T. G. E. LINDMARK.

MARINE TURBINE.

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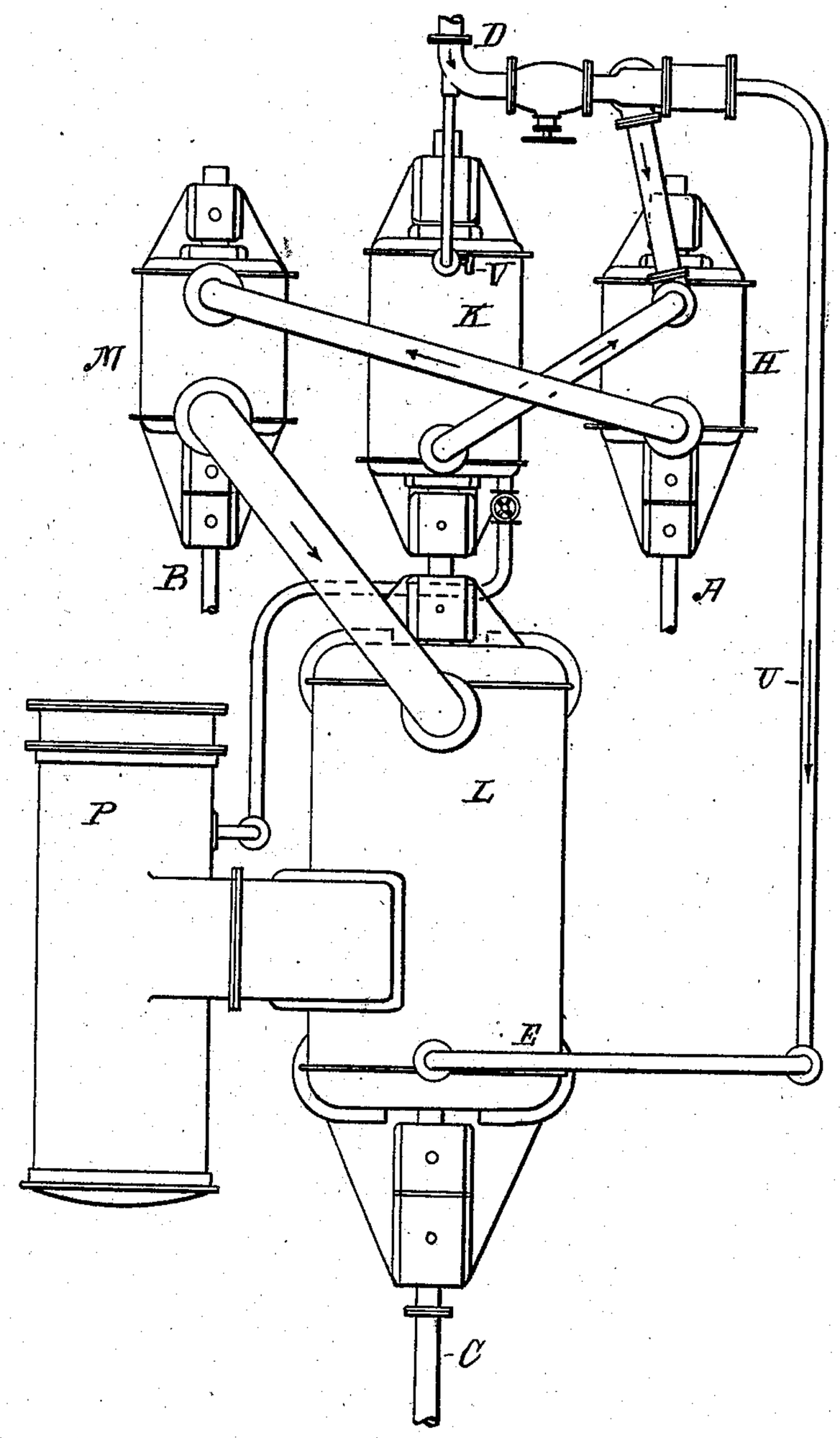
899,547.

Patented Sept. 29, 1908



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UNITED STATES PATENT OFFICE

TORE GUSTAF EMANUEL LINDMARK, OF STOCKHOLM, SWEDEN.

MARINE TURBINE.

No. 899,547. Specification of Letters Patent. Patented Sept. 29, 1908.

Application filed December 3, 1907. Serial No. 404,919.

To all whom it may concern:

Be it known that I, TORE GUSTAF EMANUEL LINDMARK, engineer, subject of Sweden, residing at Stockholm, Sweden, have invented new and useful Improvements in Marine Turbines, of which the following is a specification.

The invention relates to turbine propelling mechanisms for vessels and has for its object improved economy in operation and the attainment of a powerful and quick reversing action.

Three parallel propeller shafts are provided. On each side shaft is mounted a comparatively rapid rotating turbine, which turbines are coupled in series, so that one constitutes a high pressure turbine, whereas the second constitutes an intermediate pressure turbine. On the middle shaft is mounted a comparatively slow rotating low pressure turbine, which receives steam from the intermediate pressure turbine. On said middle shaft is mounted a reversing turbine, which may be built together with the low pressure turbine. A third turbine may be mounted on the middle shaft, if desired, which when used, is coupled in front of the high pressure turbine.

The accompanying drawing shows the arrangement of the apparatus in plan view.

A, B and C are propeller shafts. A turbine H is mounted on shaft A, a turbine M on shaft B and a turbine L on shaft C. On shaft C in advance of turbine L may also be mounted a turbine K and with turbine L may be combined at E, a reversing turbine. D is the main steam pipe communicating with turbines H and K, and having a branch pipe U leading to the reversing turbine at E. Pipe connections, as shown, are provided between turbines H and K, H and M, and M and L. Turbines L and K are separately connected to the condenser P.

The apparatus may be operated in various ways as follows.

(1) Steam may be led to the turbine K only, and thence to condenser P. This turbine alone may thus be used if desired for ordinary cruising purposes.

(2) Steam may be led to turbine K, thence to turbine H, to turbine M, to turbine L and thence to the condenser P. Or, turbine K may be cut out altogether, steam passing directly to turbine H and thence to turbines M and L and condenser.

Turbine L is of large dimensions and is a low pressure turbine. The reversing turbine at E is also of large dimensions, but, as it may take steam directly from the branch pipe U, it may be operated with great power directly from the boiler.

It is, of course, to be understood that in the various connections, valves are to be provided for causing the steam to pass as desired. Such a valve is indicated at V which when shut cuts out turbine K, so that steam then proceeds, first, to turbine H, as indicated by the arrows.

By arranging the turbines H and M on the side shafts for comparatively rapid motion and for a smaller part of the total amount of power the advantage is gained, that said turbines, which are subjected to the highest pressure and the highest temperature, may have comparatively small dimensions. This will moderate deformations and displacements of the turbine casings, and make it possible to arrange tightenings between the rotating and the stationary parts conveniently. On the contrary the low pressure turbine L is arranged for comparatively slow motion and for a large amount of power, and is given for this reason comparatively large dimensions. As it however receives steam of low pressure from the intermediate turbine M it will not be subjected to the effects of too high temperature and hence to injurious deformations and displacements. Tightenings need moreover not be carefully arranged, as the pressure in the turbine is low.

Because of the comparatively slow motion of the middle shaft on which the reversing turbine E is mounted, the propeller on said shaft may have comparatively large dimensions, whereby the backward motion, which is performed only with the middle shaft, will be powerful.

I claim:

1. In a turbine propelling mechanism, three propeller shafts, a high pressure turbine on the middle shaft, an intermediate pressure turbine on each of the side shafts; the said turbines being arranged for rapid motion and for the utilization of a small part of the total amount of power, and a low pressure turbine mounted on the middle shaft and arranged for slow motion and for the utilization of a large part of the total amount of power.

2. In a turbine propelling mechanism, three parallel propeller shafts, a turbine on each shaft and connections whereby motor fluid is led successively to the turbines on the

outer shafts and then to the turbine on the middle shaft; the turbines on the outer shaft being constructed for rapid motion and utilization of a minor proportion of the total power expended and the turbine on the middle shaft being constructed for slow motion and the utilization of a major proportion of said power.

3. In a turbine propelling mechanism, a propeller shaft, a condenser, two turbines on said shaft, one of said turbines being of larger dimensions than the other, and connections for leading motor fluid directly from either turbine to said condenser, and a connection for leading the exhaust of the smaller turbine to the inlet of the larger turbine.

4. In a turbine propelling mechanism, a propeller shaft, and on said shaft a high pressure turbine and two turbines both of larger dimensions than said high pressure turbine, one of said two turbines being a reversing turbine, and independent connections for leading motor fluid from said high pressure turbine to said direct acting low pressure turbine and directly to said reversing turbine, a condenser, an independent connection for leading exhaust from said low pressure and reversing turbines to said condenser, and from said high pressure turbine to said condenser.

5. In a turbine propelling mechanism, three parallel propeller shafts, three turbines E, K, L, on the inner shaft, the turbine E being a reversing turbine, and one turbine H, M, on each of the outer shafts, connections for leading motor fluid successively to turbines H, M, L in the order named and a connection for leading motor fluid independently to turbine E; the said turbines L and E being of larger dimensions than the other turbines.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TORE GUSTAF EMANUEL LINDMARK.

Witnesses:
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