

(No Model.)

H. F. GASKILL.
COMPOUND ENGINE.

No. 366,392.

Patented July 12, 1887.

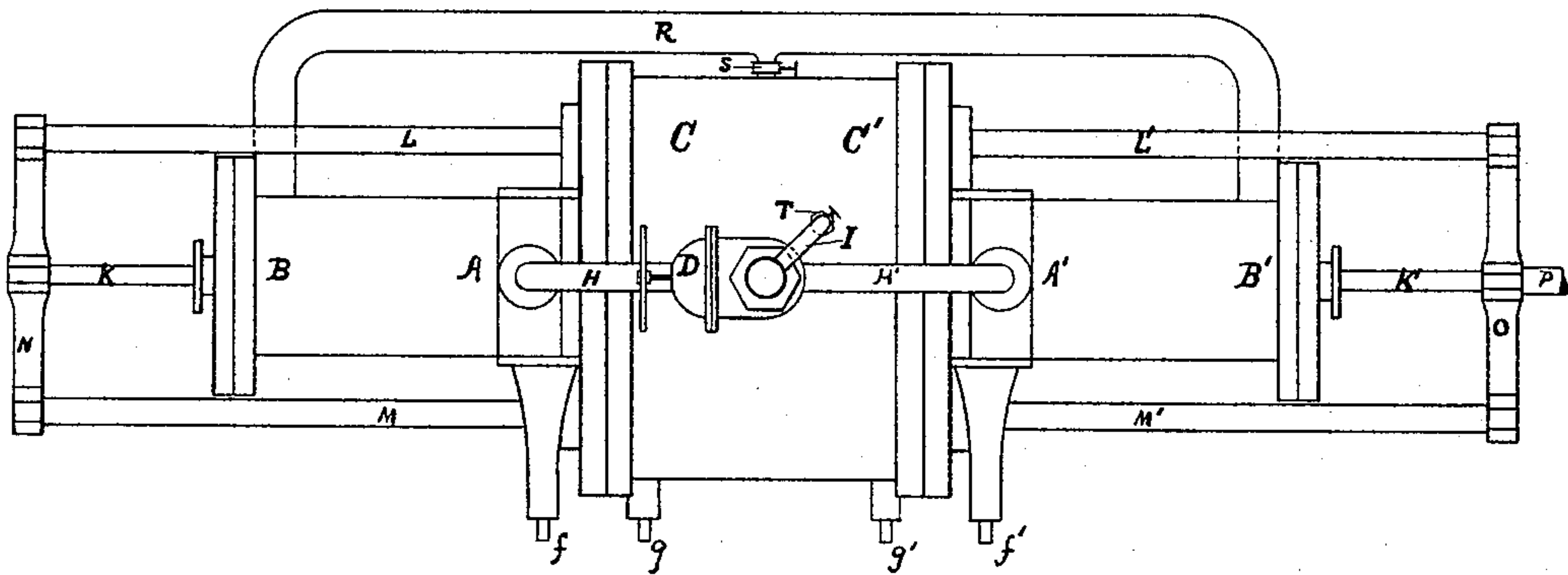


Fig. 2.

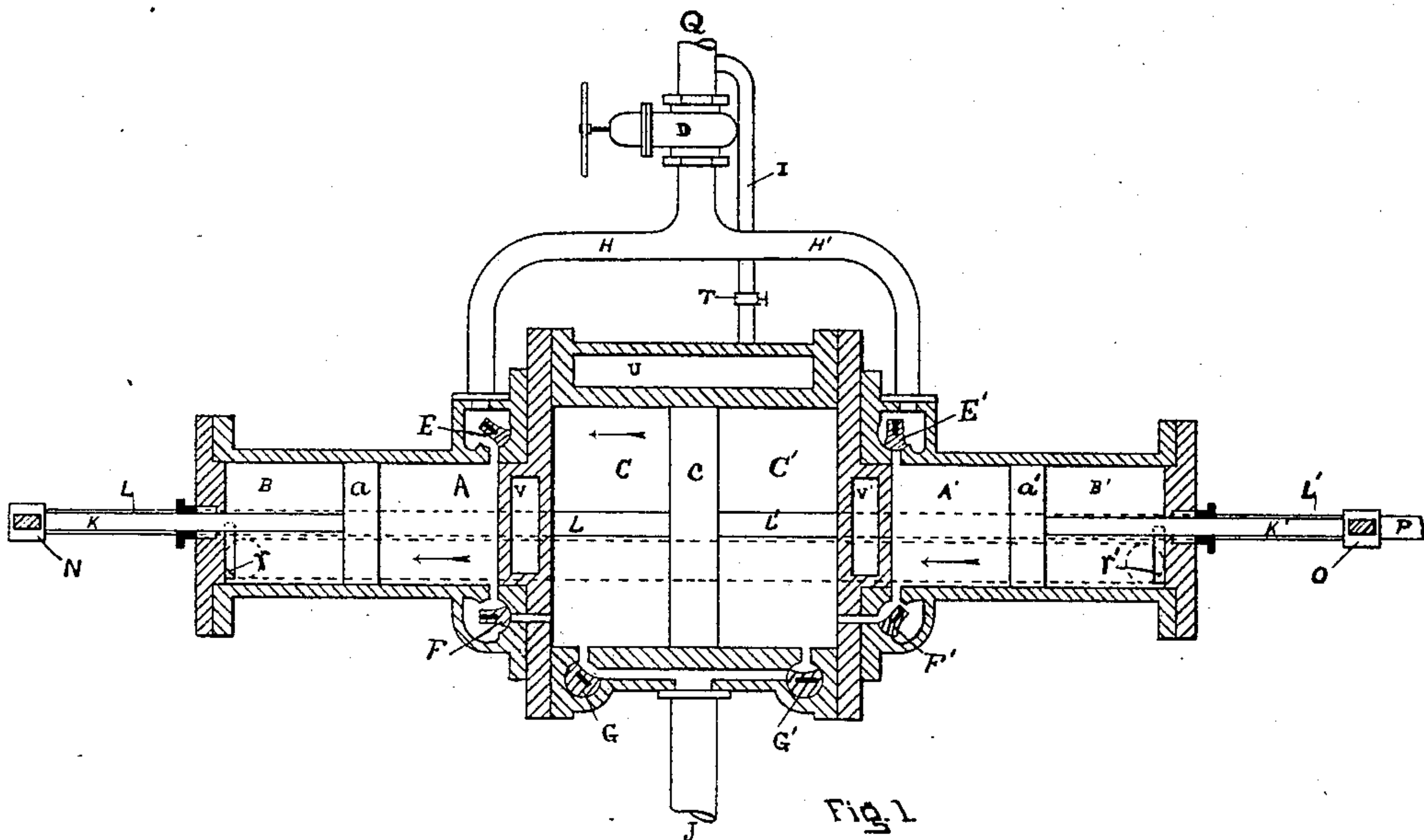


Fig. 1.

WITNESSES

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COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 366,392, dated July 12, 1887.

Application filed March 31, 1887. Serial No. 233,145. (No model.)

To all whom it may concern:

Be it known that I, HARVEY F. GASKILL, of Lockport, New York, have invented certain new and useful Improvements in Compound Engines, of which the following is a specification.

The principal object of my invention is to so construct a compound engine that the steam-passages from the high to the low pressure cylinders shall be short and direct, so as to avoid the loss heretofore caused by large clearance spaces and by intermediate expansion, &c.

To this end the invention consists in the devices or combinations recited in the claims at the end hereof.

In the accompanying drawings I have represented so much of a compound engine as is necessary to a perfect understanding of my invention, Figure 1 being a vertical longitudinal section, and Fig. 2 a top or plan view.

The principal parts of the apparatus represented in the drawings are as follows, viz: A low-pressure cylinder; a piston moving therein; a high-pressure cylinder at each end of the low-pressure cylinder; a piston moving in each of said high-pressure cylinders; suitable piston-rods for said pistons; connecting devices connecting the pistons and rods together so that they move in unison; suitable admission valves and ports for supplying steam to the high-pressure cylinders; a port or passage provided with a valve connecting each end of the low-pressure cylinder with the adjacent end of the adjacent high-pressure cylinder, through which said high-pressure cylinders exhaust into said low-pressure cylinders; suitable exhaust valves and ports for the low-pressure cylinder.

In this apparatus the high-pressure cylinders are single-acting, the ends adjacent to the low-pressure cylinder being active and the other ends passive. The low-pressure cylinder, however, is double-acting.

In the drawings, A is the active end of one of the high-pressure cylinders. B is its passive end. *a* is its piston.

A' and B' are respectively the active and passive ends of the other high-pressure cylinder, and *a'* is its piston.

C C' is the low-pressure cylinder, and *c* its piston.

LL' and M M' are the piston-rods of the low-pressure cylinder, one on each side of the high-pressure cylinders. These rods extend beyond the ends of the high-pressure cylinders, and their ends are connected by yokes N and O.

K and K' are the piston-rods of high-pressure cylinders AB and A'B', respectively. They are connected to yokes N and O. The three pistons are thus all connected together by their rods and the yokes so that they move together.

P is a continuation of the piston-rod system, or it may be a connecting-rod for transmitting motion to the crank-shaft or other part of the machine.

E is a valve which admits steam to the active end of cylinder AB. E' is a similar valve for cylinder A' B'. These valves are located close to the cylinders at their ends.

D is the throttle-valve on steam-pipe Q.

H H' are branches running, respectively, to valves E and E'.

F is a valve which opens communication between end A of high-pressure cylinder AB and end C of the low-pressure cylinder. F' is a valve which opens communication between end A' of high-pressure cylinder A' B' and end C' of the low-pressure cylinder.

G and G' are the exhaust-valves of cylinder C C'.

J is the exhaust-passage leading to the condenser.

R is a pipe connecting the passive ends B and B' of the high-pressure cylinders.

S is a branch provided with a valve connecting pipe R with the steam-jacket U of the low-pressure cylinder.

I is a branch-pipe provided with a valve, T, for supplying live steam to the steam-jacket U. The passive ends of the high-pressure cylinders thus form part of a very effective steam-jacket for the apparatus. In some cases it may be expedient to have B B' open to the atmosphere instead of using them for jacketing.

In operation, the valves being in the positions shown in Fig. 1, steam enters A from H through valve E. At the same time the steam in A' passes from it through valve F' into C', and there operates against piston *c*, and the

three pistons move in the direction indicated by the arrows, the dead steam in C passing through G to the condenser. At the proper moment valves E, F, and G are closed and
5 valves E', F, and G' are opened, and the reverse action takes place.

I have not thought it necessary to show or describe the mechanism for operating the valves, nor have I thought it necessary to show
10 or describe any of the numerous modifications which may be used to suit the varying requirements of practice, as all such will be readily adopted by the mechanic from his knowledge and skill, and their representation and de-
15 scription would only render this specification unnecessarily lengthy and prolix.

What I claim is—

1. The combination of a double-acting low-pressure cylinder, two single-acting high-
20 pressure cylinders, passages, with valves, connecting the active end of each high-pressure cylinder with its respective end of the low-pressure cylinder, and passages connecting the passive ends of the high-pressure cylinders

with the steam-jacket system, substantially as
set forth. 25

2. The combination of cylinder C C', its piston c, cylinders AB and A'B', their pistons aa', the piston-rods LL', MM', K, and K', and the yokes N and O, substantially as set forth. 30

3. The combination of a double-acting cylinder, a single-acting cylinder at each end thereof, passages provided with valves connecting the active end of each single-acting cylinder with the adjacent end of the double-
35 acting cylinder, and passages connecting the passive ends of the single-acting cylinders with the steam jacket system, substantially as set forth.

4. The combination of the double-acting cylinder C C', the single-acting cylinders AB and A'B', the valves EE', the valves FF', and the valves GG', substantially as set forth. 40

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Witnesses:

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