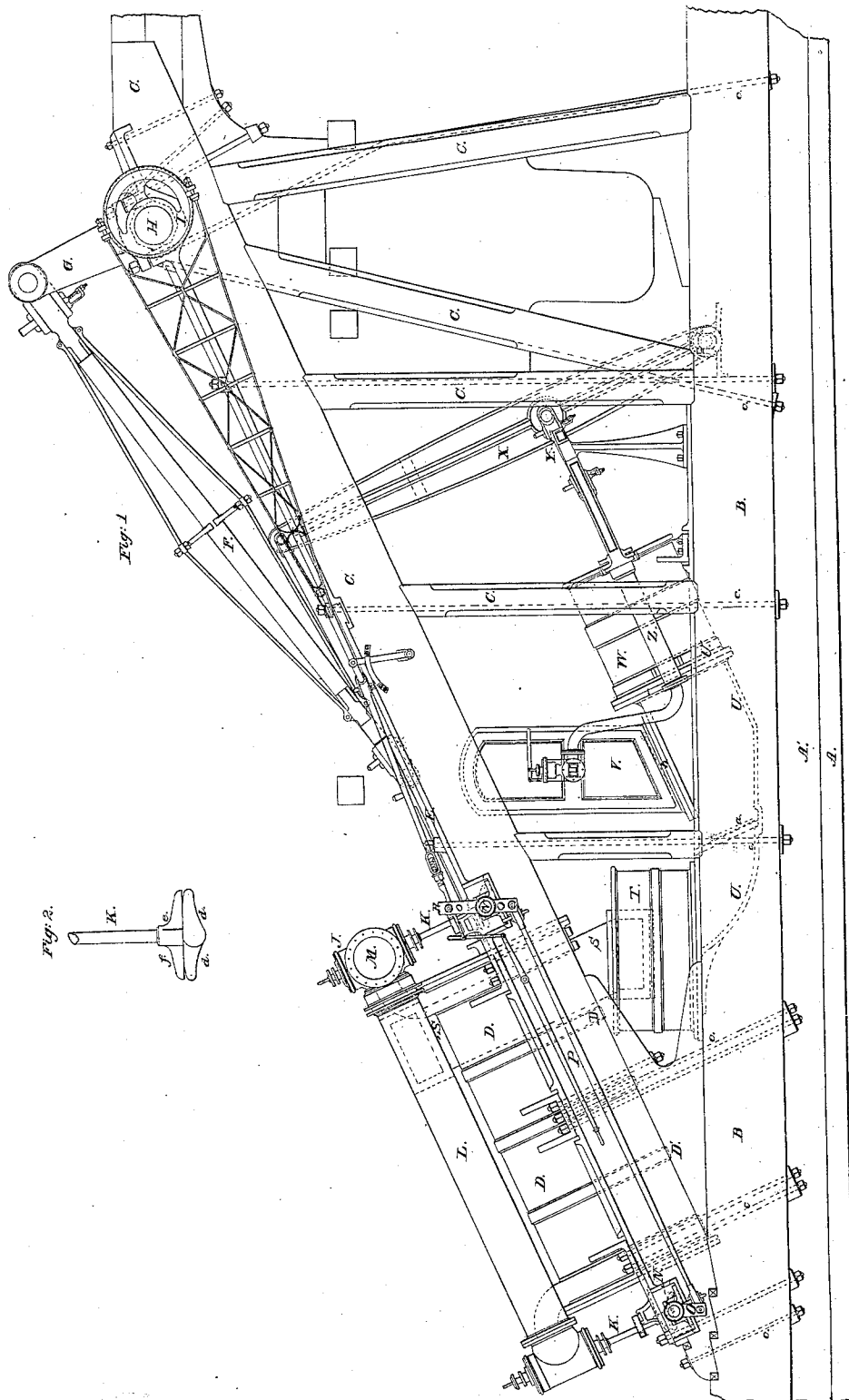


C. W. Copeland,
Reciprocating Steam Engine,
Patented June 11, 1841.

N^o 2,125,



UNITED STATES PATENT OFFICE.

CHARLES W. COPELAND, OF NEW YORK, N. Y.

IMPROVEMENT IN THE MANNER OF ARRANGING LOW-PRESSURE OR CONDENSING STEAM-ENGINES
SO AS TO ADAPT THE PARTS TO BE USED BY VESSELS FOR OCEAN SERVICE.

Specification forming part of Letters Patent No. 2,125, dated June 11, 1841.

To all whom it may concern:

Be it known that I, CHARLES W. COPELAND, civil engineer, of the city of New York, State of New York, have invented certain improvements in the manner of arranging low-pressure or condensing steam-engines and of so combining the respective parts thereof on board of a ship as to adapt them in an especial manner to steam-frigates and to other vessels intended for ocean service; and I do hereby declare that the following is a full and exact description thereof.

The principal objects which I have in view, and which I have attained by my new arrangement of the steam-engine, are, first, the ability to place an engine having any desired length of stroke on board of a vessel, without regard to the depth of such vessel; secondly, the simplifying of some of the working parts in such manner as to cause the engine to work with greater efficiency, the direct action of the steam being employed in situations where a series of levers and connecting-rods have heretofore been used, and in consequence of which new arrangements the friction and the liability to derangement are lessened; thirdly, greater security from injury to the machinery on board of vessels of war by the location of the principal working parts of the engine below the water-line and consequently out of the reach of shot; fourthly, the facility with which all the working parts may be approached when the engine is in operation; fifthly, a diminution of weight when compared with marine engines of the same power as ordinarily constructed and arranged, and in consequence of this and in the simplification of the parts a diminution in the first cost of the engine and in the keeping it in repair; and, lastly, the obtaining of greater strength in the vessel, in consequence of leaving a larger number of the deck-timbers undivided than under the usual arrangement of engines on board of sea-vessels.

In the accompanying drawings I have shown such parts of the steam-engine and of a double-decked vessel, on board of which it is supposed to be placed, as are requisite to exemplify the nature of my invention.

A represents the keel of the vessel; A', the frame-timber thereof, and B the keelsons upon which the engine is supported, which keelsons

are to be firmly fastened to the frame-timbers.

C C C are parts of the frame-work of the engine, which are represented as secured to the keelsons by bolts, (shown by the dotted lines c c c c.) These parts will not require any further explanation, as they may be variously modified, and are matters perfectly understood by every competent engineer and builder of such machinery.

D D is the steam cylinder, the lower portion of which is represented by dotted lines D' D', this part being hidden by the frame-work C C. This cylinder is placed obliquely, as shown in the drawings, and the respective parts of the apparatus are made to conform to this obliquity. The angle at which the cylinder should be placed must be determined by the length of the stroke and the depth of the vessel, and will be dependent, therefore, upon these circumstances.

E is the piston-rod, and F the rod by which it is connected to the crank G.

H is the shaft of the propelling-wheel, supported on the pillow-block I, all of which parts are the same with those in common use.

J J are the steam-valve chests, the valves in which chests may be either balance or single puppet-valves, as may be preferred.

K K are the valve-stems, which are worked directly by the action of the rock-shaft on their feet.

L is a side pipe connecting the two valve-chests J J. The opening M to one of the valve-chests is that to which the steam-pipe from the boiler is attached.

N N are the rock-shafts, O O the levers attached to them, and P the rod connecting them.

R is the eccentric-pin, to which the rod is attached for working the valves.

S S is the eduction-pipe leading to the condenser T.

The manner in which I construct and form the channel-plate U U is shown by dotted lines.

V is the hot well or reservoir, and W the air-pump, which is placed at the same angle with the steam-cylinder, the arrangement of this air-pump and its appendages being in other respects new.

X is a lever-beam for working the air-pump, which beam is operated on by the cylinder cross-head. Y are its connections with the piston-rod of the air-pump.

The dotted lines *a* and *b* show the foot and delivery valves of the air-pump.

Z is the feed-pump for supplying the boiler. This is fastened to the air-pump and is worked from its cross-head.

Instead of working the valves of my engine by the intermedium of lifting-rods in the usual manner, I omit the lifting-rods entirely and attach feet directly to the valve-stems K K, and against these feet the toes of the rock-shaft operate. This arrangement is shown separately in Fig. 2, where K is one of the valve-stems; *e* and *f*, feet attached to these stems, and *d d* the toes of the rock-shaft N. By this manner of arranging the parts concerned in working the valves I obtain a more direct action on the valves than heretofore, and that by means which are peculiarly simple and convenient. This manner of arranging the operating parts of the valves is represented also by dotted lines in Fig. 1.

In my air-pump W, I use a solid piston, and I attach the lower end of said pump directly to the end U' of the channel-plate, as shown in the drawings. I also place the delivery-valve *b*, leading into the reservoir or hot well V, on the upper side of the channel-plate. By this arrangement of the air-pump, of the channel-plate, and of the valve and hot well the motion of the water is rendered more direct than under any other known manner of constructing and combining these parts, and the apparatus is also specially adapted to the particular manner in which the cylinder and the other parts of the engine are arranged.

Having thus fully described the manner in which I arrange and combine the respective parts of my engine so far as the same is novel in its character, what I claim as new and as constituting my invention is—

1. The placing the cylinder in an oblique direction with its lower end near to the bottom of the vessel and allowing it to stand at such angle as is required for the connecting of its piston-rod with the crank on the shaft of the paddle-wheels, in combination with the condensers, channel-plate, and air-pump arranged and located as above described. I do not claim the mere placing of the cylinder of a steam-engine obliquely, as this has been done for other purposes; but as I produce a new and useful effect by so placing the steam-cylinder and its appendages in the combination above claimed on board of vessels for navigating the ocean I limit my claim to the so placing them under the said combination as to attain the objects herein fully made known.

2. The manner of arranging and working the steam and the exhaust valves, as set forth, the same being effected by a direct action—that is to say, without the employment of the lifting-rods and lifters usually required for that purpose.

3. The manner of combining and arranging the condensing apparatus, the air-pump being placed at the same angle, or nearly so, with the cylinder and attached by its lower end to the channel-plate, the delivery-valve being also placed on the upper part of said plate, the combination intended to be claimed under this last head consisting in the arranging of the several parts enumerated—that is to say, the air-pump, the channel-plate, and the delivering-valve—substantially in the way herein described and represented.

In testimony whereof I hereunto sign my name this 11th day of February, in the year 1841.

CHAS. W. COPELAND.

Witnesses:

THOS. P. JONES,
FOSTER RHODES.