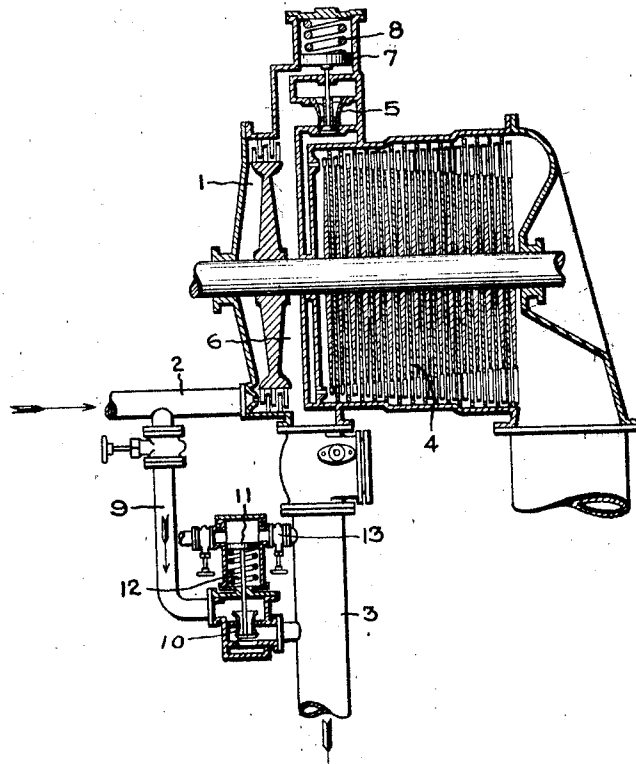


L. CUBELIC.
 TAPPED TURBINE.
 APPLICATION FILED JAN. 22, 1913.

1,063,513.

Patented June 3, 1913.



Witnesses:

Marcus L. Byng
J. Ellis Glen

Inventor,
 Ludwig Cubelic,
 by *Alfred H. Davis*
 Att'y.

UNITED STATES PATENT OFFICE.

LUDWIG CUBELIC, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

TAPPED TURBINE.

1,063,513.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed January 22, 1913. Serial No. 743,550.

To all whom it may concern:

Be it known that I, LUDWIG CUBELIC, a subject of the King of Prussia, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in Tapped Turbines, of which the following is a specification.

This invention relates to elastic fluid turbines, and especially to those in which a certain portion of the steam, after passing the high pressure stage or stages of the machine, is led off to supply heating or other industrial systems. Such turbines are frequently provided with an automatic overflow valve, which regulates the admission of the surplus steam to the low pressure portion of the turbine. When the demand of the heating system is greater than the turbine can supply, it is customary to supply fresh steam at boiler pressure to the extraction pipe through an automatically opening auxiliary valve. In this arrangement, however, unless special precautions are taken, high pressure steam will continue to enter the extraction pipe even when the turbine regains its capacity for furnishing the entire amount called for by the heating system. This of course entails a loss of energy, because the steam which goes directly to the heating system performs no useful work in the turbine. Moreover, in case of an overload, or even of an increasing load on the turbine, the high pressure steam may enter through the extraction pipe and flow to the low pressure stages without first passing through the high pressure wheels.

My invention aims to overcome these difficulties by carefully proportioning the overflow valve and the auxiliary valve which admits high pressure steam to the extraction pipe so that the latter will not open until after the former has closed, and will close before the overflow valve opens.

The accompanying drawing is a diagrammatic section of a tapped turbine embodying my invention. High pressure steam is supplied to the first stages 1 of the turbine through a main 2. The extraction pipe 3 is led off from that portion of the turbine between these stages and the low pressure stages 4 of the turbine. The overflow valve 5 which controls the flow of steam from the extraction chamber 6 to the low pressure wheels is regulated automatically by the pressure in said chamber acting against the

piston 7 and the spring 8. With an increasing demand for heating steam and a consequent drop in pressure in the chamber 6, the valve 5 will close, to reduce the amount of steam taken by the low pressure stages, and will thus tend to maintain the normal pressure in the chamber 6. A branch pipe 9 leads from the main 2 to the extraction pipe 3, and is controlled by an auxiliary valve 10 which is responsive to the pressure in said pipe 3; the heating steam acting upon a piston 11 and spring 12 to keep said valve 10 closed when the heating steam pressure exceeds a certain value. If the pressure drops, said valve will be opened by the spring to admit high pressure steam to the heating system.

By means of a throttle valve 13 the effective pressures on the piston 11 can be so regulated with reference to the pressures on the piston 7 of the overflow valve that with a rising pressure in the heating system the valve 10 will close before the valve 5 opens, while with a falling heating pressure the overflow valve will close before the auxiliary valve 10 opens. This effect is due to the fact that the spring 12 is weaker than the spring 8, so that it will yield to the pressure before the latter does. The throttle valve 13 enables the attendant to regulate this action to a nicety by lessening or increasing the effective pressure on the piston 11. In this way all danger of high pressure steam reaching the low pressure wheels by way of the branch pipe 9 is obviated, and the leakage of high pressure steam into the heating system at the time when the turbine is able to supply all that is needed is prevented.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. A tapped turbine provided with an overflow valve controlling the flow of steam to the low pressure portion of the machine, a valve controlling a supply of high pressure steam to the extraction pipe, and means

for regulating the operations of said valves so that the overflow valve will close before the auxiliary valve opens and the latter will close before the former opens.

5 2. A tapped turbine provided with an overflow valve automatically controlling the flow of steam to the low pressure portion of the machine, an auxiliary valve controlling the supply of high pressure steam to the ex-
10 traction pipe, means rendering said auxiliary valve responsive to the pressure in the extraction pipe, and means for regulating the effect of such pressure on said valve, whereby it will not open until after the
15 overflow valve has closed, and will close before the overflow valve opens.

3. A tapped turbine provided with an overflow valve automatically controlling the flow of steam to the low pressure portion of the machine, an auxiliary valve controlling 20 a branch main leading from the high pressure main to the extraction pipe, a spring-actuated piston for operating said valve, a pipe conveying pressure from the extraction pipe to said piston, and a throttle valve 25 controlling the admission of such pressure.

In witness whereof, I have hereunto set my hand this 6th day of January, 1913.

LUDWIG CUBELIC.

Witnesses:

FRIEDRICH GANZERT,
OTTO SCHMIDT.