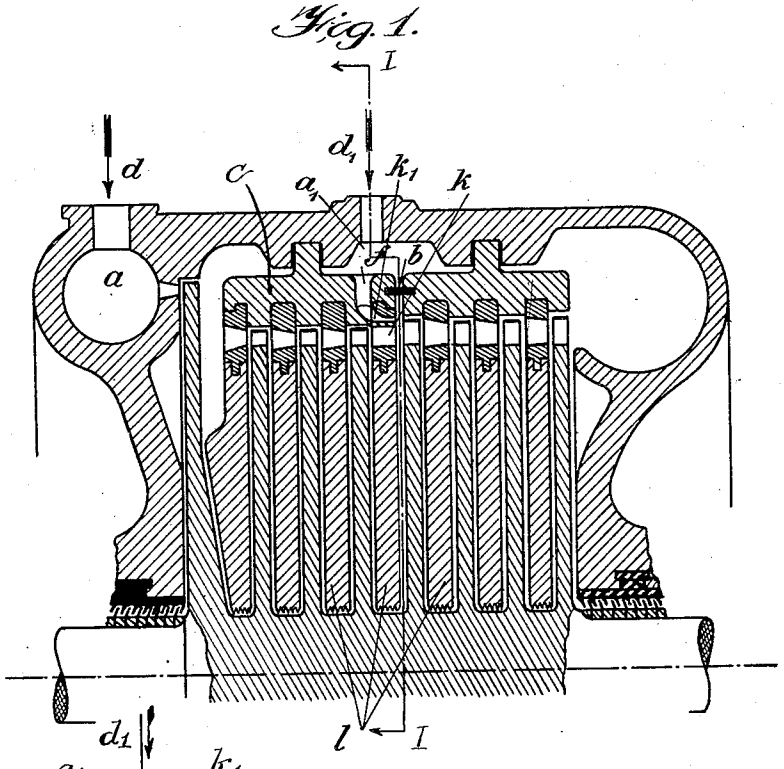
April 19, 1927. 1,625,263

F. LÖSEL

ELASTIC FLUID TURBINE

Filed Aug. 4, 1923

Fig. 1.



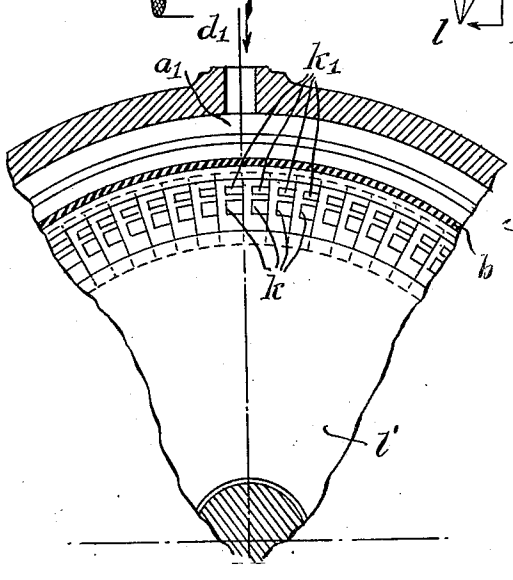


Fig. 2.

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UNITED STATES PATENT OFFICE.

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ELASTIC-FLUID TURBINE.

Application filed August 4, 1923, Serial No. 655,723, and in Austria April 30, 1923.

This invention relates to elastic fluid turbines, in which additional driving fluid is introduced into one or more intermediate stages.

The main object of the invention is to provide means by which disturbances in the current conditions are avoided, at the point where the additional driving fluid is introduced, so that obstruction to the main flow of the elastic fluid, shocks, undesirable thrust, whirls and eddy currents cannot occur.

The invention consists substantially in the provision of guide ducts or guide channels for additional driving fluid in the same blades in which are the guide ducts or guide channels for the driving fluid of the axial or main flow and arranged towards their exit ends parallel to the flow of the driving fluid through the main flow guide ducts or guide channels, so that the additional driving fluid is introduced into the next row of blades in a direction parallel with the direction of flow of the main driving fluid passing through the main guide ducts or guide channels.

Preferably the blading of an intermediate guide stage is composed of a series of separate blades in each of which are provided a passage for the main or axial flow and a separate passage for the flow of the additional driving fluid. Such guide blades are comparatively easy to make and will function with the greatest accuracy, thus the construction of the other parts of the turbine is rendered extremely simple.

In the accompanying drawings—

Fig. 1 is a view in longitudinal section illustrating one embodiment of the invention;

Fig. 2 is a view in transverse section taken on the line I—I of Fig. 1.

a is the live steam chamber, d is the inlet for the live steam, and l indicates the guide stages. The additional steam enters through the inlet d_1 into the steam chamber a_1. In the guide stage l', into which the additional steam is introduced, guide passages k are provided for the steam already performing work in the turbine and immediately next to these passages special guide passages k_1 for the additional steam are arranged. The guide passages k_1 for the additional steam communicate by means of ducts or passages f in the diaphragm carrier c with the chamber a_1 for the additional steam, which is separated from the interior of the turbine, for instance by a packing ring b.

The main current of the live steam coming from the chamber a flows through the turbine in a known manner and mixes in the rotor and guide stages following the guide stage l', with the additional steam entering the turbine through the guide passages k_1. In the preferred embodiment of the invention shown in the drawing, the guide-stage l' consists of a series of separate blades, in which the passages k and k_1 for the driving fluid are provided.

The additional steam may be live steam taken from the main steam chamber a and passed around the first section of the turbine or stages lying before the stage l', into the chamber a_1, or from the main live-steam-pipe by means of a branch-pipe (not shown), into the duct or ducts d_1. This arrangement is important, for instance, in case of overload, as it makes it possible to pass the necessary excess of the high-pressure steam into the intermediate stage. Steam of any kind may, however, be introduced in the guide stage l', as in the case of mixed pressure turbines.

Additional steam may be introduced at other stages of the turbine by means of the same or similar kind of ducts as shown in the drawing in connection with the stage l'.

By this means the following improvement is effected, namely that the introduction of the additional driving fluid does not interfere with the flow of driving fluid already performing work in the turbine, thus avoiding considerable losses. The mixing of the driving fluid takes place subsequent to the stage l', the point of introduction of the additional driving fluid in the direction of flow, the additional stream and the main stream acting on each other similar as in an ejector. The mixing of the driving fluid in turbines constructed in accordance with the invention takes place practically without loss during the working process of the steam jets in the rotor and guide passages.

What I claim is:—

1. In an elastic fluid turbine of the multi-stage type, means for admitting additional driving fluid to an intermediate stage, said means being adapted to introduce the additional fluid into the main flow of the driving fluid substantially parallel with the axial direction thereof and including a series of

separate guide blades in which are provided two guide channels, one for the main driving flow and the other for the additional driving fluid, and a carrier body within the turbine casing and with which are connected said separate guide blades.

2. An elastic fluid multistage turbine comprising stationary bladings and rotor wheels therebetween, means for admitting additional driving fluid into an intermediate stage of the turbine parallel with the axial direction of flow of the main driving current, said means being arranged in said intermediate stage, receiving the additional driving current and including the stationary blading of said intermediate stage which consists of a series of separate blades provided with two parallel channels of which one is adapted to receive the main driving current from the previous stage and the other to receive the additional driving current, to introduce both currents, flowing in parallel, into the blading of the next rotor wheel of the turbine, and a separate rotor enclosing carrier body within the turbine enclosing said stationary blading of said intermediate stage.

3. An elastic fluid multistage turbine comprising an intermediate stage having a partition, and at the periphery of said partition guide blading consisting of a series of separate blades, in each of which are provided two guide channels having parallel parts at their exit ends; a separate rotor enclosing casing part having a groove in which are inserted the outer ends of said blades; an outer casing having a groove in which is inserted said rotor enclosing casing part, and means including a series of ducts for introducing an additional quantity of driving fluid into the outer channels of the guide blades of said intermediate stage of the turbine.

4. In an elastic fluid multistage disc wheel turbine, an intermediate stage comprising a diaphragm provided with guide blading consisting of a series of separate individual blades having two adjoining guide passages arranged in parallel for the main and additional currents of driving fluid respectively, a separate rotor enclosing casing portion with which said blades are connected, and means for introducing additional currents of driving fluid including ducts leading from the outside of the turbine through said separate casing portions to the outer ducts in said blades.

5. In an elastic fluid multistage turbine, a rotor enclosing carrier body, an intermediate stage comprising a diaphragm and blading arranged on the periphery of such diaphragm to form pairs of nozzles with parallel exit parts, the blading consisting of a series of separate individual guide blades, each of which has two guide channels, one for the main flow of elastic fluid and the other for the introduction of additional fluid, said blading being inserted at its outer periphery into the rotor enclosing carrier body within the turbine.

6. In an elastic fluid turbine of the multistage type, a separate rotor enclosing casing located within an outer casing and having provision for admission of additional driving fluid, an intermediate stage comprising a diaphragm and a series of separate guide blades connected at their inner periphery with the diaphragm and at their outer periphery with the rotor enclosing casing, each of said separate guide blades being provided with a guide channel for the main current of flow and an outer auxiliary guide channel for an additional current of flow added thereto to provide adjoining parallel guide channels for guiding the two currents in parallel into the next following blades.

7. In an elastic fluid turbine of the multistage type comprising a diaphragm and a blading consisting of a series of separate individual blades mounted on the periphery of said diaphragm and having therein stationary guide channels for main driving fluid and stationary guide channels for additional driving fluid arranged at their exit ends parallel to the exit ends of the main guide channels, so that the additional driving fluid flows in parallel direction with the main driving fluid into the next following blades of the separate rotor wheels, a rotor enclosing stationary part connected with said blades at their outer ends, and means for admission of such additional fluid through said separate rotor enclosing stationary part to the intermediate stage.

8. In an elastic fluid turbine of the multistage type, an intermediate stage provided with stationary guides for the main driving fluid and stationary guides for the additional driving fluid separated from the statonary guides for the main driving fluid by walls to form parallel channels for discharging the main and additional driving fluid streams into the next rotating channels in parallelism, and a separate rotor enclosing part having provisions for admission of additional driving fluid from the outside thereof to said intermediate stage.

9. In an elastc fluid turbine of the multistage type, an intermediate stage provided with stationary guide channels for the main driving fluid and with stationary guide channels for additional driving fluid, the exit parts of the latter being arranged parallel to the exit parts of the main channels and separated therefrom by single walls to cause the additional driving fluid to enter the next succeeding rotatable blading in parallelism with the flow of the main driving fluid, said guide channels being formed in a series of separate guides each of which has one guide channel for the main driving

fluid and one guide channel for the additional driving fluid, a separate rotor enclosing casing portion with which said blades are connected and means for admitting additional driving fluid to said intermediate stage.

10. In an elastic fluid turbine of the multistage disc wheel type, an intermediate stage having guide blade pieces forming the blading thereof and consisting of a series of separate blades each of which is provided with two separate channels, one for the main driving fluid and another for the additional driving fluid, both channels in each blade piece being separated by a partition wall and said guide blade pieces being connected at one end with a diaphragm and on the other side with a stationary carrier within the turbine and means for the admission of additional driving fluid to said intermediate stage.

11. In an elastic fluid turbine of the multistage type, an outer casing, an intermediate stationary stage comprising a series of separate blades each of which contains a guide duct for the main driving fluid and a guide duct for the additional driving fluid, carriers for the guide blades within said outer casing and means for admitting additional fluid to the intermediate stage, the main and additional guide ducts being so arranged with respect to each other that the additional driving fluid enters the next succeeding rotating channels in the same direction and in parallelism with the main stream of the driving fluid.

12. In an elastic fluid turbine of the multistage type, an outer casing, carriers for the stationary guide means located within said outer casing, means for introducing additional driving fluid leading to an intermediate stationary stage having ducts for the main driving fluid and guide ducts for the additional driving fluid, an entrance into the casing for the additional driving fluid being provided between two carriers leading to a separate chamber formed by said two carriers and an outer casing, passages leading from said chamber to said additional guide ducts, small strips separating the additional guide ducts from the main guide channels and packing means connecting the two carriers across the clearance space between them to form a closure for said clearance space and said separate admission chamber.

13. In an elastic fluid turbine, a casing, a separate carrier body within said casing and spaced therefrom for the admission of fluid therebetween and stationary guide means carried by said carrier body at an intermediate stage, said casing and said carrier body being provided with an auxiliary elastic fluid admission passage extending through the casing and through said carrier body to said intermediate stage.

14. In an elastic fluid turbine a casing, separate carrier bodies therein and spaced therefrom for the admission of steam therebetween, and stationary guide nozzles mounted in said carrier bodies at an intermediate stage of the turbine, said casing and said carrier bodies being provided with auxiliary admission passages leading through the casing and to the interior of said carrier bodies to the guide nozzles of said intermediate stage.

15. In an elastic fluid turbine, a casing, a separate carrier body fixed to the interior of said casing and spaced therefrom to permit the admission of steam therebetween, and stationary guide nozzles carried by the carrier body, said casing and said carrier body having an auxiliary intake leading from the exterior of the casing through the same and through the carrier body, and one of the stationary guide nozzles having an auxiliary guide canal adjacent the main guide canal therein and receiving elastic fluid directly from the auxiliary intake, both of said guide canals delivering elastic fluid to a rotating bucket.

16. In an elastic fluid turbine, a casing, a separate inner carrier body secured to said casing and spaced therefrom for the admission of fluid therebetween, said casing and carrier body having an auxiliary fluid intake leading from the exterior of the casing through the same and to the interior of the carrier body at an intermediate stage, stationary guide means carried by said body at said intermediate stage, and sealing means on opposite sides of the auxiliary fluid intake.

In testimony whereof I have signed my name to this specification.

FRANZ LÖSEL.