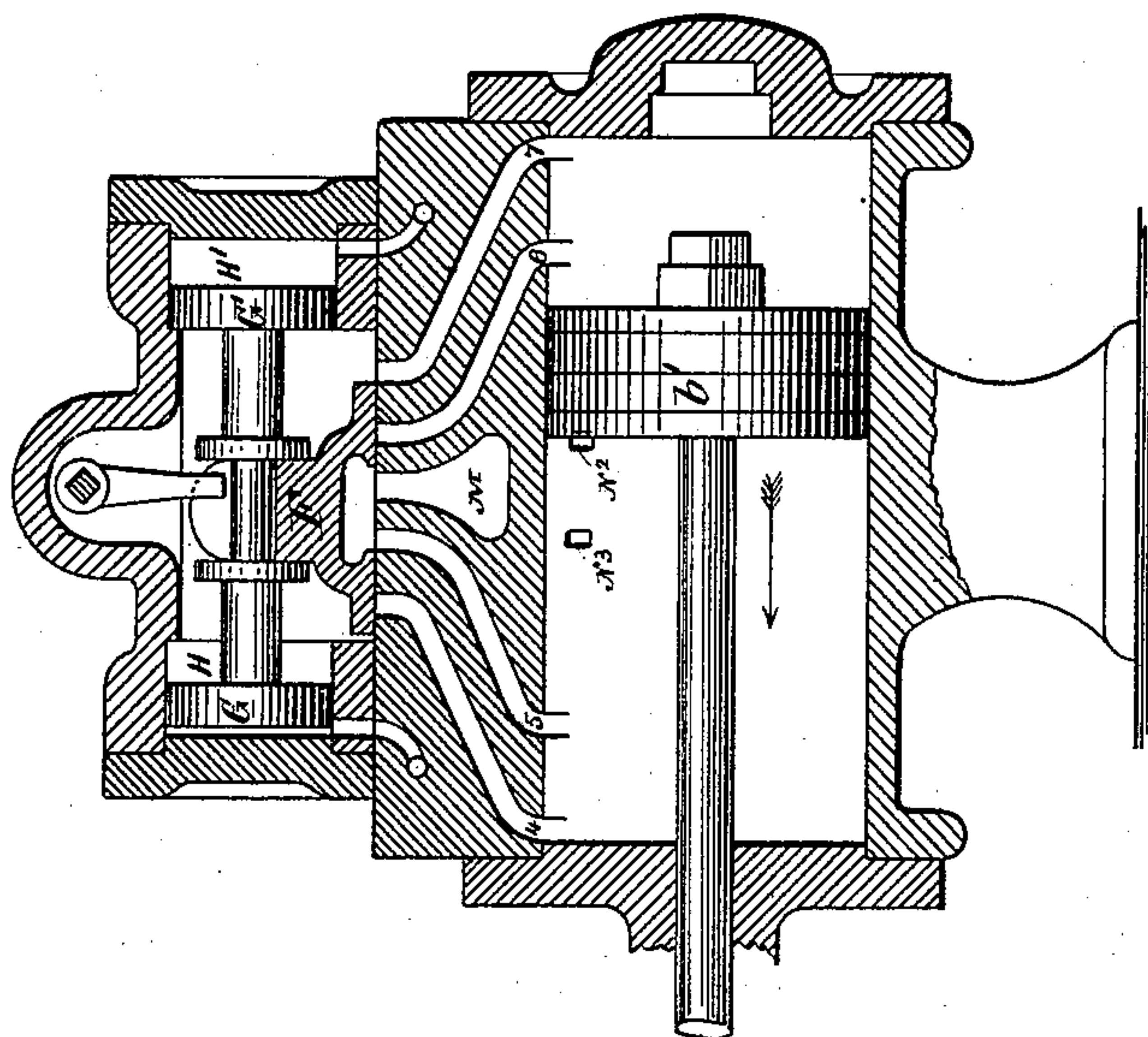


Fig. 1.



Witnesses

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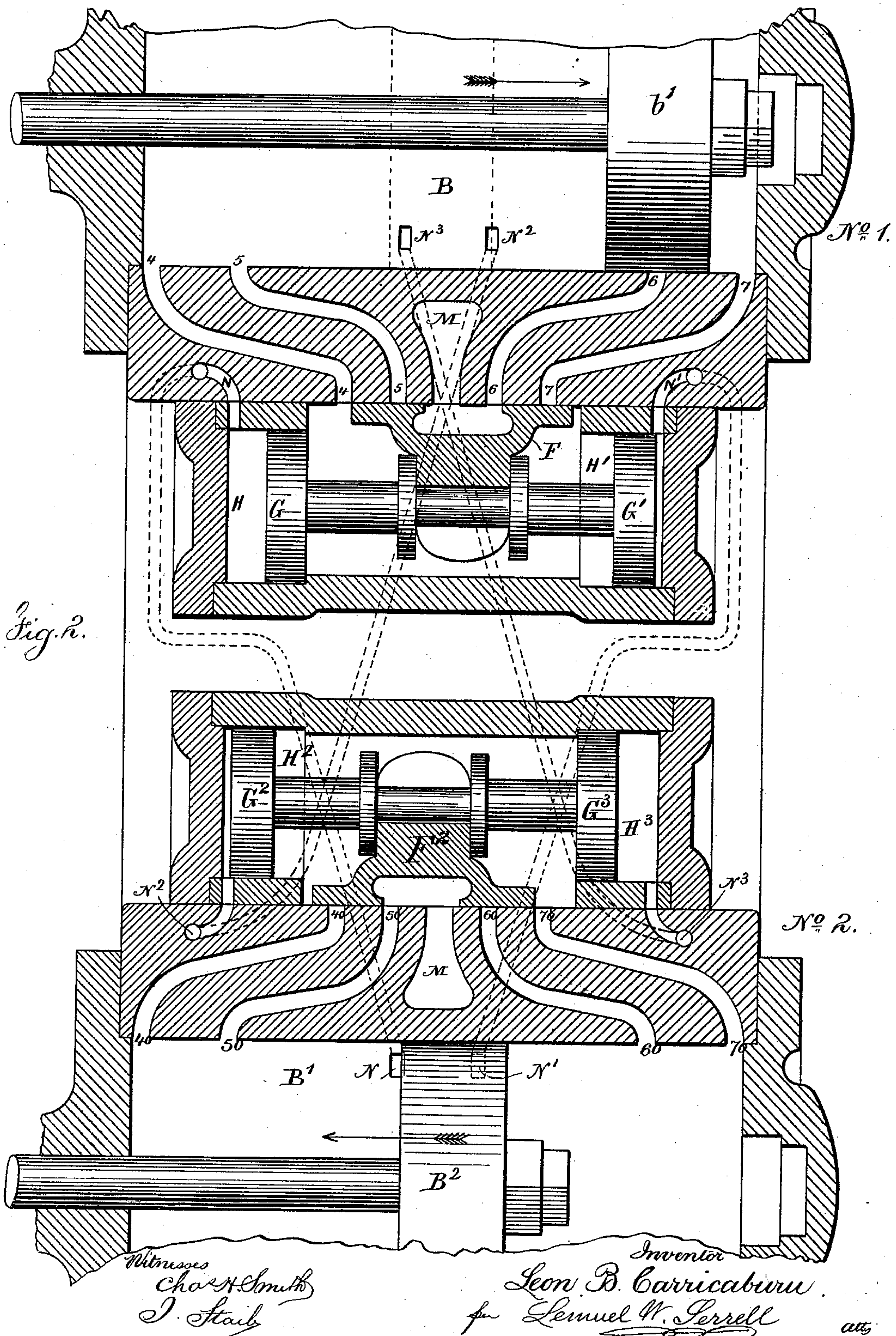
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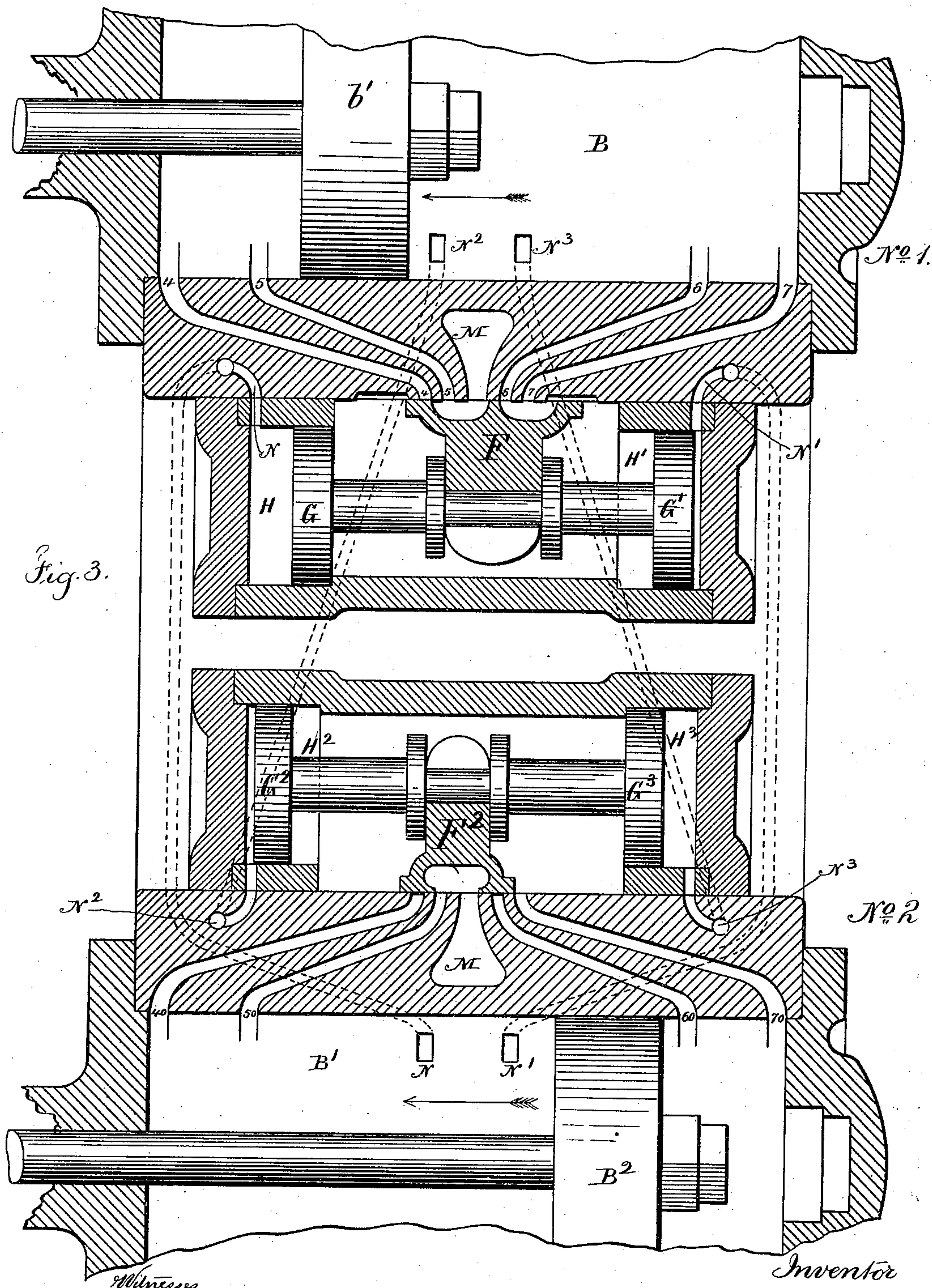
3 Sheets—Sheet 3.

L. B. CARRICABURU.

STEAM ACTUATED VALVE.

No. 321,085.

Patented June 30, 1885.



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UNITED STATES PATENT OFFICE.

LEON B. CARRICABURU, OF NEW YORK, N. Y.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 321,085, dated June 30, 1885.

Application filed March 30, 1885. (No model.)

To all whom it may concern:

Be it known that I, LEON B. CARRICABURU, of the city and State of New York, have invented an Improvement in Steam-Actuated Valves, of which the following is a specification.

Engines have heretofore been made in which there are two cylinders with valves and valve-moving pistons, and steam from the first engine-cylinder has passed through a port and moved the valve of the second engine and the reverse, but in all instances the steam passed through a passage in or controlled by a valve before reaching the valve-moving piston.

In some instances the steam acted upon an intermediate moving portion or valve before reaching the valve-moving piston, and in every case the engine would not operate if the steam-valve itself did not direct or control the steam as it passes from the cylinder of one engine to the valve-moving device of the other engine.

In my improvement, as distinguished from the devices before in existence, the ports passing from the cylinder of one engine to the valve-moving piston of the other engine are direct, and the ports are entirely free from any valves or moving, directing, or opening or closing devices of any kind, so that my engine is simple and free from any complication, and the ports are always open and ready for the passage of steam when the piston passes the end of the port, and the engineer can understand at a glance the entire operations of the parts.

In the drawings, Figure 1 is a section of one cylinder. Fig. 2 is a diagram of the ports, valves, and pistons for use with two D slide-valves; and Fig. 3 is a similar diagram of the parts for use with a B and a D slide-valve, and Fig. 4 is a cross-section of the two cylinders.

In my application No. 136,979, filed July 5, 1884, I have represented three cylinders, two of which have valves and rockers or similar mechanical device acted upon by tappets, and the third cylinder has valve-moving pistons that are connected by ports to the two adjacent cylinders.

My present invention relates to the broad features of invention which are only partially shown in said application.

The engine No. 1, with steam-cylinder B, piston b' , ports 4 5 6 7, exhaust-port M, valve F, and valve-moving pistons G and G' in the cylinders H H', are similar to the parts shown in my aforesaid application, and I employ a second cylinder, No. 2, with piston B² and ports N N' leading to the valve-moving cylinders H H' of the engine No. 1. The cylinder B' is adjacent to the cylinder B, and such ports N N' open into the cylinder B' near the middle thereof.

As the piston B² in the cylinder B' moves along in the direction of the arrow, the piston B² uncovers the port N' and admits the live steam to pass directly to the valve-moving cylinder H' and act upon the piston G', and shift the valve F of the cylinder B, causing the steam to pass in through the port 7 and act upon the piston b' to move it in the opposite direction.

The piston B² covers the port N at the same time that it admits steam by N', hence the exhaust vapors in H and N are confined and form a cushion to prevent concussion of the piston G upon the head of the cylinder H, and when the live steam is acting in both ports N N', or when the exhaust takes place in the cylinder B', there will be no motion of the valve F, because the pressures in H H' are equalized.

It will now be understood that the movement of the valve F of the cylinder B is dependent solely upon the movement of the piston B² in the cylinder B', regardless of the devices that may be used to move the valve F² of the cylinder B', and regardless of the kind of valve used for said cylinder B', and that when the piston B² of the engine No. 2 is moving in one direction the steam will act through N' upon G', and when moving in the other direction the steam will act through N upon G, thus moving the valve F first one way and then the other, and the valve-moving pistons will be cushioned, and that the piston of engine No. 2 thus has entire control of the valve-moving pistons of engine No. 1, without any regard to the valves or ports of the engine No. 2, and without the ports N N' leading to or through any intermediate valve or moving or controlling device of any kind.

It now becomes proper to state how I duplicate the foregoing connections so as to work

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the engines as duplex engines, in which the piston of engine No. 1 admits steam direct to move the valve of No. 2 engine, and the piston of No. 2 engine admits steam direct to move the valve of engine No. 1.

The diagram Fig. 2 is a duplication of the devices shown in Fig. 1, and the diagram Fig. 3 represents one cylinder with a **D**-valve, the other with a **B**-valve.

In the engine No. 2 (shown in Fig. 2) the piston G^2 in the cylinder H^2 is acted upon by steam admitted by the port N^2 upon the return-stroke of the piston b' , and the valve F^2 is moved to its opposite position. This takes place when the piston b' reaches the point indicated by dotted lines, and the port N^3 being covered the confined vapors cushion the piston G^3 in the cylinder H^3 . This movement of the valve F^2 takes place when the piston B^2 has reached the end of its stroke, and hence the piston B^2 is moved the other way and in its travel uncovers the port N to move the valve F back to the position shown, which movement takes place when the piston b' has reached the opposite end of the cylinder B from that shown.

The ports 40 50 60 70 of engine No. 2 correspond to the ports 4 5 6 7 of engine No. 1.

With one engine having a **D**-valve and the other engine a **B**-valve, as in Fig. 3, the ports $N N'$ and $N^2 N^3$ do not have to cross, but where both valves are alike—such as the **D**-valves shown in Fig. 2—the ports $N^2 N^3$ from engine-cylinder B cross so that there is a lead of the steam in opposite directions in order that the piston of one engine may uncover the ports to give the motion in the proper direction to the other valve-moving piston.

The parts in Fig. 3 are marked with the same reference-letters as those in Fig. 2, and the operation corresponds with those before described. In Fig. 3 the pistons $b' B^2$ are represented in a position where they are both moving in the same direction. The piston b' reaches the end of its movement at about the same time that the piston B^2 uncovers the port N' and allows live steam to enter and act upon the valve-moving piston G' to shift the valve F .

It will be apparent that the ports $N N' N^2 N^3$ will usually be cast in the metal that unites one valve-chest to the other, and is in the space between the two steam-cylinders, as in-

dicated in Fig. 4. I however do not limit myself in this particular, as such ports may be composed of tubes screwed into the respective castings, and where the ports cross each other, as indicated in Fig. 2, care is to be taken to prevent one port opening into the other by any defect in the casting.

I claim as my invention—

1. The combination, with an engine having a cylinder, piston, valve, and valve-actuating pistons and cylinders, of a second steam-engine cylinder, and ports leading directly from the second cylinder to the valve-actuating cylinders and pistons of the first engine, substantially as specified.

2. The combination, with the cylinder of the first engine and its valve and valve-actuating pistons and cylinders, of ports leading into a second steam-cylinder, and a piston in such cylinder that acts as a valve to the said ports to admit steam by one of the ports to move the valve and valve-actuating pistons of the first engine, and to confine the vapors in the other port and in the cylinder with which it is connected to cushion the valve-actuating piston of the first engine, substantially as specified.

3. The combination of two steam-cylinders and their pistons, two steam-valves, valve-actuating pistons and their cylinders, and ports leading directly from each cylinder to the valve-actuating cylinder of the adjacent engine, substantially as specified, whereby the piston of one engine acts as a valve to the ports leading directly to the valve-moving devices of the adjacent engine, and the said ports do not pass through and are not influenced by any valve or moving device, as set forth.

4. The combination of two engine-cylinders and their pistons and ports, two valve-moving pistons and their cylinders, a **D**-valve to one engine, and a **B**-valve to the other engine, and ports leading from the cylinder of one engine to the valve-moving cylinder of the other engine, substantially as set forth.

Signed by me this 24th day of March, A. D. 1885.

L. B. CARRICABURU.

Witnesses:

GEO. T. PINCKNEY,
CHAS. H. SMITH.