

No. 731,126.

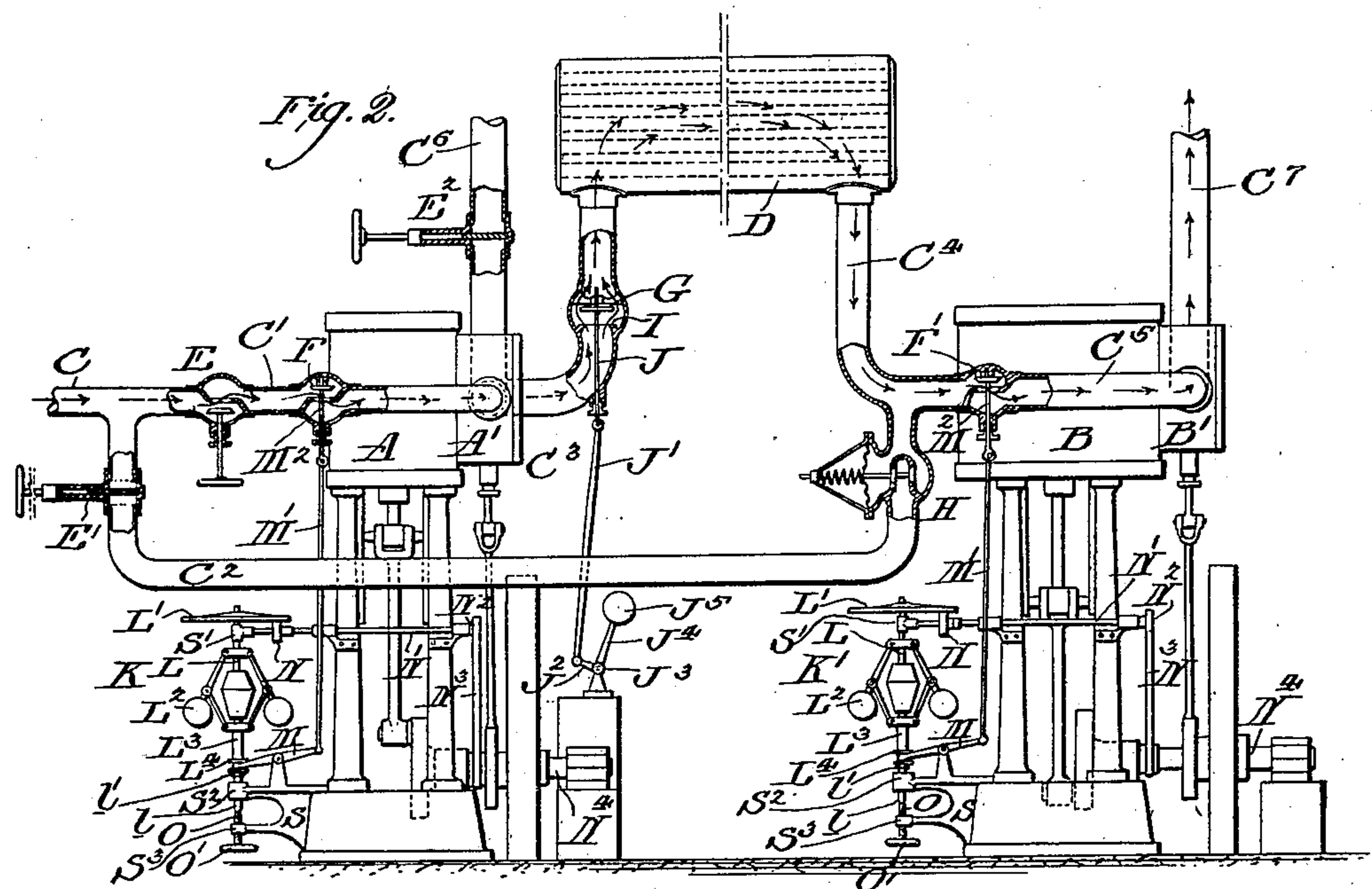
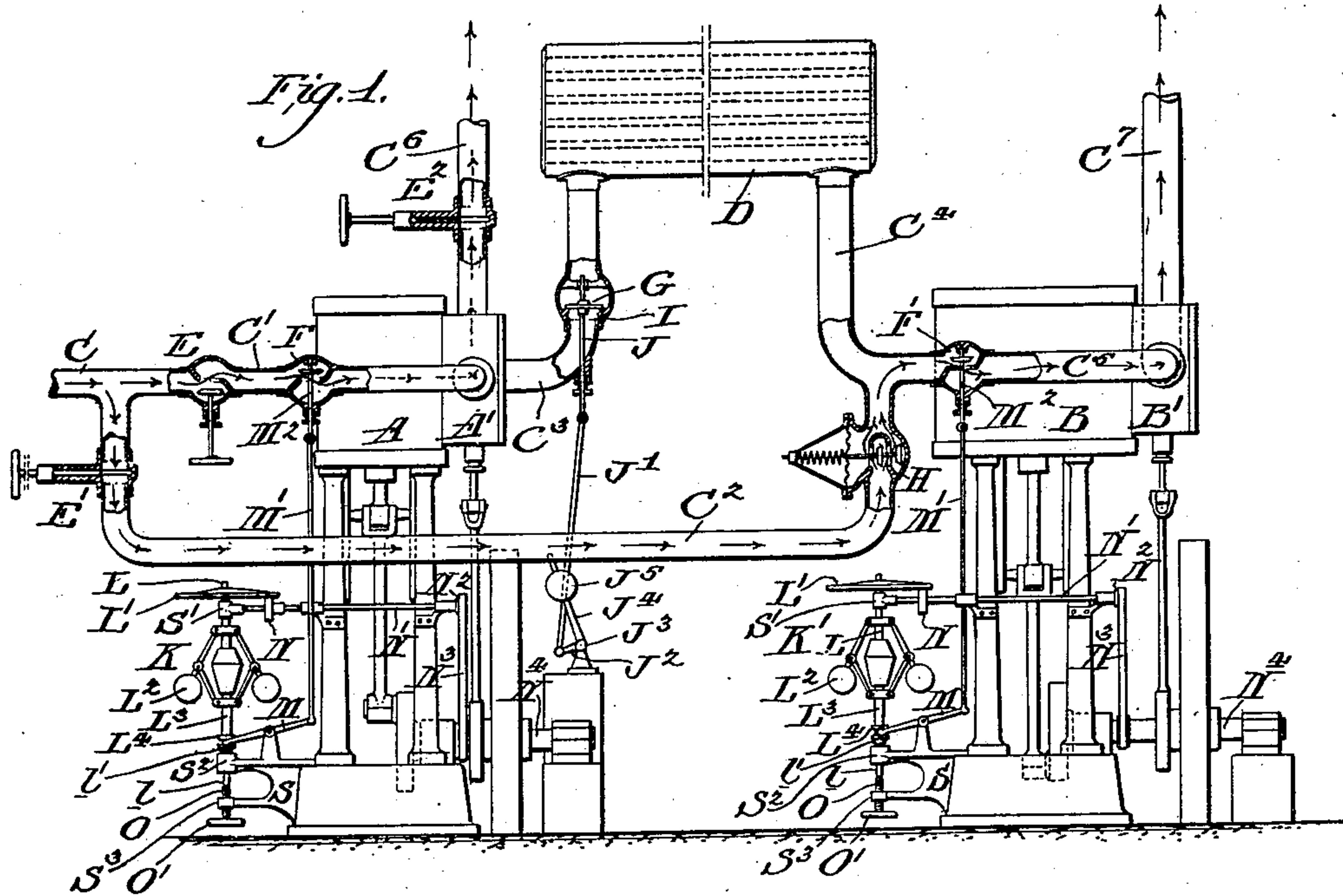
PATENTED JUNE 16, 1903.

G. B. PETSCHÉ.
COMPOUND ENGINE.

APPLICATION FILED JULY 18, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Stewart
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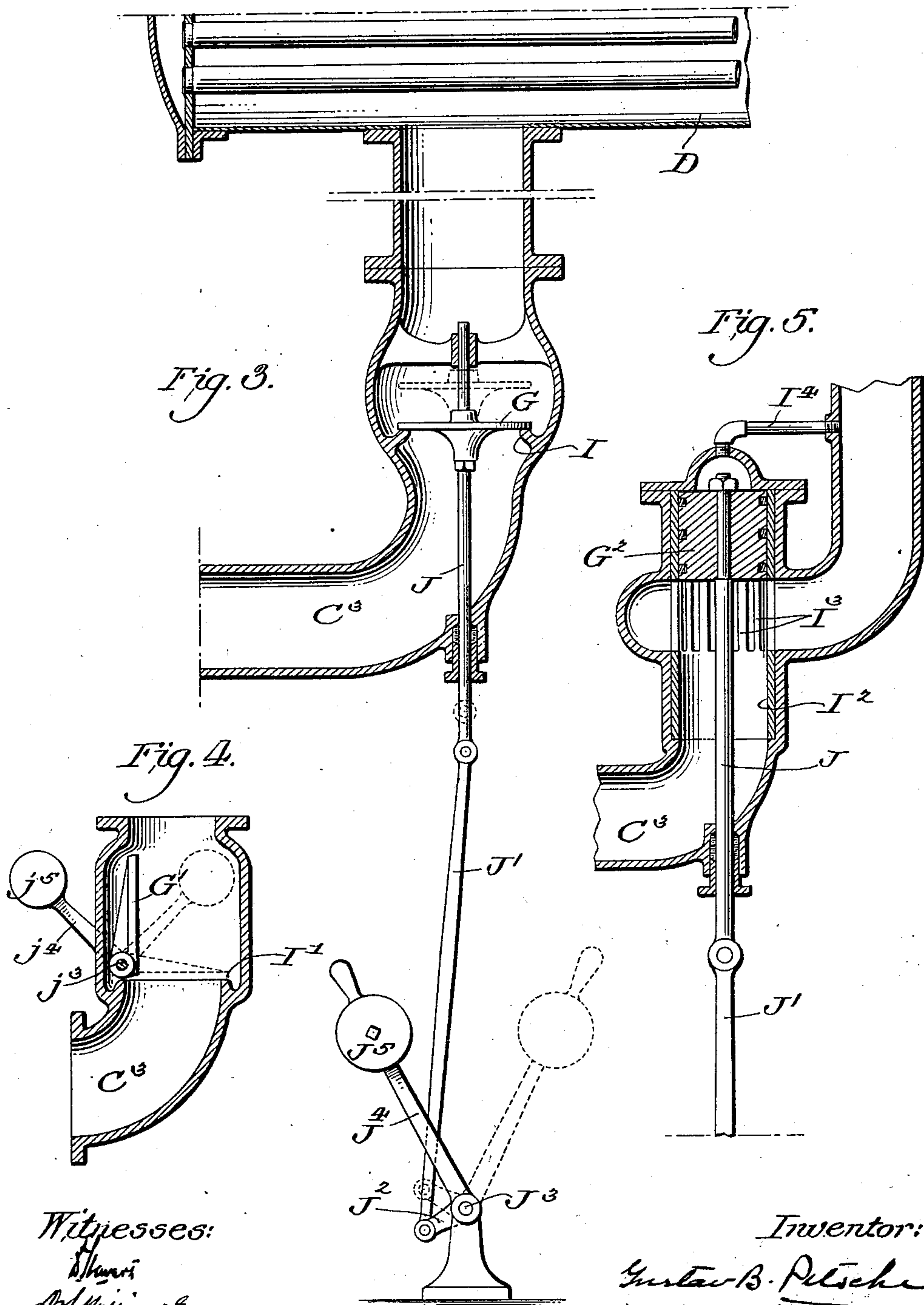
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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THE SOUTHWARK FOUNDRY & MACHINE COMPANY, OF PHILADEL-
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COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 731,126, dated June 16, 1903.

Application filed July 18, 1902. Serial No. 116,020. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV B. PETSCHÉ, a
subject of the Emperor of Germany, residing
in the city and county of Philadelphia, in the
5 State of Pennsylvania, have invented a cer-
tain new and useful Improvement in Com-
pound Engines, of which the following is a
true and exact description, reference being
had to the accompanying drawings, which
10 form a part thereof.

My invention relates to steam-engines, and
particularly that class of steam-engines in
which the exhaust-steam from one cylinder
is led into and used to actuate the piston in
15 another cylinder, two cylinders being thus
compounded; but more particularly my in-
vention has reference to that class of com-
pound engines in which engines or cylinders,
usually compounded, are also adapted to work
20 independently, and the particular object of
my invention is to provide simple and effi-
cient mechanism whereby the two engines
can be thrown into compound relations with
each other or made to work independently.

25 The nature of my improvements will be
best understood as described in connection
with the drawings, in which they are illus-
trated, and in which—

Figure 1 is an elevation, partly in section,
30 of two compound engines set to work inde-
pendently, while Fig. 2 is a similar elevation
showing two engines operating compound.
Fig. 3 is an enlarged sectional view of the
valve G, as shown in Figs. 1 and 2, with its
35 appliances, while Figs. 4 and 5 illustrate modi-
fied forms of said valve G, also adapted for
use in and embodying my invention.

A and B are the two engines, which I will
refer to, respectively, as the "high-pressure"
40 and "low-pressure" engines or as the "first"
and "second" engines. A' and B' indicate the
steam-chests of the engines.

C is the steam-supply pipe, leading directly
through its extension C' to the steam-chest
45 of the first engine and connecting through a
branch C² and its connection C⁵ to the steam-
chest of the second engine.

C³ is a steam-conduit leading from the ex-
haust of the first engine, preferably through

a reheater, (indicated at D,) to the steam-chest 50
of the second engine, the connections being
indicated at C⁴ and C⁵.

C⁶ and C⁷ are the exhaust-pipes of the first
and second engines, respectively.

E is a valve by which the steam-conduit C' 55
can be closed; E', a valve or gate by which
the steam-conduit C² can be closed, and E² a
valve or gate by which the exhaust-conduit
C⁶ can be closed.

F and F' are regulating-valves controlled 60
by governors, (indicated at K and K'.)

G (see Figs. 1, 2, and 3) is a valve adapted
to close the steam-conduit C³ when seated on
its seat, (indicated at I.) As shown in the
above figures, this valve is secured to a spin- 65
dle J, which is operated through a connect-
ing-rod J' by a lever J², secured to a shaft J³,
from which extends a second lever-arm J⁴,
having secured to it a weight J⁵ or any equiva-
lent device. 70

H (see Figs. 1 and 2) is a reducing-valve
situated in the conduit C².

Referring to the governor construction
illustrated in Figs. 1 and 2, L is a longitudi-
nally movable and rotatable spindle moving 75
in bearings (indicated at S' and S²) and hav-
ing secured to it a friction-disk L', which
normally rests upon a friction-wheel N,
driven, as shown, by a shaft N', having at its
end a pulley, (indicated at N²,) which pulley 80
is driven by a belt N³ from the main shaft
N⁴ of the engine. L² indicates the ordinary
weights of the governor, to which is secured
the sleeve L³, having attached to it the grooved
collar L⁴, which through a lever M and con- 85
necting-rod M' actuates the throttle-valve
spindle M² of either throttle-valves F or F'.
l indicates the lower end of the governor-
spindle, and l' a collar around the spindle
situated below the grooved collar L⁴. O is 90
an adjusting-screw moving in a threaded
bearing S³ and actuated by a hand-wheel O'.

In the construction shown in Fig. 4 a hinged
valve G' is shown, which is adapted to seat
itself on a seat I' in the conduit C³ and is 95
hinged on a spindle j³, from which extends
the lever-arm j⁴, having a weight j⁵ attached
to it.

In the modification shown in Fig. 5 a cylindrical valve is provided in the conduit C³, having openings I³, and the piston-valve G² is provided to move in this cylindrical valve-seat, said valve being attached to a spindle J, actuated like the similar spindle in Fig. 3 by a connecting-rod J'.

In the position shown in Fig. 1 the valves E and E' are open, so that steam can pass from the conduit C through the branches C' and C² to the steam-chests of both engines. The valve E² in the exhaust-conduit C⁶ is also open, so that the first engine A can exhaust into this conduit, and the valve G is seated so as to cut off the passage of steam through the conduit C³. The governors K and K' are also both indicated in operative position. It will be noticed that the valve G is in the indicated position held to its seat with a certain pressure due to the weight J⁵ on the lever-arm J⁴ and that the steam delivered to the high-pressure engine B is properly reduced in pressure by passing through the reducing-valve H and that a certain desirable reserve of steam for the low-pressure or large cylinder engine is provided in the reheater D, the pressure of this steam acting, in addition to the weight J⁵, to hold the valve G seated. Obviously the two engines in this adjustment will work entirely independent of each other. When it is desired to combine the two engines A and B, the valves E' and E² are closed, as indicated in Fig. 2. The exhaust steam then from the first or high-pressure engine A passes into the conduit C³ and lifts the valve G from its seat I. The lifting of the valve by the steam throws the weighted lever J⁴ to somewhat beyond a vertical position, whereupon this weight causes it to move over to the position indicated in dotted lines in Fig. 3. In the position shown in Fig. 2 this motion of the weighted lever resulting in a still further elevation of the valve G above its seat and in locking and holding the valve in elevated position. The engines then work as a compound engine; but, as will be readily understood, it is no longer necessary or desirable that each engine should be provided with an independent governor, and consequently one of the governors should be thrown out of operation and the valve controlled by it set to some determined and proper point. This in the construction I have indicated is accomplished by the simple expedient of screwing up the screw O by means of its hand-wheel O', the said screw abutting against the lower end l of the spindle L and raising the spindle until the friction-disk L' leaves contact with the friction-wheel N, which at once disconnects the governor from the moving parts of the engine by which it is normally driven. The adjustment of the throttle or other valve controlled by this disconnected governor is also, in the construction I have indicated, effected by the screw O, the spindle having secured to it a collar or other device, (indicated at l',) which,

as the spindle is elevated, carries with it the sleeve and collar L³ and L⁴ and through the collar actuates the lever M and rod M', which, as already explained, is connected to the regulating-valve. This governor and the devices by which it is thrown into and out of operation are not broadly claimed in this application, but form the subject-matter of another application for Letters Patent, filed July 18, 1902, Serial No. 116,019.

In place of the valve G (shown in Figs. 1, 2, and 3) other modified forms of valves having the same capacity for action may be used. For instance, in Fig. 4 I have shown a hinged valve having attached to its hinged spindle the weighted lever j⁴. This valve is lifted from its seat by the exhaust-steam, and after the weighted lever has passed the vertical position its weight causes it to move still farther downward, raising the valve entirely out of the conduit, as is shown in full lines, the closed position of the valve being shown in dotted lines.

In Fig. 5 the same principle is shown as applied to a piston-valve, the connecting-rod J' being connected, as in Fig. 3, the valve being, when the engines are not compounded, in the lower part of the casing I² and being raised by the pressure of steam when the engines are connected to work compound. The weighted lever J⁴, as in the case of the valve shown in Fig. 3, will raise the valve to the position shown in full lines in Fig. 5. The conduit I⁴ indicated in this figure has simply the function of maintaining the pressure above the valve at the same point as below the valve when the valve is in elevated position.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when seated to prevent passage of steam from the valve-box of the second to the exhaust of the first engine and to be lifted from its seat by the passage of the exhaust-steam from the first to the second, a retaining device operating to hold the valve open when raised by the exhaust-steam, an independent valve-controlled exhaust-passage from the first engine, and an independent valve-controlled high-pressure steam-conduit leading to the second engine.

2. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when seated to prevent passage of steam from the valve-box of the second to the exhaust of the first engine, and to be lifted from its seat by the passage of the exhaust-steam from the first to the second, a device, set in operation by the opening of the valve, acting to further open and to retain the valve in open po-

sition, an independent valve-controlled exhaust-passage from the first engine, and an independent valve-controlled high-pressure steam-conduit leading to the second engine.

5 3. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when seated to prevent passage of steam from the
10 valve-box of the second to the exhaust of the first engine, and to be lifted from its seat by the passage of the exhaust-steam from the first to the second, mechanism arranged to press the valve to its seat and to be overcome by steam-pressure tending to raise the
15 valve, said mechanism being adapted also to further open and hold open the valve after it has moved beyond a certain point, an independent valve-controlled exhaust-passage
20 from the first engine, and an independent valve-controlled high-pressure steam-conduit leading to the second engine.

4. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when
25 seated to prevent passage of steam from the valve-box of the second to the exhaust of the first engine, and to be lifted from its seat by the passage of the exhaust-steam from the
30 first to the second, a retaining device operating to hold the valve open when raised by the exhaust-steam, a reheater set in the conduit between the valve and the second engine.
35

5. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when
40 seated to prevent passage of steam from the valve-box of the second to the exhaust of the first engine, and to be lifted from its seat by the passage of the exhaust-steam from the first to the second, a retaining device operating
45 to hold the valve open when raised by the ex-

haust-steam, an independent valve-controlled exhaust-passage from the first engine, an independent valve-controlled high-pressure steam-conduit leading to the second engine, and a reducing-valve in said high-pressure
50 conduit.

6. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit, adapted when
55 seated to prevent passage of the steam from the valve-box of the second to the exhaust of the first engine and to be lifted from its seat by the passage of the steam from the first to the second engines, a pivoted lever J^4 connected
60 with said valve, means acting on said lever and acting to draw it to either of its extreme positions after it has passed a neutral line corresponding to a partially-opened position
65 of the valve.

7. The combination with two steam-engines of a steam-conduit leading from the exhaust of the first to the admission of the second, a valve in said conduit adapted when
70 seated to prevent passage of steam from the valve-box of the second to the exhaust of the first engine, and to be lifted from its seat by the passage of the exhaust-steam from the first to the second, a retaining device operating to hold the valve open when raised by
75 the exhaust-steam, an independent valve-controlled exhaust-passage from the first engine, an independent valve-controlled high-pressure steam-conduit leading to the second engine, a governor for each engine adapted
80 to be operated by a moving part of the engine, and to operate a regulating-valve, and means whereby one of said governors can be disconnected from the moving part of the engine and whereby its controlled regulating-
85 valve can be set to any required point.

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Witnesses:

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