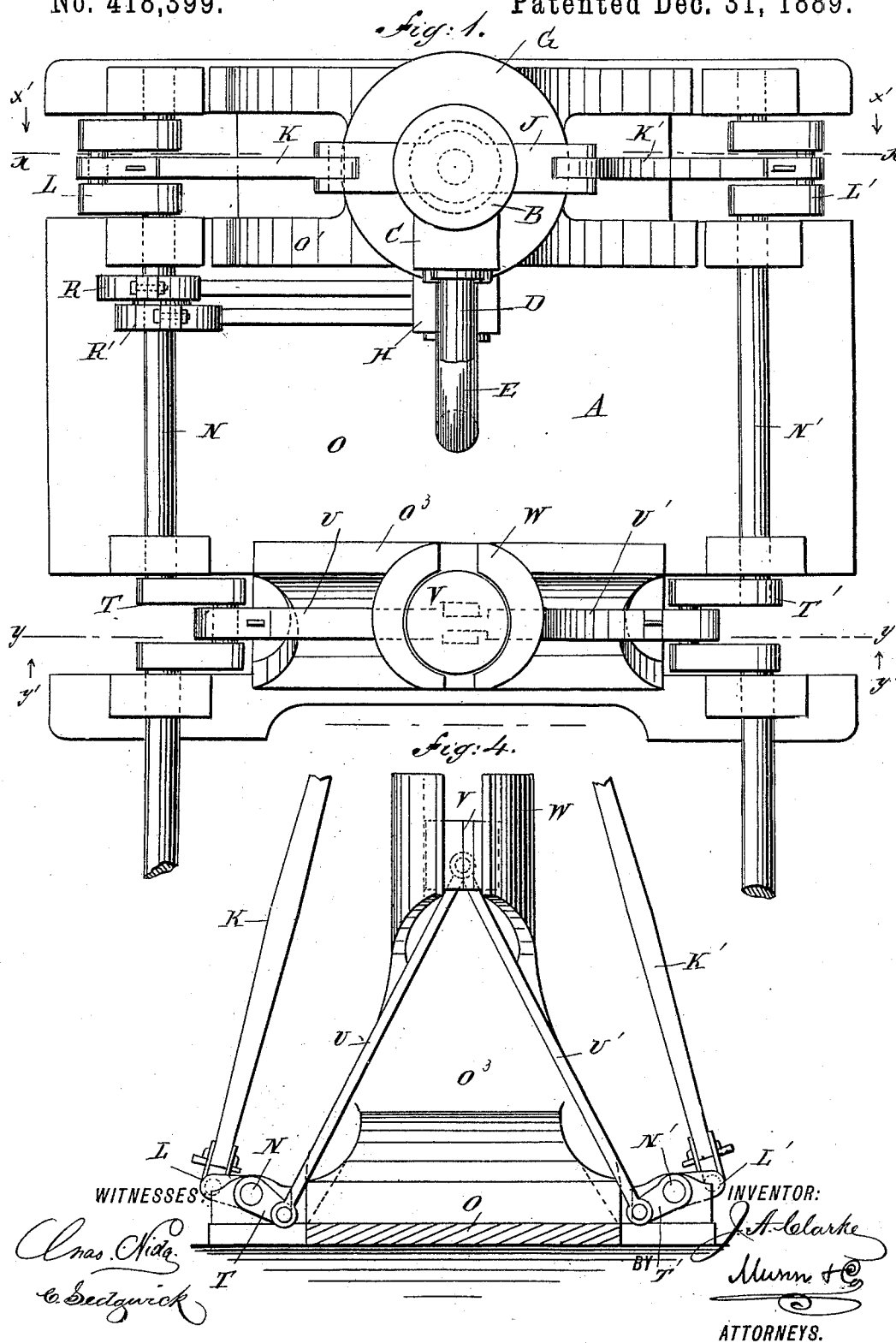


J. A. CLARKE.
ENGINE.

No. 418,399.

Patented Dec. 31, 1889.



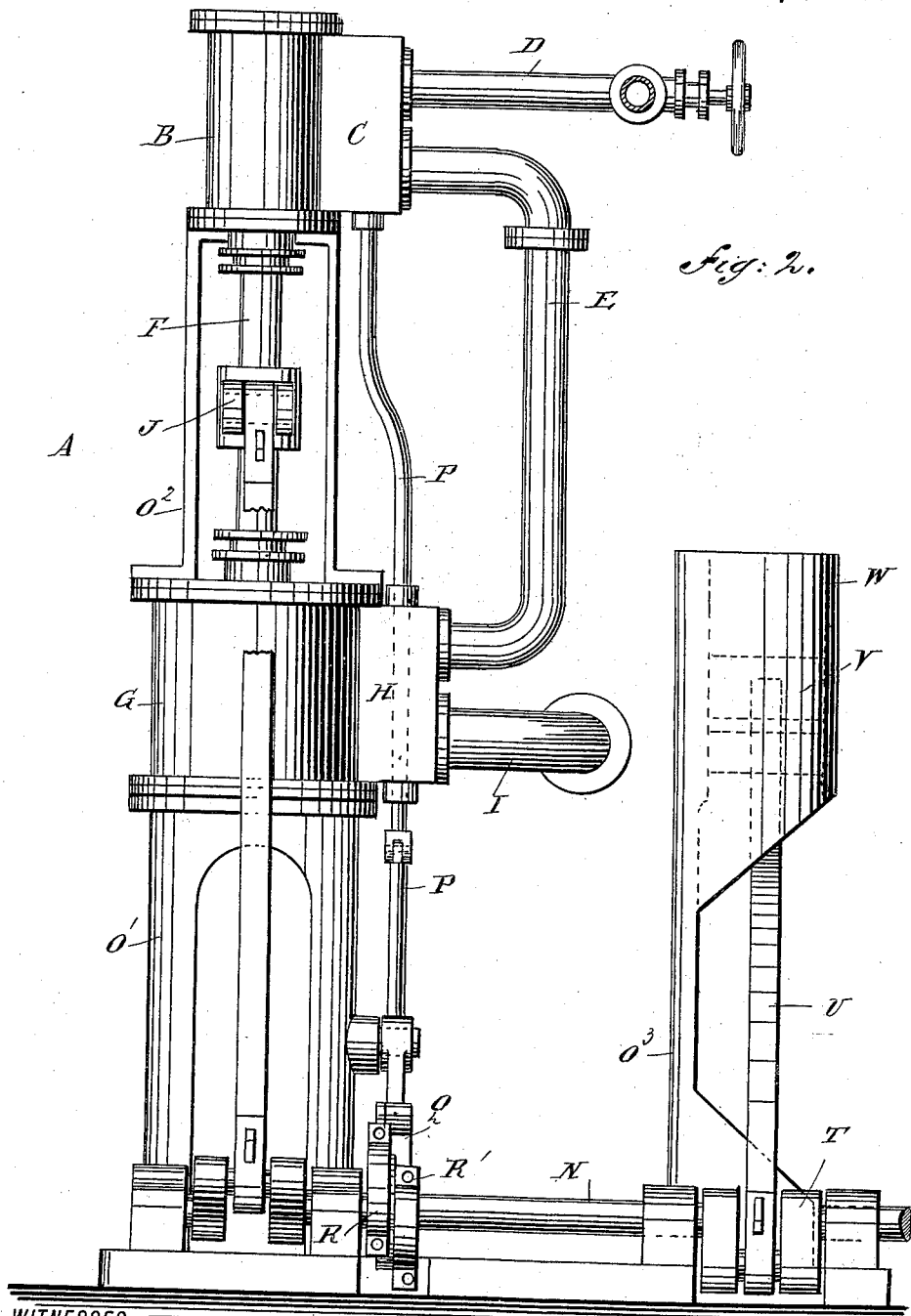
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WITNESSES:

Chas. Kida
C. Sedgwick

INVENTOR:

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J. A. Clarke
BY Munn & Co

ATTORNEYS.

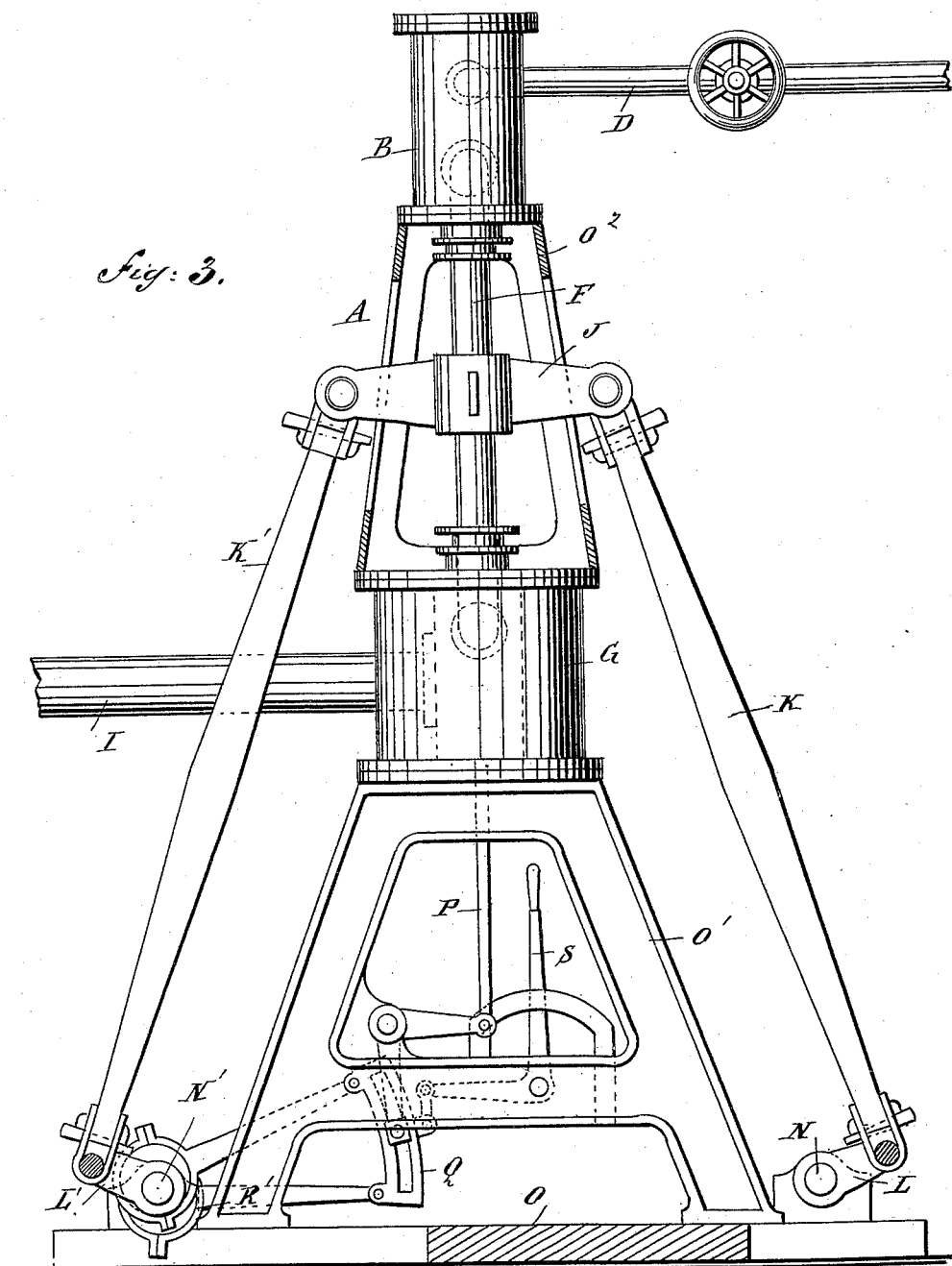
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INVENTOR:

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UNITED STATES PATENT OFFICE.

JAMES ANTHONY CLARKE, OF PORT MOODY, BRITISH COLUMBIA, CANADA.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 418,399, dated December 31, 1889.

Application filed April 16, 1889. Serial No. 307,391. (No model.)

To all whom it may concern:

Be it known that I, JAMES ANTHONY CLARKE, of Port Moody, in the Province of British Columbia and Dominion of Canada, have invented a new and Improved Engine, of which the following is a full, clear, and exact description.

The invention relates to compound tandem engines; and its object is to provide a new and improved compound engine which is simple and durable in construction, very effective in operation, and specially designed for marine vessels to drive twin propellers.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional end elevation of the improvement on the line xx of Fig. 1, looking in the direction of the arrow x' ; and Fig. 4 is a reduced sectional end elevation of the same on the line yy of Fig. 1, looking in the direction of the arrow y' .

The improved engine A is provided with a high-pressure cylinder B, placed in a vertical position and provided with a steam-chest C, into which discharges the steam-inlet pipe D, connected in the usual manner with the source of steam-supply, and also provided with a valve for letting steam into and shutting it off from the steam-chest C. The cylinder B is also provided with an exhaust-pipe E, and with a piston secured on a piston-rod F, extending downward and connected with a piston operating in the low-pressure cylinder G, placed in a vertical position centrally below the high-pressure cylinder B.

The low-pressure cylinder G is provided with a steam-chest H, into which discharges the exhaust-pipe E from the cylinder B. The cylinder G is also provided with the exhaust-pipe I, leading to the outside. On the piston-rod F, common to both cylinders B and G, is secured a cross-head J, pivotally connected by the pitmen K and K' with the crank-arms L and L', respectively, secured on the crank-

shafts N and N', respectively, mounted to turn in suitable bearings formed on the base O, which also supports a frame O', carrying the low-pressure cylinder G. On top of the latter is arranged a frame O², supporting the high-pressure cylinder B, as is plainly shown in the drawings.

The valves in the steam-chests H and C are connected with each other by a valve-rod P, connected at its lower end, in the usual manner, with the reversing-link Q, operated from the eccentrics R and R', secured on one of the crank-shafts N or N'. As shown in the drawings, the eccentrics R and R' are secured on the shaft N. The crank-arms L and L' stand at angles to each other, so that the crank-shafts N and N' are turned in opposite directions when the engine is in operation. The position of the link Q can be changed in the usual manner by the reversing-lever S, of any approved construction, so that the motion of the crank-shafts N and N' can be simultaneously reversed.

On the crank-shafts N and N' are secured or formed the crank-arms T and T', respectively pivotally connected by the pitmen U and U' with the slide V, mounted in vertical guideways W, supported on a frame O³, erected on the base O. This arrangement serves as a governor, as will be hereinafter more fully described.

The operation is as follows: The live steam passing through the steam-inlet pipe D into the steam-chest C operates the piston in the high-pressure cylinder B, and the exhaust from the latter acts on the piston in the low-pressure cylinder G. The piston-rod F thus receives an up-and-down motion by the action of the steam in the cylinders B and G. The piston-rod F, on account of being connected by its cross-head J, the pitmen K and K', and the crank-arms L and L' with the crank-shafts N and N', rotates the latter in opposite directions. The motion of the crank-shafts N and N' causes the vertical sliding motion of the slide V, traveling loosely in the guideways W.

The engine is specially designed for marine purposes to drive twin screws secured directly on the crank-shafts N and N' in front of the crank-arms T and T'. It will be seen that in case one of the screw-propellers becomes dis-

abled the power of the respective shaft carrying the disabled propeller is directly transmitted to the other shaft by means of the crank-arms T'T', the pitmen U U', and the slide V. For instance, if the propeller on the shaft N' is disabled, the power of the said shaft N' is transmitted by the crank-arm T' and the pitman U' to the slide V, which latter, by the pitman U and the crank-arm T, transmits its power to the crank-shaft N, so that by this means the other screw-propeller is caused to do all the work. In a heavy rolling sea one of the propellers frequently gets partially out of the water, while the other is deeply submerged. In this case the piston V will prevent the flying around of the one propeller and will assist the other.

It will be understood that as the cross-head J is secured directly on the piston F and the pitmen K and K' are directly connected to the said cross-head no guideways of any description are used, thus gaining power which would otherwise be lost on account of friction, and also saving the extra cost of manufacturing and wear and tear and attention in running the guideways.

A triple extension can be used by placing the other cylinder on top or underneath or by having two more cranks, and the triple engine placed forward of the other similar to the compound, but having one open cylinder or guideways like the governor for the piston-guide, or the quadruple would be more effectual placed in a similar position. The advantage of having the cranks at right angles would be that there would be no center to stick on.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an engine, a high-pressure cylinder,

and a low-pressure cylinder deriving its motive agent from the exhaust of the high-pressure cylinder, in combination with a piston-rod carrying the pistons of the two cylinders, a cross-head secured to the said piston-rod, pitmen pivotally connected at opposite sides with the said cross-head, crank-arms placed at angles to each other and connected with the said pitmen, crank-shafts carrying the said crank-arms and placed parallel with each other, a reversing-link operated from one of the said crank-shafts and operating the valves in the said high-pressure and low-pressure cylinders, vertical guideways parallel with said cylinders, a slide therein, and pitmen pivoted thereto at their upper ends and connected at their lower ends to cranks on said shafts, substantially as shown and described.

2. In an engine, the combination, with two crank-shafts and means for rotating them, of crank-arms secured on the said shafts and standing at angles to each other, pitmen pivotally connected with the said crank-arms, a slide pivotally connected with the said pitmen, and a guideway in which operates the said piston, substantially as shown and described.

3. In an engine, the combination, with guideways W, of a slide V, mounted to slide in the said guideways W, pitmen pivotally connected with the said slide, crank-arms pivotally connected with the said pitmen and standing at angles to each other, main crank-shafts carrying the said crank-arms, and a compound engine operating the said two crank-shafts, substantially as shown and described.

JAMES ANTHONY CLARKE.

Witnesses:

JAMES KAY SUTER,

JOSEPH C. ARMSTRONG.