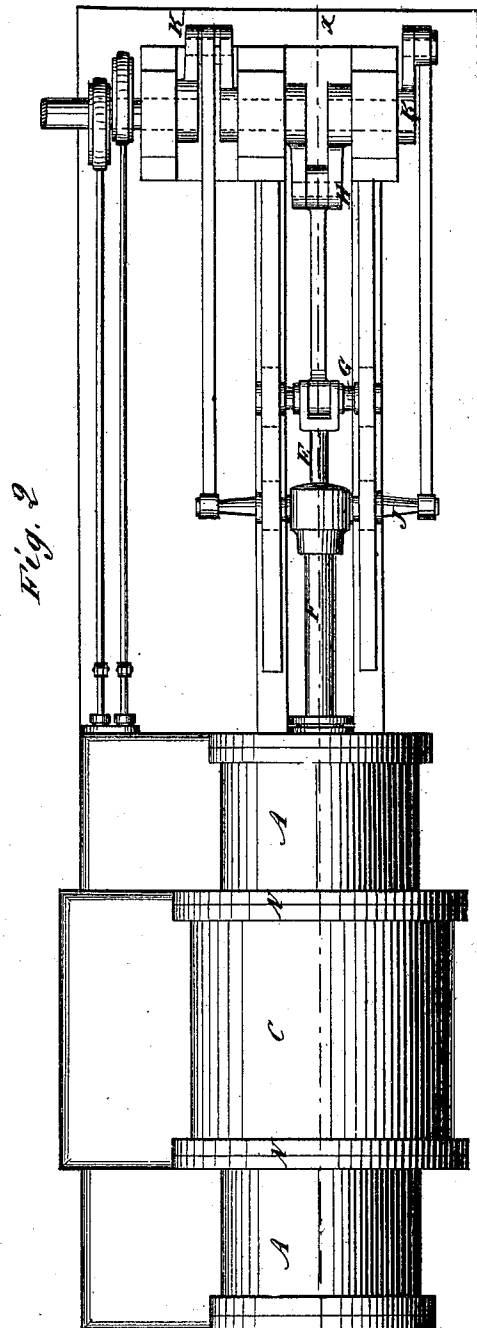
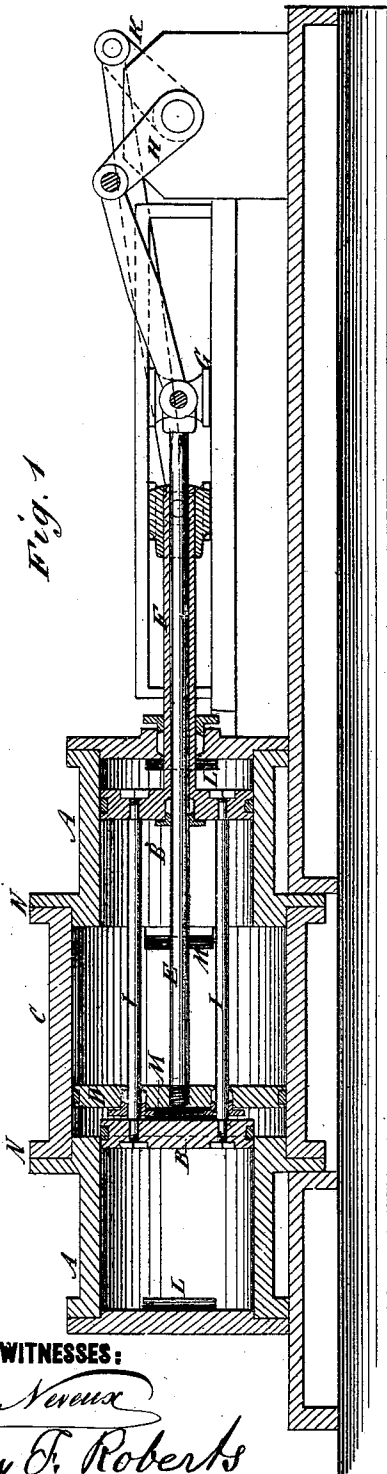


G. B. MASSEY.

COMPOUND STEAM-ENGINE.

No. 179,713.

Patented July 11, 1876.



WITNESSES:

C. Veroux
Alex F. Roberts

INVENTOR:

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Munn
ATTORNEYS.

UNITED STATES PATENT OFFICE.

GIDEON B. MASSEY, OF NEW YORK, N. Y., ASSIGNOR TO THE MASSEY
COMPOUND ENGINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN COMPOUND STEAM-ENGINES.

Specification forming part of Letters Patent No. **179,713**, dated July 11, 1876; application filed
November 13, 1875.

To all whom it may concern:

Be it known that I, GIDEON B. MASSEY, of the city, county, and State of New York, have invented a new and Improved Steam-Engine, of which the following is a specification:

My invention consists of three pistons in one cylinder, two of which work together on one crank, and the other works between the first two on another crank at right angles to the first, together with parts contrived for working the steam between the cylinder-heads and the end pistons, and also between the middle piston and the end pistons, in such manner as to overcome the dead-centers; and the invention also consists of an enlarged middle section of the cylinder and middle piston, together with provision for working the steam on the large piston after doing its duty on the small ones.

Figure 1 is a longitudinal sectional elevation of my improved engine, and Fig. 2 is a plan view.

Similar letters of reference indicate corresponding parts.

A represents the small end portions of the cylinder containing pistons B, and C represents the large middle portion containing piston D. The rod E of piston D works through the tubular rod F of pistons B, and connects with cross-head G and crank H. The pistons B are connected together by rods I, working through piston D, and their rod F connects with cross-head J and crank K.

Cranks K and H are arranged at right angles, and steam acts alternately on the small and large pistons, so that they pass the centers without obstruction.

Steam is admitted at the end ports L into the small parts of the cylinder, and, after pushing pistons B to the end of their stroke, or thereabout, enters the large part C, and pushes piston D through its course, and exhausts through ports M, thus operating the same as in compound engines of the ordinary kind, but without back pressure on the small pistons, which the latter are subject to in the common arrangement.

The valve-gear may be arranged in different ways, using one or two valves, or more. In this example the small pistons are represented as running out of parts A into part C

to let steam pass on to piston D, in which case the packing will, of course, be contrived to retain its position; but ports may be made to conduct the steam from A to C without the pistons B passing out of their parts of the cylinder, the ports being uncovered by the pistons at the proper time.

Cylinders A and C may be made separate, and be joined by flanges N, bolted together.

The steam admitted at one end port—say the right-hand end port L—may be exhausted at the left-hand middle port *m*; but by keeping that port closed, and retaining it till crank H passes the center, it reacts on right-hand piston B until it gets well back to the cylinder-head again, when it may be exhausted at the right-hand port *m*, thus still further expanding the steam.

The steam acts between the ends of the cylinder and the end pistons when the crank of the middle piston is passing its centers.

It will be noticed that as soon as the steam passes by the small pistons to act on the large one the pressure is balanced on the small ones by acting alike on both sides, and thus there is no back pressure on the small ones.

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

1. The combination of a single cylinder, A, connected end pistons B, and middle piston D with the driving-shaft having cranks H K K, all arranged substantially as shown, so as to cause the steam to pass directly from the small pistons onto the large one without returning through the ports at the ends of the cylinder, and to permit the steam to exhaust from the large and small pistons independently, and at different points of the revolution, as described.

2. In a cylinder having two end pistons and a middle one, the two end pistons connected by rods I, working through the middle piston, and the rod of the middle piston working through the tubular rod of the end pistons, substantially as specified.

GIDEON B. MASSEY.

Witnesses:

A. P. THAYER,
ALEX. F. ROBERTS.