Sheet 1-2 Sheets

Newton & Wheeler,

Reciprocating Steam Engine,

No. 41,964. Patented Mar. 15, 1864.

Fig. 1.

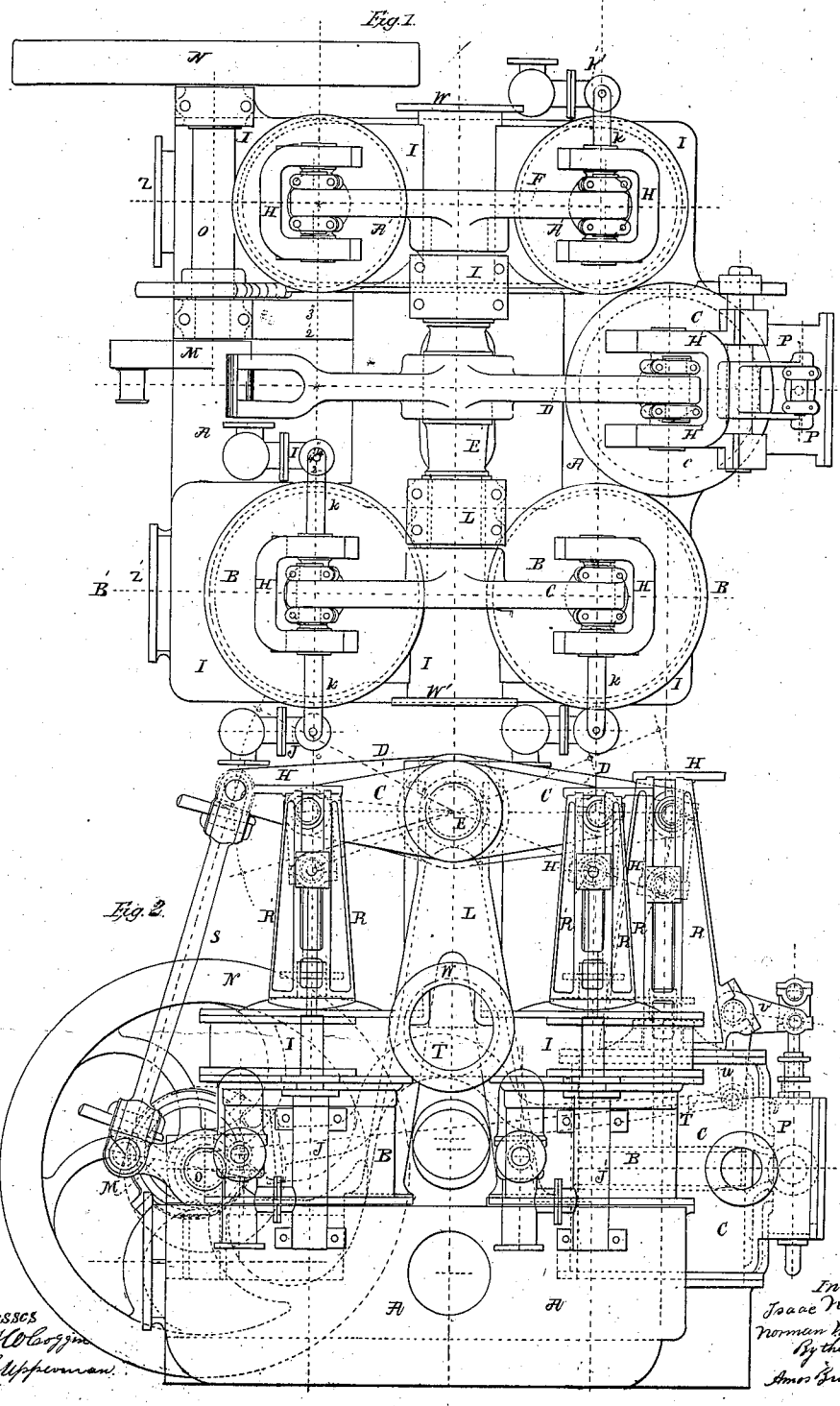


Fig. 2.

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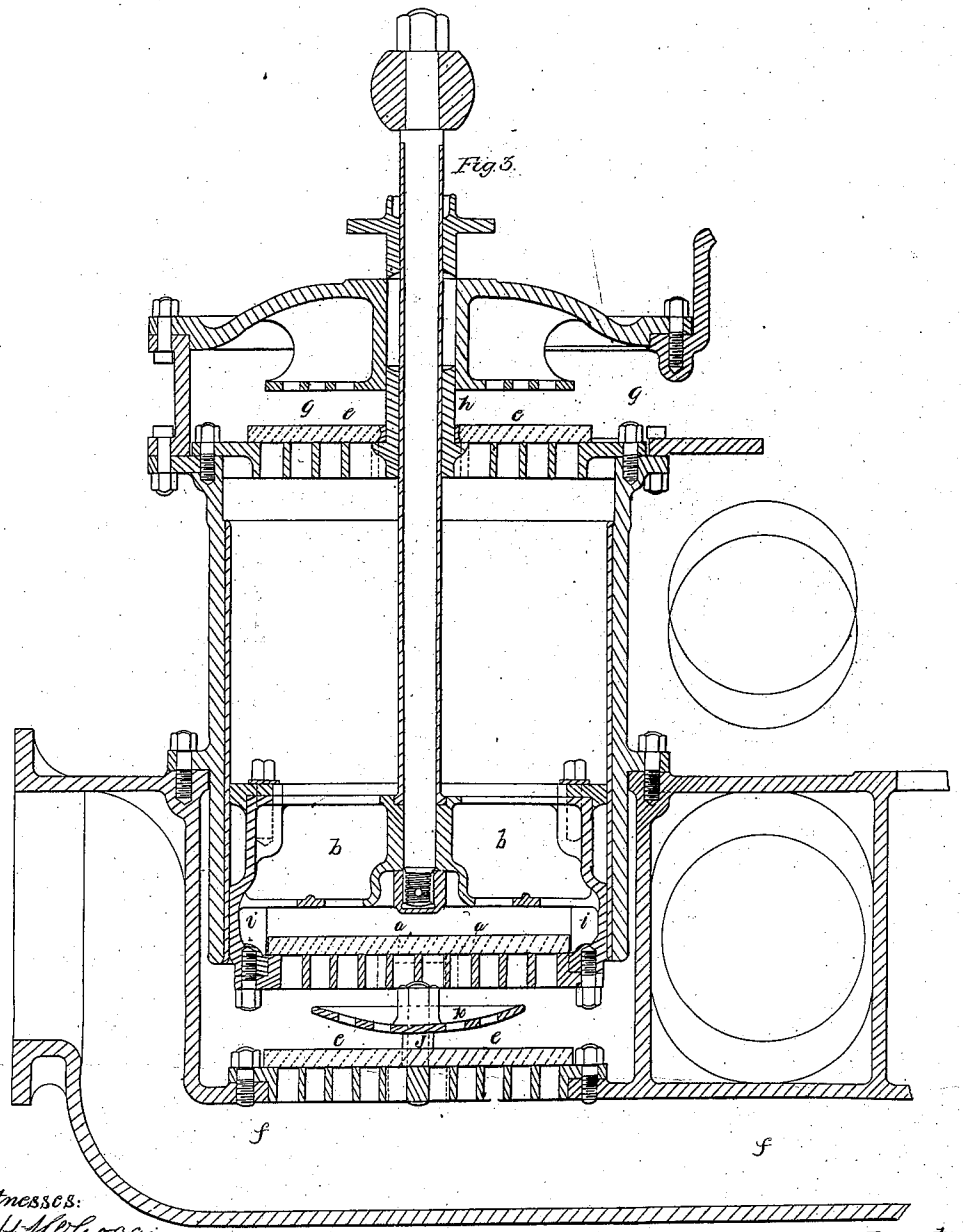
Sheet 2 - 2 Sheets.

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Fig. 3.



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UNITED STATES PATENT OFFICE.

ISAAC NEWTON, OF NEW YORK, AND NORMAN W. WHEELER, OF BROOKLYN, N. Y., ASSIGNORS TO ISAAC NEWTON.

IMPROVEMENT IN VACUUM-ENGINES.

Specification forming part of Letters Patent No. **41,964**, dated March 15, 1864; antedated January 13, 1864.

To all whom it may concern:

Be it known that we, ISAAC NEWTON, of the city and county and State of New York, and NORMAN W. WHEELER, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Vacuum-Engine; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a top view; Fig. 2, a side elevation; and Fig. 3 is a vertical section through one of the pumps of said engine, showing the internal construction of the channel-ways, buckets, valves, &c., all of which will be hereinafter referred to and more fully explained.

To enable others skilled in the arts to which our invention appertains to make and use the same, we will proceed to describe its construction and operation, its nature, objects, and advantages, and the considerations which have led to its creation.

The experience furnished by the present war shows that armed vessels, especially while performing blockading duty, should at all times be ready to get under way, and to move at once with their maximum velocity and power, and not be compelled to wait the gradual development of the fires to supply steam enough to work the engines even at a moderate rate of speed; and it is also important that this state of preparation should be kept secret from the enemy, by which great advantages may be realized.

With the marine engine as at present constructed, with surface-condensers, and with the air and circulating pump worked by the main engine, it is impossible to accomplish these two objects in anything like perfection, because the engine cannot be made to develop its maximum power without the usual head of steam in the boilers and the reserved vacuum in the condenser, neither of which can be sustained without the operation of the main engine to work off the steam and maintain the vacuum; for while the engine is at rest the vacuum is lost, and in case the fires are kept up there is no way of disposing of the steam but by blowing it off, which at once gives notice to the enemy that the vessel is prepared to start. To cure these defects—that is, to obtain secrecy and readiness—it is necessary to so modify the construction of the condensing marine engine with surface-condenser that it will be capable of consuming the steam of the boilers when the motive engine is at rest, even though it be kept at its maximum pressure, and at the same time maintain the vacuum in the condenser.

To provide such a modification of the marine engine as will effectually realize these advantages is the object of our invention; and our said invention consists in a certain combination and arrangement of independent air and circulating pumps with each other, and with the surface-condenser of the main engine, to the end that the vacuum in the condenser may be constantly maintained, and all the steam generated in the boiler (whether the main engine be at rest or not) can be consumed in the condenser, thus avoiding noise and waste of fresh water by blowing off steam. The engine which we have fabricated for this purpose, and which embodies the combination and arrangement of the devices above referred to, is described as follows, reference being had to the drawings annexed, and to the letters of reference marked thereon.

The main or channel plate of the engine is represented in the drawings by A. Upon one side of said bed-plate there are set two air-pumps, B B, and upon the opposite side of said plate there are arranged two circulating pumps, A′ A′. These pumps are all of like stroke, and their axes are adjusted on parallel planes both ways. The internal construction of the pumps are all substantially the same. A longitudinal section through one of the air-pumps, a part of the bed-plate, and delivery-channel, is shown by Fig. 3. *a* represents the pump; *b*, the buckets; *c*, the receiving-valve; *d*, the bucket-valve; *e*, the delivery-valve; *f*, the receiving-channel, and *g* the delivery-channel. All the aforementioned valves are of india-rubber. The delivery-valve rises and falls on the center piece, *h*, as a guide. The bucket-valve is guided in its ascent and descent by ribs *i*, cast in the buckets around the periphery of the valve, and the receiving-valve is kept in position by the center piece, *j*, of the fender *k*. The internal detail construc-

tion of these pumps is so fully and completely illustrated by the drawings that any further description of it is thought unnecessary.

On one end of the said bed-plate, about midway between the two sides, the steam-cylinder C is arranged. It is of the ordinary construction, provided with a steam-chest, P, and fitted with slide-valves of the usual style. The main beam or lever of the engine is represented by D. This beam is secured on a rock-shaft, E, which is supported in the frame L. To one end of this beam the steam piston-rod is attached by means of links in the usual way, one end of said links being attached to a pin in the end of the beam and the other end to a cross-head, *x*, which has a vertical reciprocating motion in the guide-brackets R R. To the opposite end of said beam the connecting-rod S is attached, which communicates motion to the fly-wheel N through the agency of the crank M, said fly-wheel being secured on one end and said crank on the opposite end of the shaft O, which shaft is arranged in suitable plumber-blocks on the rear end of said bed-plate.

On each end of the rock-shaft E a lever, F G, is secured, the one, G, operating the two air-pumps, and the other, F, operating the two circulating-pumps, the bucket-rods being connected to the ends of the respective beams by means of links and cross-heads *x*, which reciprocate in the guides R′ R′ in substantially the same manner as the connection is made between the steam piston-rod and the main beam. The brackets R′ R′, which guide the pump-rods, are arranged and secured on the pump-covers, and those which guide the piston-rod are secured on the cylinder-cover and furnish a support to the rock-shaft and levers *u* and *v*, through the agency of which the steam-valve is operated, the lever *u* being actuated by the eccentric-rod T. (Shown in dotted lines.) The eccentric is of the common variety, and is applied in the ordinary manner.

Upon both the air and circulating pumps there is mounted what we term a "channel-plate." These plates are shown in Figures 1 and 2 by I I. Each plate covers the entire top of two pumps—that is to say, one plate covers the air pumps and the other the circulating-pumps—and form the delivering-channel for these pumps, respectively. The inside of the channel is shown by *g g* in Fig. 3. The delivery-nozzle of the channel-plates is shown by W, and the receiving-nozzles of the bed-plate are shown by Z Z.

At the side of one of the air-pumps there are arranged two feed-pumps, as shown by I′ J, and at the side of the other air-pump there is arranged a bilge-pump, J′, and at the side of one of the circulating-pumps there is arranged a pump, K′, which is designed to operate the reversing-gear of the main engines by pumping water into a hydraulic cylinder communicating with that part of the main engines. These small pumps are operated by attaching their plungers to one end of the main pump cross-heads, the length of which is extended to afford means for the connection, as shown by K.

When this engine is in operation the receiving-nozzle Z′ of the air-pumps is connected to the fresh-water side of the surface-condenser, and the receiving-nozzle Z of the circulating-pumps united to the salt-water side of the condenser, the air-pumps drawing the water of condensation out of the condenser and discharging it through the nozzle W′ into a hot-well, while the circulating-pumps draw out of the condenser the condensing-water and throw it, through the nozzle W into the out-board delivery-pipe, into the sea.

It will be seen that the pumps employed in this engine are single-acting; that they are arranged in pairs and connected to opposite ends of the same lever, and that the operation of the engine is steadied by the action of a heavy fly-wheel, from which facts it will appear that the pumps are accurately balanced, and must be uniform and steady in their action, which is one of the great desiderata in a pumping-engine.

In constructing these engines it is proposed to extend the main rock-shaft E over the side of the frame next the main engine and fix thereon a lever to which a connection can be made with the main engine, so that in case of accidents to the pumping-engine the pumps can be worked by the main engine. This arrangement is not shown on the drawings, but an engineer will readily see how it can be accomplished.

The apparatus described herein is intended for engines provided with surface-condensers; but the same arrangement is applicable to jet-condensers by dispensing with the circulating-pumps.

Now, we are aware that independent air and circulating pumps for marine engines with surface-condensers have been proposed and even applied, but with poor success. The indispensable conditions to realize the advantages offered by such an apparatus are simplicity, certainty, capacity, and a steady regularity of action, and we claim that our apparatus approaches perfection in these particulars more nearly than anything that has been hitherto proposed. We do not, however, mean to lay claim to the use of independent air, circulating, feed, or bilge pumps, *per se;* neither do we mean to confine our claim to the certain construction and arrangement of parts described in this specification, or shown in the drawings annexed hereto; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. The use of the single-acting air and circulating pumps B B and A A, in combination with each other, and with the surface-condenser of a marine engine, when said pumps are connected and operated in relation to each other substantially in the manner described.

2. The combination of the receiving-valves

c, bucket-valve *d*, and delivery-valve *e*, when said valves are arranged in respect to each other and to their respective seats and chambers, constructed substantially in the manner described.

3. The combination of the steam-cylinder with the air and circulating pumps when said pumps are arranged between separate channel-plates and steadied by the action of a fly-wheel, substantially as shown and described.

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JAMES M. WADE.