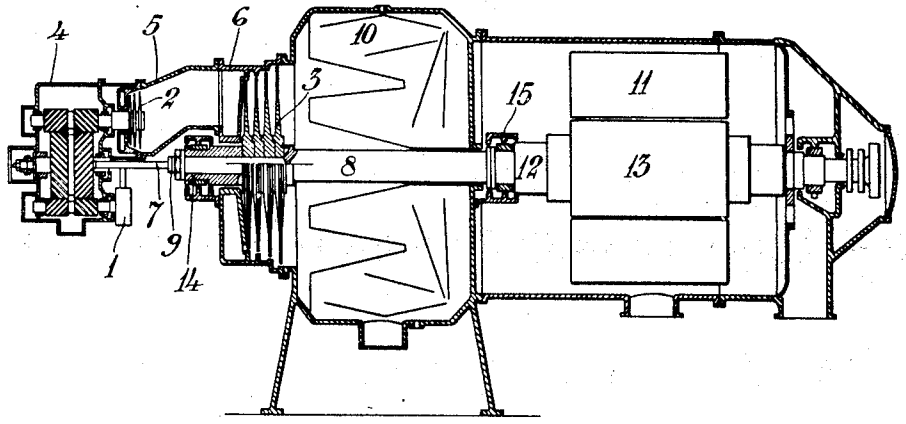
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TURBINE AGGREGATE

Filed March 25, 1924



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UNITED STATES PATENT OFFICE.

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TURBINE AGGREGATE.

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In turbine aggregates provided with condensers it has previously been proposed to arrange the condenser in such a way, that the shaft of the turbine passes through the condenser. By this arrangement the outlet of the turbine to the condenser will be very short. It has also been proposed to provide an electrical generator on the same shaft, which supports the blade system of the turbine aggregate. Constructions are also known, in which the electrical machine and the turbine are disposed at opposite sides of the condenser. However, such constructions are connected with several disadvantages due to variations in temperature of the different parts of the turbine aggregate. Such disadvantages arise especially in case of using a high initial pressure of the supply steam, and particularly in such cases, where the turbine aggregate comprises a plurality of turbines coupled in series, the turbines of the higher pressures being secured to shafts from which the power is transmitted to the slowest running shaft of the lower pressure turbine by means of toothed gearings. In such cases those parts, which are heated to very different temperatures, lie in relatively short distance from each other, and, consequently, the material might be jeopardized by stresses due to the variations in temperature occuring during operation, if the high pressure turbines, the low pressure turbines, the condenser and the electrical machine are disposed on separate bases.

The present invention refers to turbine aggregates of such a type and has for its object to avoid such stresses due to variations in temperature. To attain this object the housing of the electrical machine is rigidly secured to the housing of the condenser, which, consequently, supports the turbine aggregate as well as the electrical machine and is disposed on a base common to the aggregate as a whole.

The invention is shown diagrammatically in the single figure of the annexed drawing illustrating as an example a turbine aggregate according to the invention.

In the form of embodiment shown, the turbine aggregate consists of three blade systems 1, 2 and 3 forming high pressure, intermediate pressure and low pressure turbines, respectively. The turbines 1 and 2 working with back-pressure are assembled with a speed reducing toothed gearing to form a so-called high pressure system in the frame-work 4, which is suspended in a previously proposed manner by means of the discharge pipe 5 of the intermediate pressure turbine 2 in the inlet part 6 of the low pressure turbine 3. The speeds of the turbines 1 and 2 are reduced by means of a toothed gearing located in the frame-work 4 to the same speed, with which the low pressure turbine rotates. Thus, the shaft 7 of the toothed gearing of the high pressure system rotating with the lowest speed has the same speed as the shaft 8 of the low pressure turbine, so that the shafts 7 and 8 which are located co-axially may be directly connected at 9. By suspending, as above mentioned, the high pressure system with the discharge pipe 5 in the inlet part 6 of the low pressure turbine 3 and by making the shaft 7 so weak as to permit a certain resiliency, variations in the dimension, due to variations in temperature, may be allowed in the different parts of the aggregate. The steam passes first the turbines 1 and 2 in the succession mentioned above and then it passes the turbine 3, from which it is discharged to the condenser.

The condenser 10 is located adjacent the last blade rim of the low pressure turbine 3. It is apparent from the drawing that the exhaust steam passes directly into the condenser without changing the direction of movement. The discharge pipe of the low pressure turbine 3 will be very small or may be dispensed with entirely, so that the last blade rim of the low pressure turbine rotates in the proximity of or close to the condenser 10. The turbine shaft 8 passes through the condenser 10, which may be of any known type and provided with pumps and ejectors for the condensate and air. The turbine shaft 8 is connected directly to the rotor shaft 12 of the electrical generator 11. Thus, the condenser is located between the electrical generator and the turbine aggregate.

According to the invention the housing of the electrical generator 11 is rigidly secured to the housing of the condenser 10, to which the housing of the low pressure turbine 3 is also secured. The bearing 15 is common to the turbine and the generator,

and the bearings 14 and 15 of the turbine aggregate lie at opposite sides of the condenser 10.

According to the invention the condenser and the turbine aggregate may be located at the same height as the electrical machine. By this arrangement the machinist will be able to watch from a single place that everything is acting satisfactorily which is of great importance particularly in ship installations.

What I claim as new and desire to secure by Letters Patent of the United States of America is:—

1. A turbine aggregate comprising a turbine, an electrical generator and a condenser arranged between the turbine and the electrical generator, the housing of the electrical generator being directly secured to and supported by the housing of the condenser.

2. A turbine aggregate comprising a plurality of turbines driving the same shaft, an electrical generator secured on said shaft and a condenser arranged between the turbines and the electrical generator, the housing of the electrical generator being directly secured to and supported by the housing of the condenser.

3. A turbine aggregate comprising a turbine, an electrical generator and a condenser arranged between the turbine and the electrical generator, the housing of the electrical generator being rigidly and directly secured to and supported by the housing of the condenser, bearings for said turbine and electrical generator, one of said bearings being common to the turbine and the electrical generator.

4. A turbine aggregate comprising a turbine, an electrical generator and a condenser arranged between the turbine and the electrical generator, the housing of the electrical generator being directly secured to and supported by the housing of the condenser, bearings for said turbine and said electrical generator, the bearings of the turbine lying on opposite sides of the condenser and being supported by the condenser.

In testimony whereof I affix my signature.

FREDRIK LJUNGSTRÖM.