

UNITED STATES PATENT OFFICE.

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UTILIZING WASTE STEAM.

1,020,704.

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To all whom it may concern:

Be it known that I, WALTER KIESER, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Utilizing Waste Steam, of which the following is a specification.

This invention relates to machines in which a rotating shaft passes through the wall of a steam chamber. One instance of such a structure is found in a steam turbine. The shaft is usually provided with a stuffing box to prevent excessive leakage of steam, but a difficulty which makes itself felt in these machines is that in the case where the chamber contains steam of high pressure, the leakage steam not only condenses on adjacent parts of the machine, causing unsightly deposits, but it is also entirely lost so far as further use is concerned. Moreover, if the turbine is operating with low-pressure steam or with a vacuum and the stuffing box is packed with steam to prevent the entrance of air under atmospheric pressure, sufficient high pressure steam must be introduced into the stuffing box to pass out at the end thereof in order that the engineer may know that the packing is operative. If the supply of steam is so small that it is all sucked into the turbine casing then the engineer has no way of determining the condition of the packing and its degree of efficiency. To overcome these difficulties, I admit sufficient steam to the stuffing box to produce a certain amount of leakage, but I provide means for utilizing this leaking steam in a suitable manner; such, for instance, as the heating of feed water, in order to conserve the heat of the waste steam. The constant flow of the water produced by the condensation of said leakage steam is a visible indication to the engineer that the packing is in working order.

The accompanying drawing illustrates an embodiment of my invention in a steam turbine.

Steam is supplied to the turbine casing 1 through a pipe 2, and exhausts through the conduit 3. The turbine shown is a reaction turbine and its shaft 4 passes out of the casing through a stuffing box 5 which leaves a small annular space 6 around the shaft through which a portion of the exhaust steam can escape. It is caught in an annular groove 7 surrounding the stuffing box

and communicating therewith. From said groove it is led by a pipe 8 to some apparatus for utilizing it; for example, a feed water heater 9, in which there is a coil of pipe 10 connected with the pipe 8. The steam gives up its heat to the feed water and is condensed. A three-way cock 11 in the continuation of the pipe 8 beyond the feed water heater enables the water of condensation to be directed into a pipe 12 extending through the cover of the feed water reservoir 13, so that said water also will be utilized. The feed water enters the heater through a pipe 14, becomes heated as it rises to the top, and flows off through a pipe 15 to the reservoir, from which it passes by a pipe 16 to the boiler.

If the turbine is not, as shown in the drawing, a non-condensing turbine, but one operating with a condenser, steam from a stage or other region of suitable pressure must be supplied through a special pipe 17 to one end of the low pressure stuffing box, and passes thence to the condensing coil 10. An important advantage in this connection is the fact that at any time, notwithstanding the utilization of the leakage steam, the efficiency of the steam packing in the stuffing box can be observed and regulated. This is a valuable feature because the supply of stuffing box steam varies a great deal, usually in accordance with the load on the turbine. To obtain this result, it is simply necessary to turn the three-way cock 11 so that the water of condensation instead of dropping through the pipe 12 flows from the open end of the pipe 8 and drops through the opening 18 in the top of the reservoir 13. It is thus visible at all times to the engineer, and if the pressure or the amount of the stuffing box exhaust is not sufficient to prevent the entrance of air into said box, the water will stop dripping from the pipe 8. The engineer will then have to increase the supply of steam to the stuffing box until the flow of condensation water is resumed. It is desirable to arrange the feed water heater coil and the discharge therefrom as low as possible below the stuffing box in order to effect a satisfactory dropping of the water of condensation. Instead of utilizing the water as a visible signal some other form of alarm may be actuated thereby, or be released when the water ceases to flow, as will be readily apparent to the skilled engineer.

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. The combination with a steam turbine having a stuffing box permitting the leakage of steam, of means for utilizing such steam after it leaves said stuffing box, and a device for indicating flow of steam from the stuffing box to said means.

2. The combination with a steam turbine having a stuffing box permitting leakage of steam, of a pipe for conveying away the waste steam, means for condensing said steam, and a device for indicating the quantity of water of condensation.

3. The combination with a steam turbine having a stuffing box permitting leakage of steam, of a pipe for conveying away the waste steam, means for conserving the heat

of said steam consisting of a feed water heater containing a coil of pipe connected to said waste steam pipe, and a device for observing the flow of the water resulting from the condensation of the steam in the coil.

4. The combination with a steam turbine having a stuffing box permitting a leakage of steam, of a pipe for conveying away the waste steam, means for condensing the steam in said pipe, and means whereby the water of condensation serves to indicate the condition of said stuffing box as to operativeness.

5. The combination with a turbine having a steam stuffing box, of a pipe for conveying away the waste steam, a feed water heater through which the pipe passes, a tank receiving feed water from the heater, and means for visibly discharging the water of condensation from the pipe into the tank.

In witness whereof, I have hereunto set my hand this 22nd day of September, 1910.

WALTER KIESER.

Witnesses:

FRANZ KLESCRUER,
HERMANN HILLE.