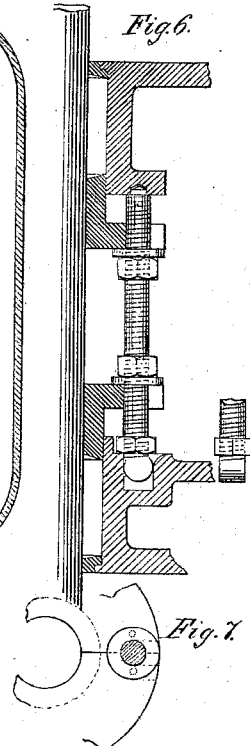
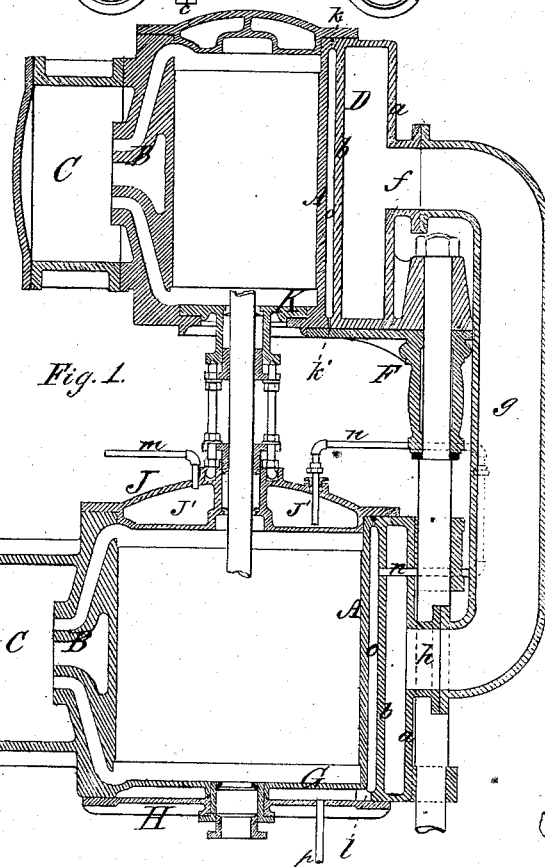
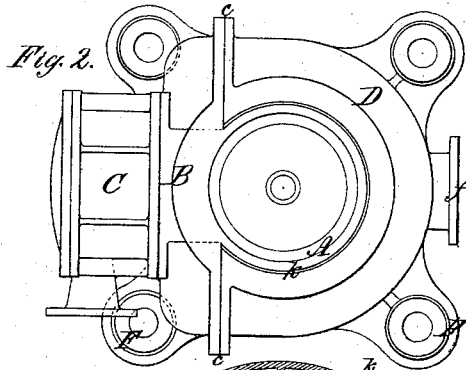
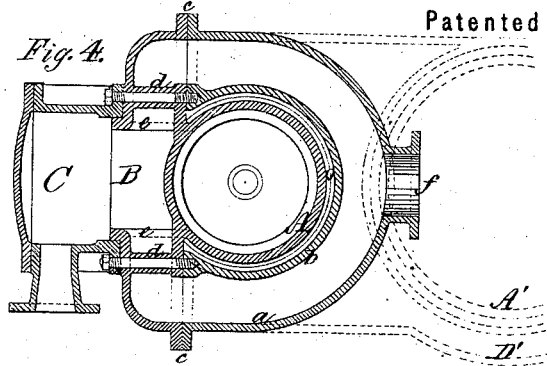


C. E. EMERY. Compound Engine.

No. 160,817.

Patented March 16, 1875.



INVENTOR,
Chas. E. Emery.

Witnesses.
Wm. W. Eightman
E. Hugentobler

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Fig. 5.

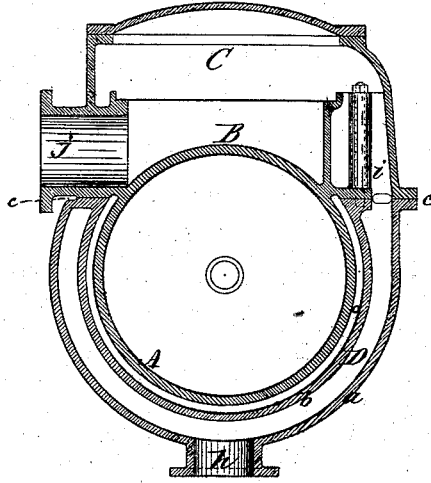
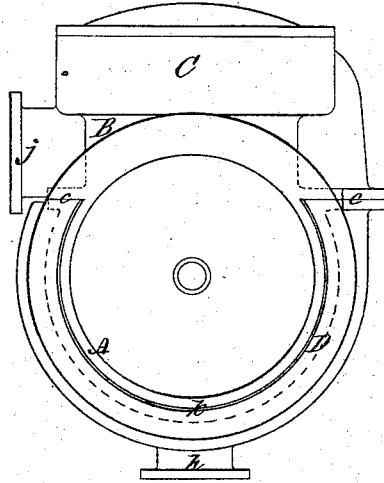


Fig. 3.



Witnesses,
M. A. Weigman
E. Hougentobler

Inventor,
Chas. E. Emery

UNITED STATES PATENT OFFICE.

CHARLES E. EMERY, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN COMPOUND ENGINES.

Specification forming part of Letters Patent No. **160,817**, dated March 16, 1875; application filed April 9, 1874.

To all whom it may concern:

Be it known that I, CHARLES E. EMERY, of Brooklyn, Kings county, New York, (office, New York city,) have invented certain new and useful Improvements in Compound Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification.

The object of the invention is to provide a method of constructing the jackets of compound engines, whereby the liability of same to crack, and the weight of parts to be handled in construction, are much diminished; also, means for effectually draining the jackets in the cylinder-covers, and also means whereby the lower cylinder-cover of a steeped compound engine may be raised for access to piston, with a limited space between the two cylinders.

The nature of the invention is fully set forth in the claims.

In the drawings, Figure 1 represents a vertical central section of the two cylinders of a steeped compound engine. Fig. 2 is a top view of the upper or smaller cylinder with cylinder-cover removed; and Fig. 3 is a similar view of the large cylinder. Fig. 4 is a central cross-section of the smaller cylinder; and Fig. 5 is a similar view of the larger cylinder. Fig. 6 is a sectional half-view, showing means for securing the intermediate stuffing-boxes; and Fig. 7 is a top view of a portion of one of the stuffing-box glands.

A distinguishing feature of the construction is that the jackets are bolted on the cylinder-castings proper. The general description applies to both cylinders.

The cylinder proper, designated A, (see Figs. 4 and 5 in connection with the other views,) has preferably very narrow flanges at upper ends, and is cast in one piece with the cylinder-nozzles or valve-face B, to which the steam-chest C is secured or cast, and such cylinder-casting is slid longitudinally into an outer casing, D, which casing surrounds the cylinder as nearly as exits for the ports will allow, and is secured to the cylinder-casting by suitable flanges, forming a steam-tight joint at *c c*, which joint may either be in radial parts or otherwise. As shown, the several parts of

same are in one plane. As represented, the casing D is formed with two walls, *a* and *b*, connected at top and bottom, and the annular space between the inner wall *b* and cylinder A is utilized as a steam-jacket, *o*, while the space between the two walls *a* and *b* forms an intermediate chamber. As shown, the steam, after doing its work in smaller cylinder, passes from the exhaust-opening in valve-seat, through lateral openings *e e*, (see Fig. 4,) around the studs *d d*, (through which bolts pass to secure the inner wall *b* of intermediate chamber D,) and, through openings in joint *c c*, into intermediate chamber D, thence to nozzle *f*, and, by pipe *g*, Fig. 1, to nozzle *h* and intermediate chamber D of larger cylinder, around which it circulates, and by a suitable opening, *i*, Fig. 5, reaches the steam-chest of larger cylinder, and, after again performing its work, it is exhausted through exhaust-pipe *j* in the usual way. The steam in its passage through the intermediate chamber is dried or superheated by the hotter steam in the jacket *o*.

When desired, the outer walls *a* of the intermediate chamber may be dispensed with, when the steam would be conveyed from one cylinder to the other entirely by pipes. When the two cylinders, instead of being arranged one above the other, are placed beside each other, as shown in dotted lines, Fig. 4, the same general construction may be used; and, if desired, the two intermediate chambers may be cast together, and the cylinders A and A' cast and slid in separately, the steam from one passing directly through the common intermediate chamber to the other. When the cylinder and jacket castings are bolted together at the longitudinal joints *c c* the upper ends of both are faced off together, and the circular portion of joint *k* between the two preferably grooved and closed with a calking-ring.

The joints *k*, as will be seen in Figs. 2 and 3, are in position to be covered by the cylinder-covers, which will cut off all leakage from jackets *o*.

The bottom of cylinder may be fitted in same manner, but, as shown, the upper cylinder has part of its bottom cast in, and the lower joint is covered by, a plate cast on the supporting-legs F.

A bottom, G, is cast in the lower cylinder,

but a ring on same around stuffing-box, and some external projections *l*, are faced with the bottom of the intermediate chamber, and the joints are covered steam-tight by the cylinder-bottom *H*, the space between the bottoms *G* and *H* forming the steam-jacket for lower part of cylinder.

The lower cylinder-cover *J* is shown made with a chamber to form a steam-jacket for that part of the cylinder. It is customary and necessary usually to make the cover enter the cylinder a little way, as shown, so that heretofore in using a cylinder-cover as a jacket there has been difficulty in freeing it of water. To obviate this steam is admitted at the top of the chamber through a pipe, *m*, and from near the bottom of chamber a pipe, *n*, is taken upward and carried around into the cylinder-jacket *o*. From jacket *o* communication is made to the jacket in cylinder bottom, either by pipes or through the casting, as shown, and at the bottom the water is drawn off through a suitable pipe, *p*.

It will be observed that the steam entering jacket *C* through *n* must take with it all water that collects in the chamber of *J* up to bottom of pipe *n*.

It is evident that the system may be used to clear any portion of the steam-jacket system which cannot be drained conveniently otherwise—for instance, with suitable sliding parts the cavity in a piston could be supplied with steam and drained from the top. Evidently, too, the steam may be made to pass through a similar system in smaller cylinder before entering that described for the larger, and one outlet for condensed water used for all. The connection to supply-pipe *m* may also be made from the bottom of either of the steam-chests *C*, and thereby supply the jacket system with the pressure in such chest, less the weight of any water that may be lifted with the steam when the supply is taken from a chest below the level of pipe *m*.

To facilitate access to the larger cylinder the bottom of upper cylinder is provided with a bonnet, *K*, opening upward into the cylinder, covering an opening of sufficient size to permit the stuffing-boxes on both cylinders to pass upward into the upper cylinder as the lower cylinder-cover *J* is lifted, the small pipes *m* and *n* being removed temporarily. This device can evidently be employed, whatever the kind of gas or fluid used in either cylinder. A bonnet somewhat similar to *K* has heretofore been employed to close an opening in the bottom of a vessel, in such manner that parts below such opening

may be removed through it in the same manner as a lower pump-valve is removed through the seat of an upper. In the improvement hereinbefore set forth the bonnet opening into a vessel is used, but the same is combined with the stuffing-boxes and cover of the large cylinder of a compound engine, which cover it is not intended to lift through the opening, but the arrangement is used so that the stuffing-boxes can be lifted a short distance into the upper cylinder, and thereby permit the lower cylinder-cover to be raised sufficiently to give access to lower piston with a reduced total height of engine, which, with cylinders connected in this way, is both desirable and important.

The stuffing-box glands, made in halves with long bolts removable through slots in flanges of glands, described in my patent of May 7th, 1872, may be employed also in connection with the above.

The drawing shows a modification in which the lower ends of the studs are flattened in one direction, to prevent them from turning, but they are rounded in the other direction, as shown, so that they can be removed by slacking lower nut and turning outward the upper ends of studs.

I do not claim steam jacketing or any particular arrangement of jackets and intermediate chambers, but simply a plan of constructing latter.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An independent casing, secured at longitudinal joints to a steam-cylinder, with end joints covered by plates or cylinder-covers to form a jacket, &c., substantially as described.

2. The combination of a chamber, *o*, forming a portion of the steam-jacket system of a steam-engine, with a depressed chamber, as at *J'*, by means of a pipe, *n*, led to the former, substantially in siphon shape, from the bottom of the latter, whereby the supply of steam to the former will carry with it the condensed water from the latter, substantially as and for the purposes specified.

3. In an engine, where two cylinders are arranged in the same line, the bonnet or bottom *K* opening into the smaller, in combination with the intermediate stuffing-boxes and the cylinder-cover of the larger cylinder, substantially as and for the purposes specified.

CHAS. E. EMERY.

Witnesses:

W. H. WEIGHTMAN,
E. HUGENTOBLE.