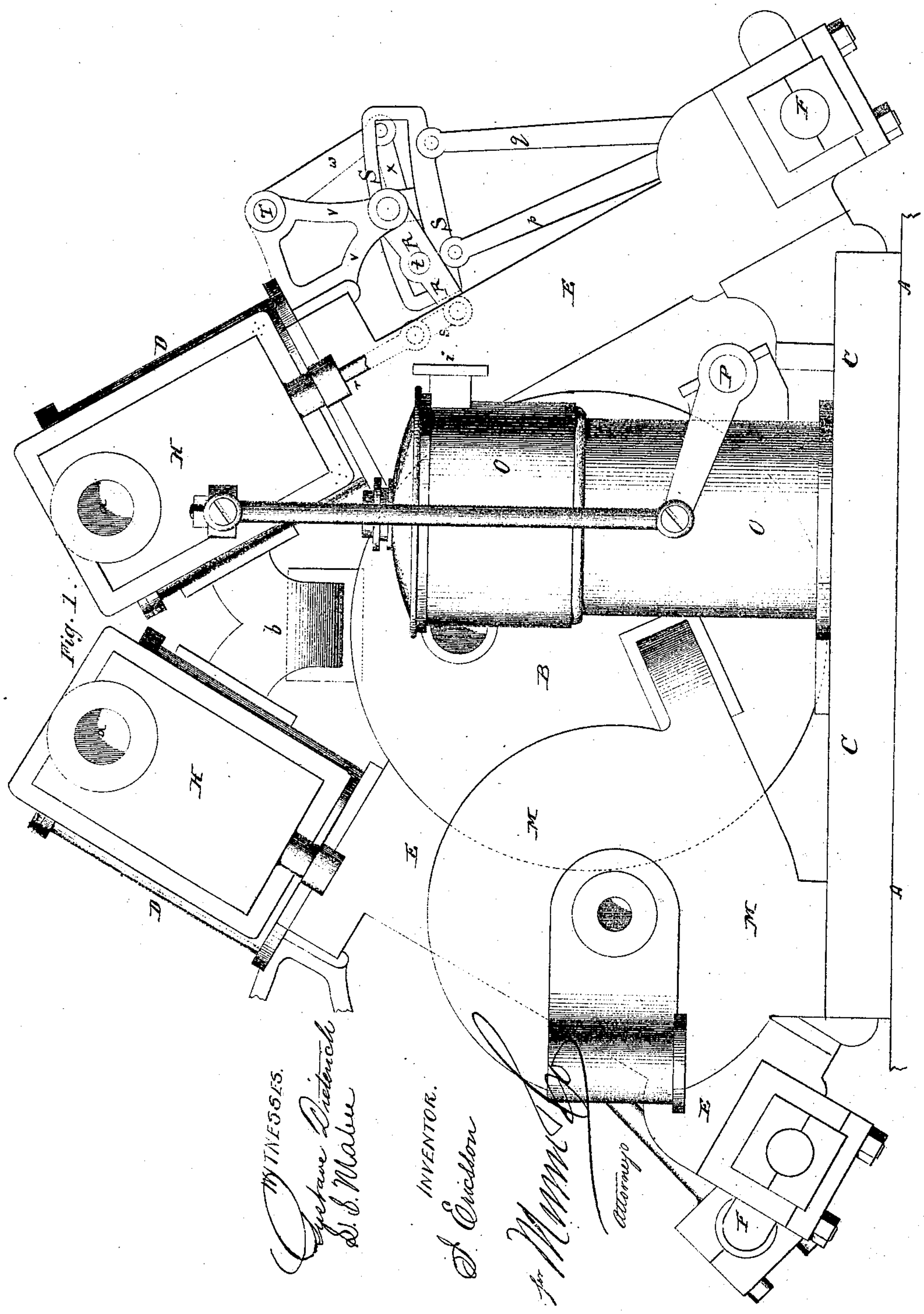
3. Sheets. Sheet. 1.

J. Ericsson,

Marine Engine.

No. 106,800. Patented Aug. 30. 1870.



J. Ericsson,

3. Sheets. Sheet. 2.

Marine Engine.

No. 106,800. Patented Aug. 30 1870.

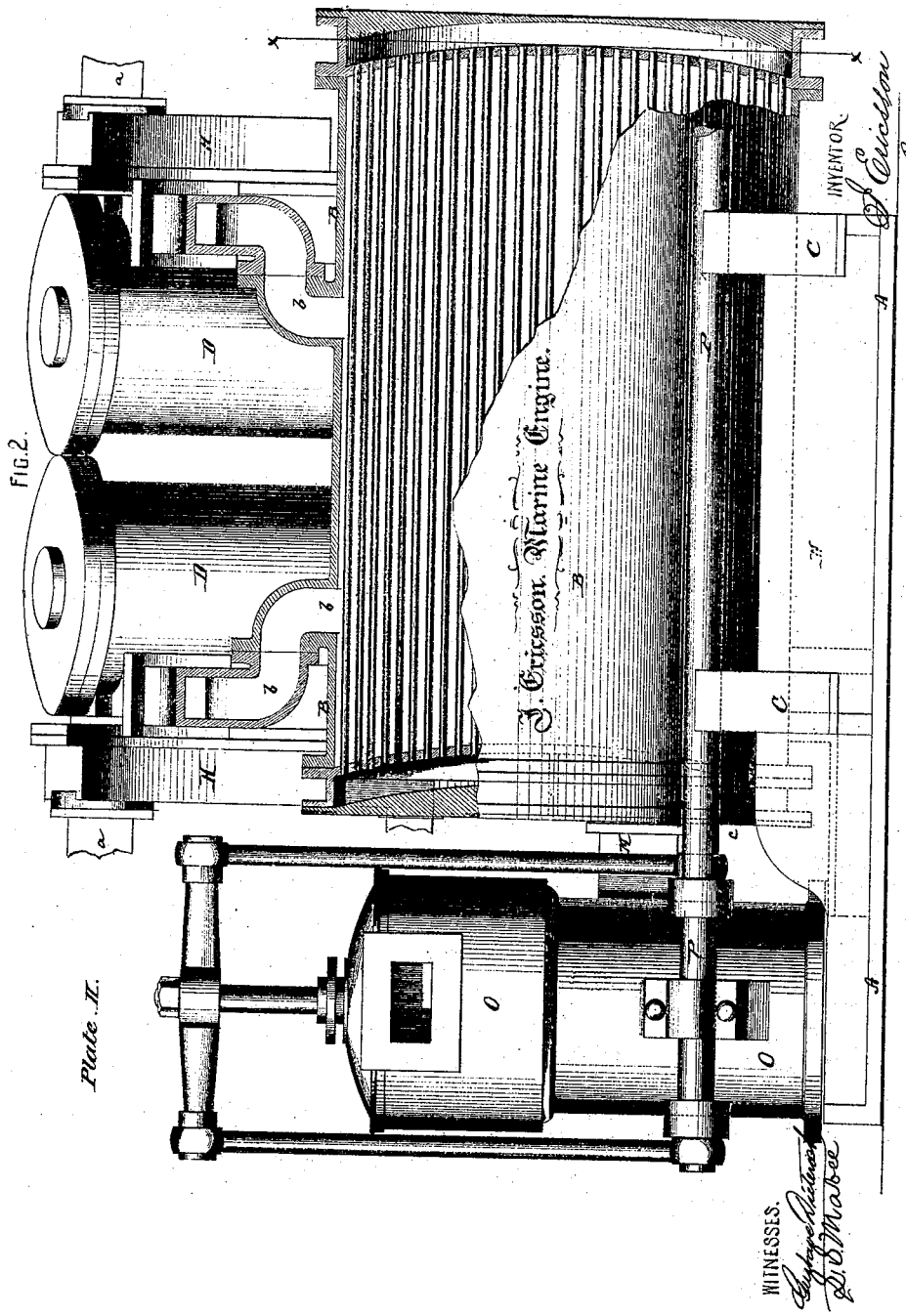


FIG. 2.

Plate. II.

3. Sheets. Sheet. 3

J. Ericsson,

Marine Engine.

No. 106,800. Patented Aug. 30. 1870.

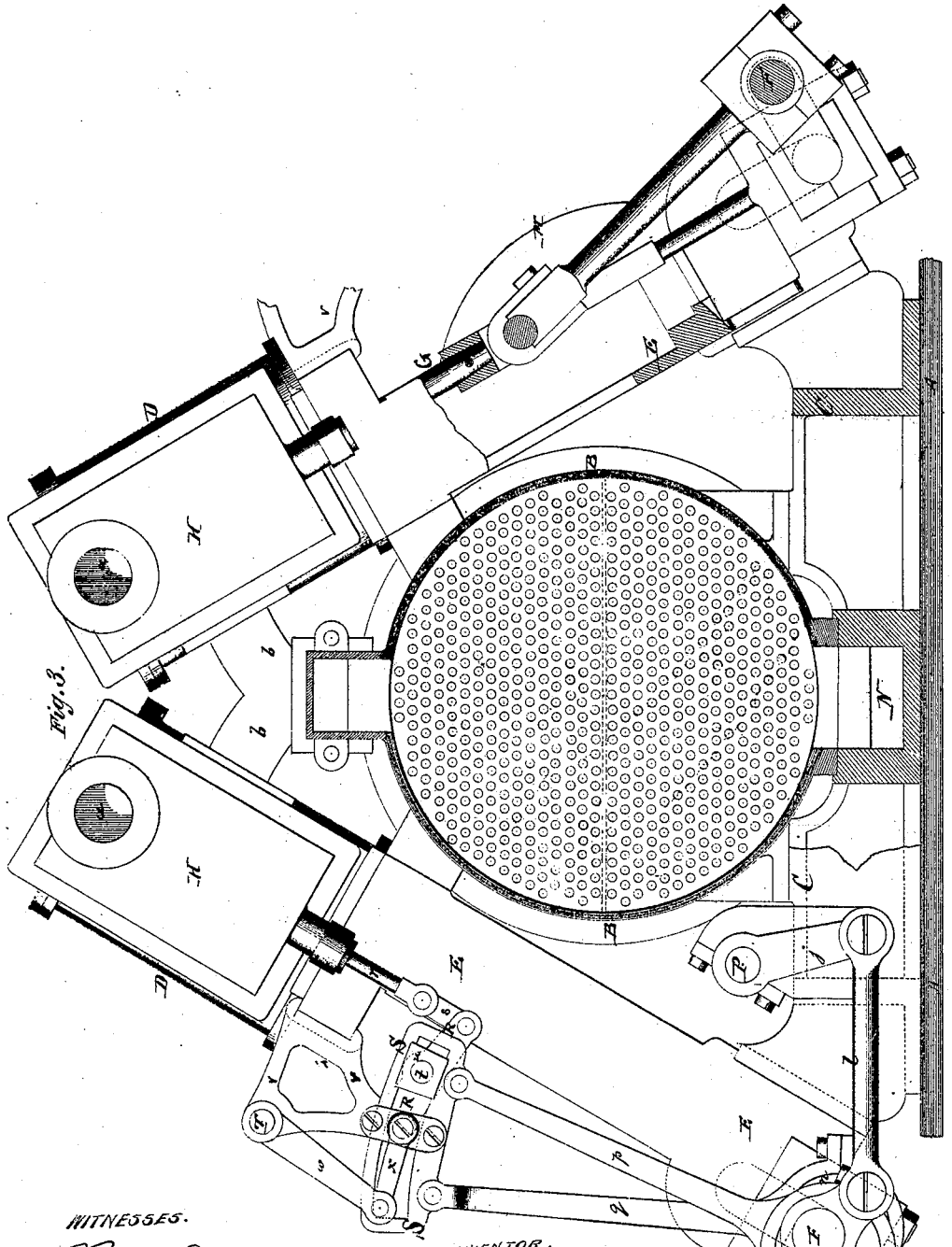


Fig. 3.

WITNESSES.

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JOHN ERICSSON, OF NEW YORK, N. Y.

Letters Patent No. 106,800, *dated August* 30, 1870.

IMPROVEMENT IN MARINE ENGINES.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, JOHN ERICSSON, of the city New York, in the county and State of New York, have invented a new and improved Marine Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

Figure 1 represents an end elevation of my improved marine engine.

Figure 2 is a side elevation, partly in section, of the same.

Figure 3 is a vertical transverse section of the same, the plane of section being indicated by the line $x\ x$, fig. 2.

Similar letters of reference indicate corresponding parts.

The object of this invention is to so arrange and construct the machinery pertaining to a marine, and more particularly to a twin-screw engine, that the utmost degree of compactness, combined with simple mechanism, will be attained.

These essential requisites of a twin-screw engine have as yet not been reached. Twin-screw engines, therefore, at present, are not only too expensive, complicated, and bulky, but they occupy so much room that they are difficult to control, and, consequently, very apt to get out of order. By my invention these defects are entirely overcome. The cylinders, steam-chests, air-pumps, and injection-engine are all so placed, with reference to the condenser and each other, as to occupy the least possible amount of room, and still be easily reached.

My invention consists in a novel construction of valve-gear, the same being so arranged that the power is applied by the eccentric rods to the middle of a lever, which at its ends connects with the slide valve. The economy of power, as well as room, by this construction, is evident, for the motion required by the eccentrics and rods is but small, and their action proportionately powerful, while the stroke produced has the full length. The link motion is so connected with the reversing gear as not to be in the least influenced by the same, otherwise than necessary for reversing.

The invention consists, also, in connecting the crank-shaft, which is operated by the piston-rods, with the rock-shaft that operates the air-pump, so that the said rock-shaft will derive its motion direct from the main crank-shaft.

A in the drawing represents the bed-plate of my improved marine engine.

The drawing represents the parts, to which my invention relates, arranged in connection with a condenser, B, which is placed horizontally upon a frame, C, which is in turn supported by the bed-plate.

The cylinders D are secured in frames E, which are in inclined positions, placed against the opposite sides of the condenser, as clearly shown in fig. 3.

The lower ends of the frames E are supported by the bed or frame C, while their upper parts lean against the condenser.

The number of steam-cylinders D can be varied at will. Two are shown on each side of the condenser.

In the lower parts of the frames E are the bearings for the crank-shafts F, which are revolved by the piston-rods G of the cylinders D.

A steam-chest, H, is secured alongside of each cylinder D, as is clearly shown in fig. 2.

The steam enters the steam-chest H through pipes $a\ a$, and the exhaust steam escapes from the cylinders through pipes b, which conduct it into the upper part of the condenser.

A centrifugal pump, M, is employed to inject cold water into the condensers, the same being worked by any suitable mechanism, but, preferably, by a donkey-engine.

The products of condensation are collected in a channel, N, that extends longitudinally under the condenser.

An air-pump, O, the piston of which is connected with a rock-shaft, P, serves to withdraw the condensed water from the channel N, and to convey it through a pipe, i, to a fresh-water tank, or other suitable receptacle.

The rock-shaft P has a crank, j, which is, by means of a rod, l, connected with a crank of one of the shafts F, as shown in fig. 3. The rock-shaft receives its motion, therefore, directly from one of the shafts F, and conveys it to the air-pump.

The valve-gear is best shown in figs. 1 and 3. For each slide-valve the respective shaft F has two eccentrics, m and n, which work in the lower ends of rods p and q respectively.

The upper ends of these rods are connected with the opposite ends of a slotted plate, S. The slot of this plate is curved on an arc of a circle, described from the axis of the shaft F as center.

The valve-rod r is, by means of a link, s, connected with the outer end of a lever, R, which is at the opposite end pivoted to braces v of the frame E.

From the middle of the lever R projects a pin, t, which fits loosely through a block, u, that is held in the slotted plate S, so that lever p or q, which is brought entirely or nearly in line with the pin t, will produce the desired motion of the slide-valve. When the plate S is shifted to carry the block u to its other end, the lever p or q, which was formerly idle, will be brought into action, and *vice versa*. The engines are thereby reversed.

The reversing-gear consists of a rock-shaft, T, hung in the braces v, and provided with a crank, w, which,

by means of a link, x, is connected with the middle of the plate S, as shown. While the engine is in action the reversing-gear will have no effect at all upon the operation of the valve-gear, as the jointed arms w x of the same permit entirely free motion of the plate S.

The power of the crank-shaft F is applied to the middle of the lever R, while it is transferred to the valve-stem by the end of said lever. The motion required to operate the valve is thus half that produced, and as much less room is consequently taken up by the mechanism.

Having thus described my invention,

I claim as new and desire to secure by Letters Patent—

1. The rock-shaft P, for operating the air-pump, when connected, by means of a link, l, with the revolving crank-shaft F, substantially as herein shown and described.

2. The valve-gear, operated by the lever R, which receives motion at its middle, and transfers it at the end, substantially as herein shown and described.

3. The reversing-gear, connected, by jointed arms, with the slotted plate S of the valve-gear, so as not to effect the action of the same during the operation of the engine, as specified.

J. ERICSSON.

Witnesses:
S. W. TAYLOR,
WM. F. MCNAMARA.