

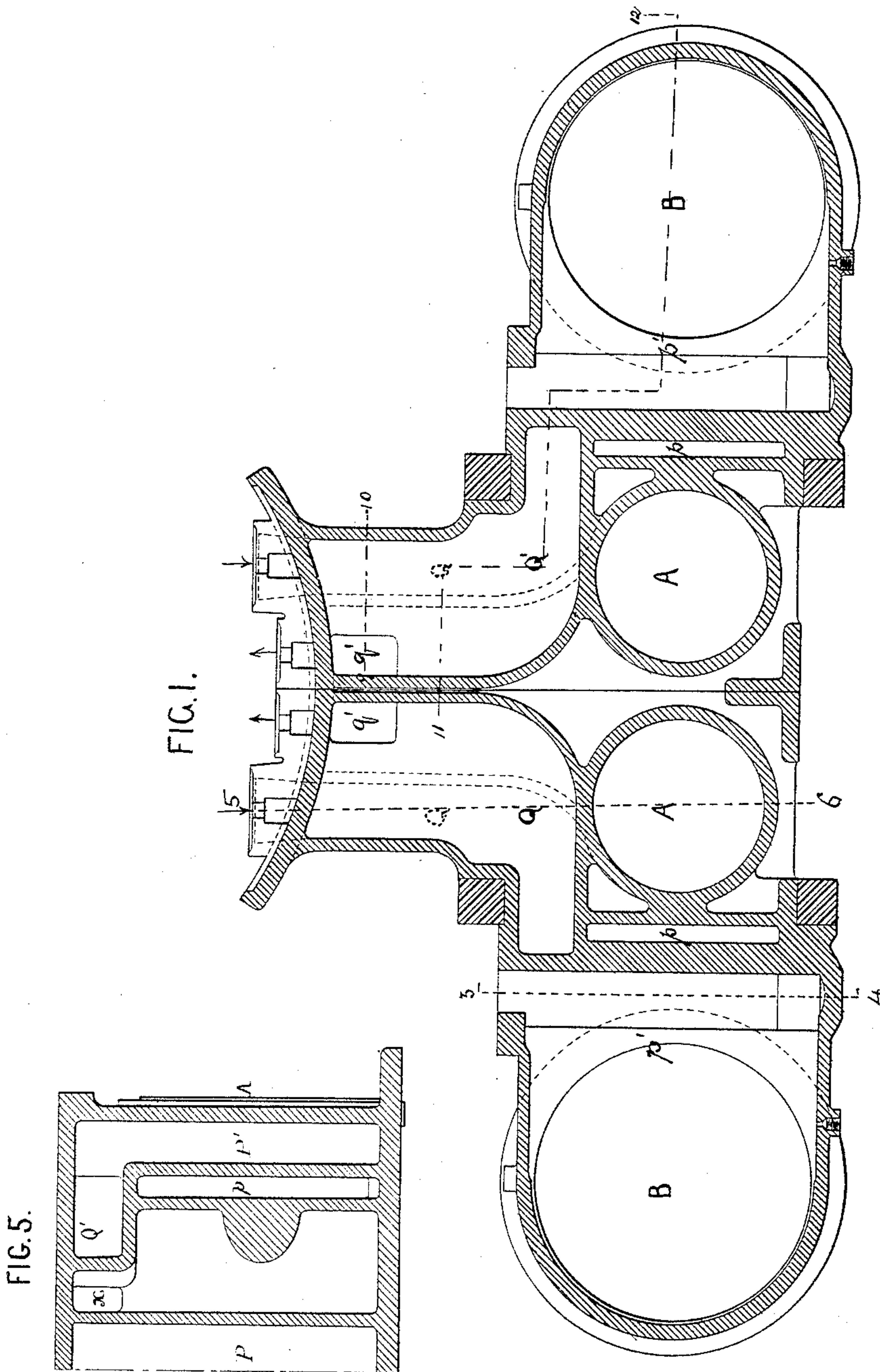
(No Model.)

4 Sheets—Sheet 1.

G. S. STRONG.
COMPOUND LOCOMOTIVE ENGINE.

No. 450,751.

Patented Apr. 21, 1891.



WITNESSES:

George Baumann
John Revell

INVENTOR.
George S. Strong
BY
Howe and Howard
his ATTORNEYS

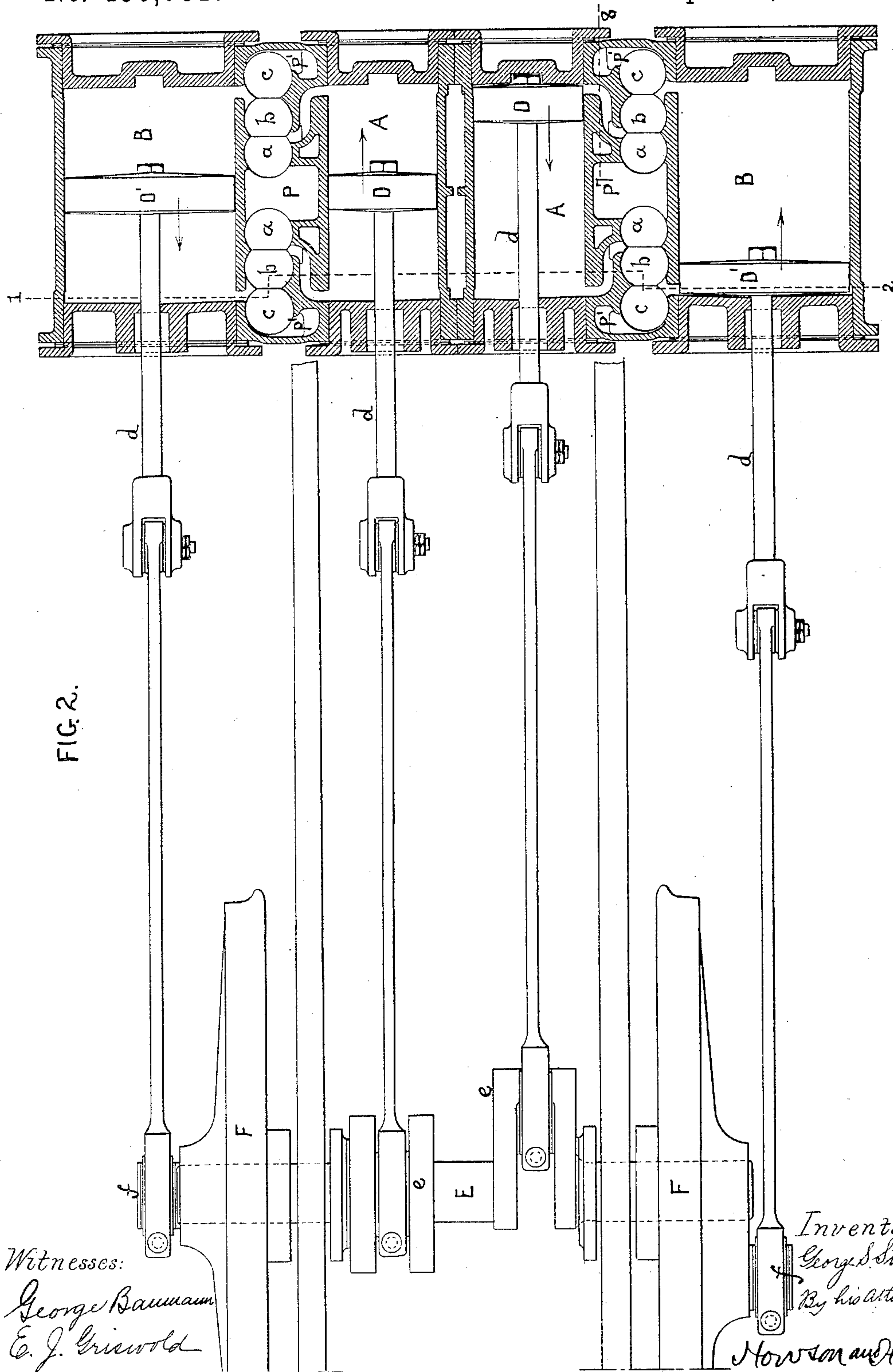
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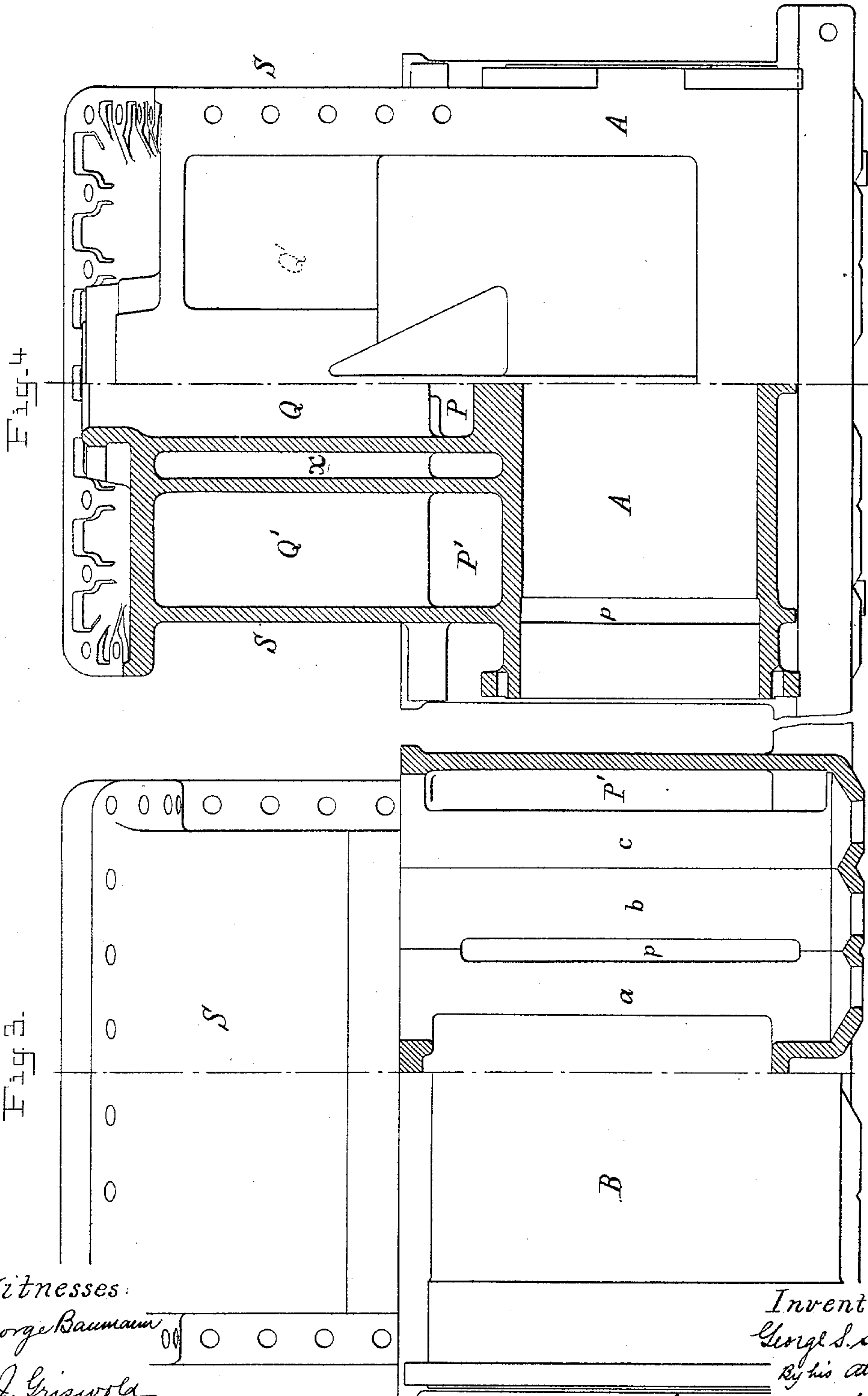
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Patented Apr. 21, 1891.



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(No Model.)

4 Sheets—Sheet 4.

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Fig. 6.

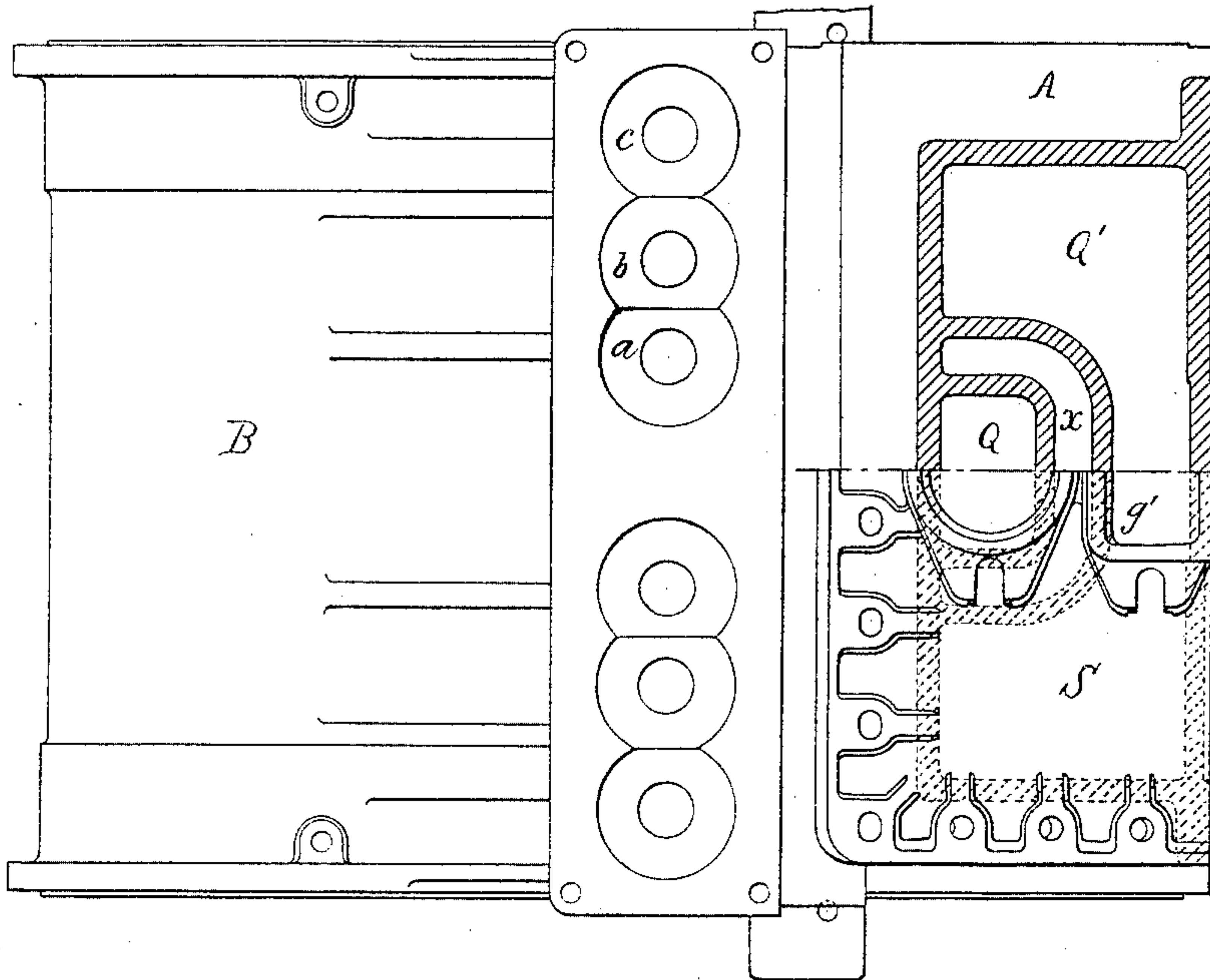
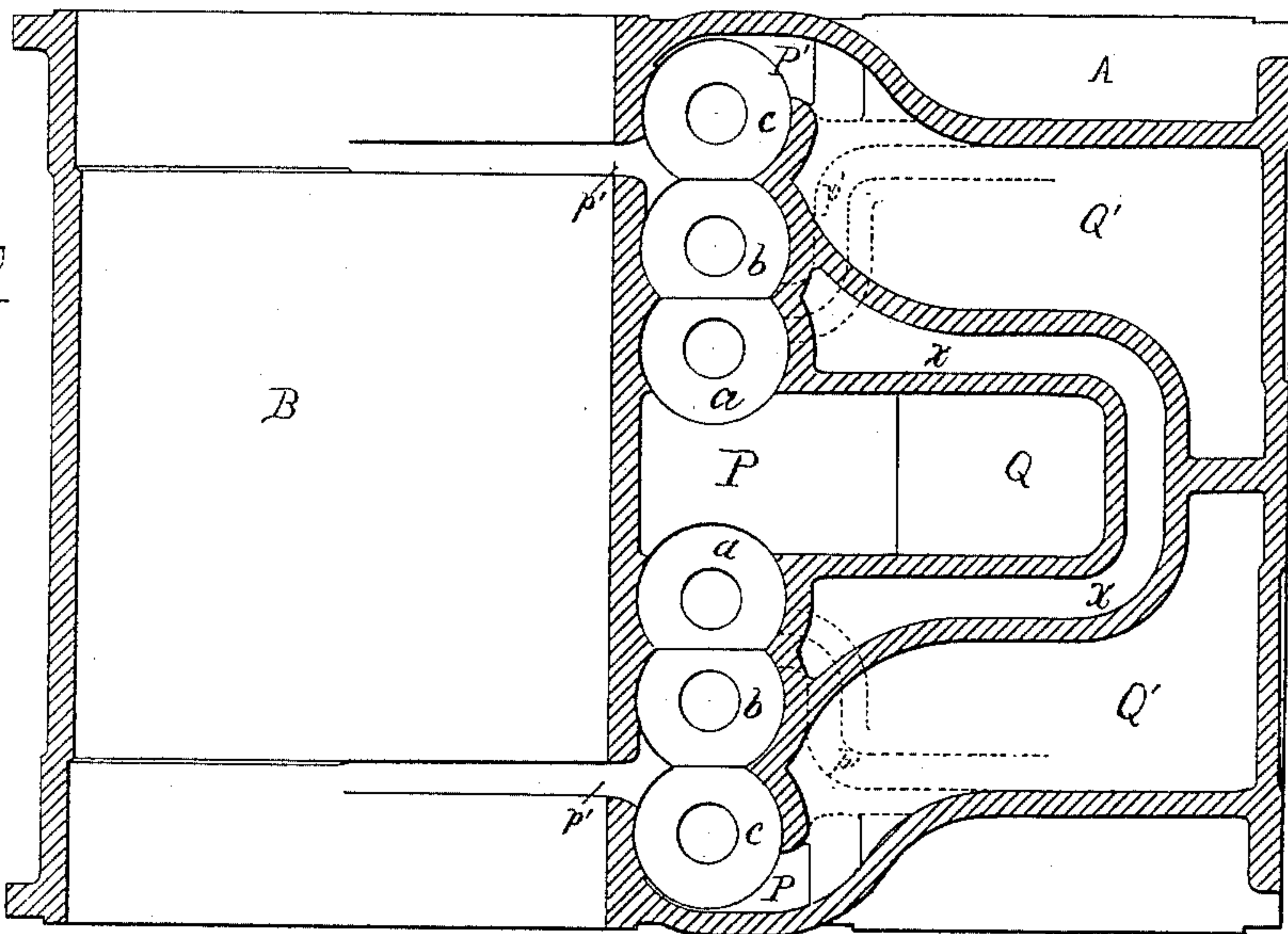


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF NEW YORK, N. Y.

COMPOUND LOCOMOTIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 450,751, dated April 21, 1891.

Application filed March 11, 1890. Serial No. 343,527. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, a citizen of the United States, and a resident of New York city, State of New York, have invented Improvements in Compound Locomotive-Engines, of which the following is a specification.

The object of my invention is to construct an improved type of compound engine for locomotives, and this object I attain in the manner which I will now describe, reference being had to the accompanying drawings, in which—

Figure 1 is a transverse section through the steam-cylinders and their passages on about the line 1 2, Fig. 2, the pistons and piston-rods being omitted. Fig. 2 is a sectional plan view through the cylinders, and showing the manner of connecting the piston-rods up to the crank-pins and cranks on the driving-wheels and their axle. Fig. 3 is a side elevation of the steam-cylinders with a part in section on the line 3 4, Fig. 1. Fig. 4 is a rear elevation of one pair of high and low pressure cylinders with a half in section on the line 5 6, Fig. 1. Fig. 5 is a sectional view on the line 7 8, Fig. 2. Fig. 6 is a plan view of one pair of cylinders, one-half in section on the line 9 10, Fig. 1. Fig. 7 is a sectional plan on the line 11 12, Fig. 1.

My improved locomotive-engine has as a characteristic feature two pairs of high and low pressure cylinders, all lying in substantially the same plane at the front of the locomotive, below the smoke-box. The plane in which these cylinders lie is substantially horizontal, as shown; but it may for some purposes be inclined upward a little toward the forward end of the locomotive. Preferably the two high-pressure cylinders A A are arranged to lie between the two low-pressure cylinders B B, which latter occupy about the position in the locomotive of the ordinary steam-cylinders of a simple locomotive-engine, except that these low-pressure cylinders are a little farther apart than are the ordinary cylinders on the opposite sides of a locomotive. If preferred, however, the high-pressure cylinders may be outside and the two low-pressure cylinders lie between these high-pressure cylinders. In the construction shown the piston-

rods d of the pistons D of the inner or high-pressure cylinders are connected to cranks e upon the axle E of the forward driving-wheels F. The piston-rods d' of the pistons D' of the outer or low-pressure cylinders are connected to crank-pins f upon the drivers F, as shown in Fig. 2. As will be seen on reference to this figure, the crank-pin on each driving-wheel lies at one hundred and eighty degrees to the adjacent crank on the axle, so that when the piston of, say, the low-pressure cylinder of one pair of high and low pressure cylinders is at the end of its cylinder the piston of the other or high-pressure cylinder will be at the opposite end of its cylinder. Again, in order to prevent dead-centers, the crank and crank-pin of one pair of high and low pressure cylinders at one side of the locomotive are set at right angles to the crank and crank-pin at the other side of the locomotive, as will be seen on reference to Fig. 2.

I construct each pair of high and low pressure cylinders with their valves in accordance with the principle described and shown in the application for a patent filed by me August 14, 1889, Serial No. 320,745—that is to say, I provide each pair of high and low pressure cylinders with three sets of valves, one set acting as admission-valves to the high and low pressure cylinders, while the second set act both as exhaust-valves from the high-pressure cylinders and as admission-valves to the low-pressure cylinders, and the third set act as exhaust-valves from the low-pressure cylinders. I prefer to employ also two valve-rods for these several valves, one controlling the high-pressure set of valves, while the other rod controls the remaining valves.

In the drawings I have not thought it necessary to illustrate the valves themselves, as their detailed construction is not a material feature of my present invention, and since their location may be readily seen by reference to the positions of the chambers for the valves. These valve-chambers for each pair of high and low pressure cylinders lie vertically between the two cylinders of the pair, and in Fig. 2 P are the inlets for the live steam, and P' are the outlets at the opposite ends of the cylinders. In this same figure, a are the chambers for the valves controlling

the passage of the live steam from P through the ports *p* to the high-pressure cylinder, while *b* are the chambers for the valves controlling the passage of steam from the high-pressure cylinder through the ports *p* and *p'* to the low-pressure cylinder. The exhaust from the low-pressure cylinder is controlled by the valves in the chamber *c*.

As will be seen on reference to Figs. 1, 3, and 4, the passages P and P' for the live and exhaust steam lead from and to chambers or passages in the saddle S of the locomotive passing over the tops of the high-pressure cylinders. The central passage P communicates, as indicated by dotted lines in Fig. 1 and in section in Figs. 4 and 7, with a central chamber or passage Q in the saddle. The end passages P' communicate, as shown in Fig. 5 and also in Figs. 1, 4, and 7, with the passages Q' on opposite sides of the passage Q in the saddle. These passages Q' lead, as shown in Figs. 1 and 6 and as indicated in dotted lines in Fig. 4, to a common central passage *q'*, on which is fitted the exhaust-nozzle in the smoke-box, if the steam be admitted and exhausted in the manner described. In that case the steam from the steam-dome is led to the passages Q.

I form between the chambers or passages

Q and the chambers or passages Q' a non-conducting air chamber or chambers *x*, as shown in Figs. 4, 6, and 7, in order that the lower temperature of the exhaust may detract as little as possible from the live steam.

I claim as my invention—

1. A compound locomotive-engine having two pairs of high and low pressure cylinders, with the valves of each pair lying vertically between them and with the saddle containing the steam and exhaust passages passing up over the high-pressure cylinder to and from the said valves, all substantially as described.

2. A compound locomotive-engine having two pairs of high and low pressure cylinders, with the valves of each pair lying vertically between them and with the saddle containing the steam and exhaust passages to and from the valves, and a non-conducting air-chamber between the said steam and exhaust passages, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE S. STRONG.

Witnesses:

E. SNOWDEN,
CLINTON COLLINS.