

Sheet 1 - 2 Sheets.

R. F. Loner,

*Reciprocating Steam Engine,*

*N<sup>o</sup> 6,673,*

*Patented Aug. 28, 1849.*

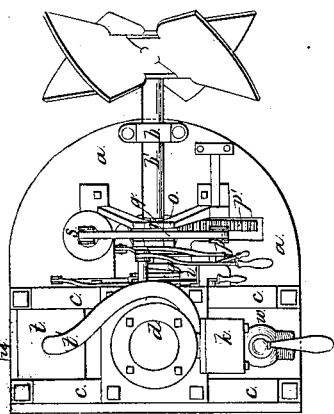


Fig. 1.

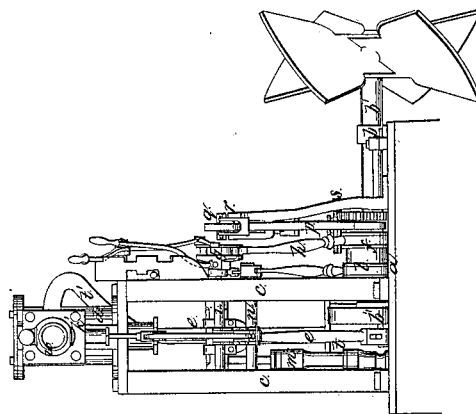
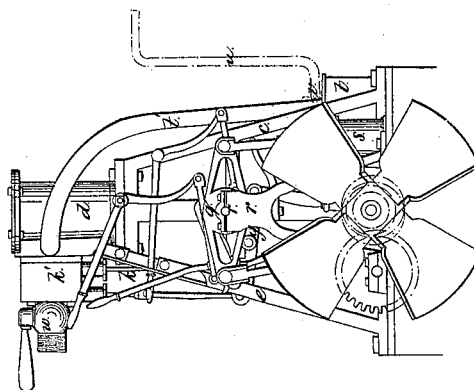
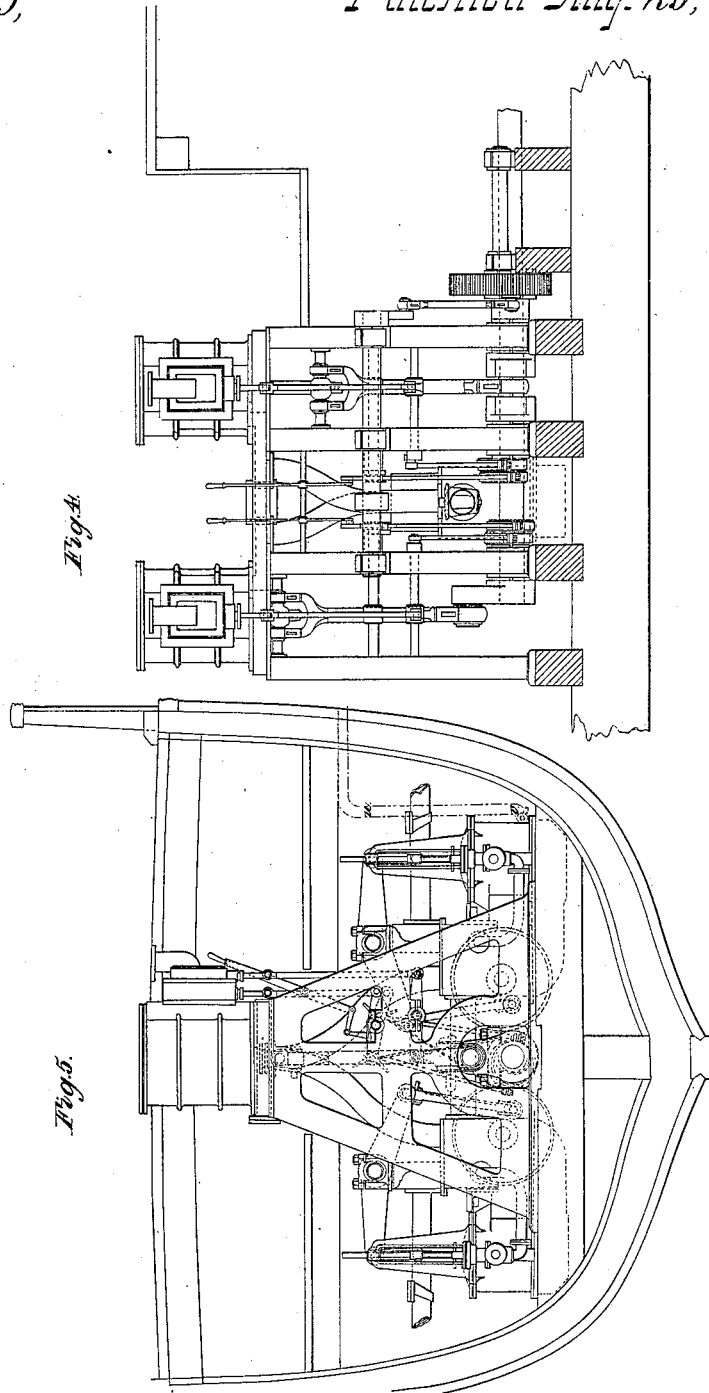


Fig. 2.



Sheet 2-2 Sheets.

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# UNITED STATES PATENT OFFICE.

R. F. LOPER, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF WORKING THE AIR-PUMP AND USING A CONDENSING AS A NON-CONDENSING ENGINE.

Specification forming part of Letters Patent No. 6,673, dated August 28, 1849.

*To all whom it may concern:*

Be it known that I, R. F. LOPER, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Engines and their Application to Propellers; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known, and of the usual manner of making, modifying, and using the same, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a rear view, Fig. 3 a top plan, and Fig. 4 a side elevation, of a double engine; Fig. 5, a front view with a portion of the vessel.

The same letters refer to like parts in all the drawings and figures.

The nature of my improvement consists in the arrangement of the engine within a vessel for propelling, and the peculiar combination of the air-pump therewith, together with the method of converting the engine at once into a condensing or non-condensing apparatus.

The construction and arrangement of the parts are as follows: A suitable bed-plate, *a*, so shaped as to fit the vessel at the stern just above the keelson, or at a sufficient height above it for the purpose intended, is firmly secured in place by suitable bolts and braces. To this bed-plate are affixed the bearings *b* of the shaft *b'* of the propeller, and to the same plate all the other parts of the engine are attached. An iron frame, *c*, is affixed to the front end of the plate, on the top of which the cylinder *d* is situated. This cylinder is reversed from the ordinary position of engines, the piston-rod running down through the lower head and connecting, by the usual connecting-rod, *e*, with the crank *b''* on the shaft below. The valves of this engine take their motion from eccentrics *f* *f* on the main shaft, coupled with a small valve-lever, *g*, by proper eccentric-rods, *h*. The lever is affixed to its axis by its center, and is made double, so that the eccentric-rod can be thrown to either end to reverse the motion, or may be wholly detached, as in ordinary engines. *i* is the axis of the valve-lever; *k*, the valve-stem connected therewith, and *k'*

the valve-box. The cut-off is worked by another eccentric, *l*, on the same shaft, and needs no further description. The pump *m* is connected directly with the cross-head *n* of the engine and works in the ordinary way. By this connection I obtain compactness in its introduction. Upon the main shaft, in a proper position, I place a pinion, *o*, that gears into a wheel of double the diameter of said pinion, to which wheel a connecting-rod, *p*, is connected by a wrist projecting from the fan of said wheel. This connecting-rod is attached at the upper end to one end of a small working-beam, *q*, which is made to bear on proper supporters, *r*, affixed to the bed, and at the opposite end of the beam there is a connection with the piston-rod of an air-pump, *s*. This air-pump communicates with the condenser *t*, into which the exhaust-pipe *t'* opens. An escape-pipe, *u*, is also connected with the bottom of the condenser, which, when open, allows the steam to escape without condensing. This opening can at any time be closed or opened by a stop-cock, *v*, and the apparatus at once changed into either a condensing or non-condensing engine without stopping the machinery, so that if the engine is working the condenser and the air-pump or condenser should fail it is at once converted into a non-condensing-engine. In Fig. 5 this pipe *u* is represented by red lines and shows its exit at the side of the vessel below deck. At the termination of the steam-pipe the valve-box has a stop-cock, *w*, or other fixture to stop off the steam from the engine. The two last figures (4 and 5) show two engines working on the same shafts. In other respects these figures are like the two first. The other parts of the apparatus not described are in construction like those of the ordinary engine, only adapted to the change of position which they are here made to assume and which any competent engine-builder understands how to modify.

By the above-described construction of parts it will be seen that the air-pump has one action for every two of the piston of the engine, by which means I am enabled to increase the size of the cylinder and reduce the rubbing surfaces. I also reduce the action of the valves one-half, which in practice is found

of great advantage, reducing the friction, and thus working it more easily and with less power for a given effect.

Having thus fully described my improved machinery, what I claim as my invention, and for which I desire to secure Letters Patent, is—

1. The combination of the air-pump with the engine in the manner set forth, by which I work it more easily and reduce the number of actions of the valves one-half less than can be done in the ordinary way.

2. The arrangement for converting the engine into a condensing or non-condensing engine by opening or closing a free vent for the steam from the condenser, as set forth.

R. F. LOPER.

Witnesses:

WM. GREENOUGH,  
C. BURCHARDT.