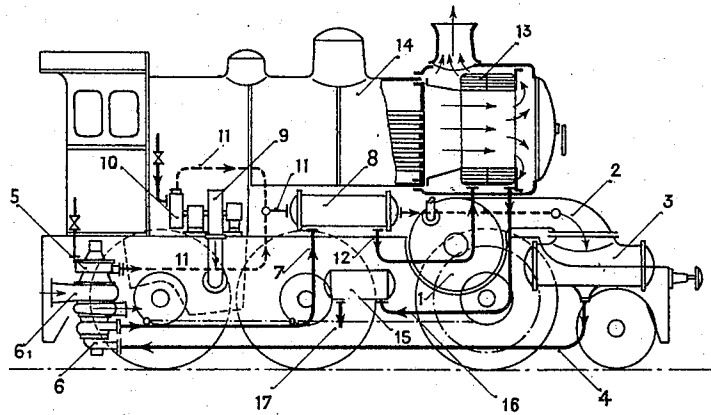


C. KOHLER,
DEVICE FOR THE RECUPERATION OF AVAILABLE HEAT ON STEAM LOCOMOTIVES PROVIDED
WITH SURFACE CONDENSERS.

APPLICATION FILED SEPT. 25, 1919.

1,342,544.

Patented June 8, 1920.



Inventor
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UNITED STATES PATENT OFFICE.

CONRAD KOHLER, OF ZURICH, SWITZERLAND.

DEVICE FOR THE RECUPERATION OF AVAILABLE HEAT ON STEAM-LOCOMOTIVES
PROVIDED WITH SURFACE CONDENSERS.

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Specification of Letters Patent.

Patented June 8, 1920.

Application filed September 25, 1919. Serial No. 326,338.

To all whom it may concern:

Be it known that I, CONRAD KOHLER, a citizen of the Republic of Switzerland, residing at Hardturmstrasse 19, Zurich, Switzerland, have invented certain new and useful Improvements in Devices for the Recuperation of Available Heat on Steam-Locomotives Provided with Surface Condensers; and I do hereby declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to a device for the recuperation of available heat on a steam locomotive provided with a surface condenser. According to this invention the condensed steam discharged by the surface condenser is forced at first through a recuperator or feed heater heated by the exhaust steam of auxiliary machines of the locomotive and then through a recuperator or feed heater heated by the flue or combustion gases of the boiler and is finally pumped into the boiler.

At the present time electric locomotives are introduced more and more in the railway traffic because it is found that the working with electric locomotives is, at least in countries where water powers are available and coal is expensive, more economical than the working with steam driven locomotives. Electric locomotives are however dependent on at least one central power plant. Consequently, all locomotives are stopped when the central power plant or the intermediate conduits fail to deliver power. Owing to this, it is still preferred, particularly also for military reasons, not to centralize the delivery of the power required for the working of railways and to drive each single locomotive independently of the other ones. This is only possible, however, when using steam locomotives. It is therefore the task of the railway engineers to design steam locomotives working in a more economical manner and to take advantage in the best possible way of any available energy of heat. This task is fulfilled by a device designed according to the present invention.

The accompanying drawing illustrates by way of example a diagrammatic side view of

a locomotive driven by a steam turbine and provided with a surface condenser.

1 designates the main steam turbine driving the locomotive. The exhaust steam of this turbine 1 is discharged through the connecting pipe 2 into the surface condenser 3. The water of condensation or condensed steam collecting on the bottom of this condenser 3 is drawn through a pipe 4 covered with non-conducting material by a pump 6 driven by an auxiliary turbine 5 and it is then discharged through a pipe 7, also covered with non-conducting material, into a recuperator or feed heater 8. The latter is heated by the exhaust steam of the auxiliary turbines 5 and 10, which drive the pumps 6, 6' and the fan 9 respectively, the exhaust steam being supplied to said feed heater 8 through the pipe 11. The water of condensation heated in the recuperator 8 to a higher temperature could now be fed into an intermediate tank or reservoir 15 connected to the boiler feed pump. In order to heat however said water of condensation to a still higher temperature, it is fed from the recuperator 8 through the pipe 12 covered with non-conducting material into a second recuperator or feed heater 13 which is heated by the flue or combustion gases of the boiler 14 of the locomotive. It is only from this second recuperator or feed heater 13 that the water of condensation or the condensed steam is supplied through the pipe 16 into the intermediate tank 15 connected to the boiler feed pump by means of the pipe 17. The pipes 16 and 17 are also covered with non-conducting material. When the water of condensation discharged from the surface condenser 3 has for instance a temperature of 50° C., it can be heated in the first feed heater or recuperator 8 up to 80°-90° C. and in the second feed heater or recuperator 13 up to 130° C., so that it contains a much greater quantity of heat energy than in the case in which it would be directly used after leaving the surface condenser 3 for feeding the boiler of the locomotive. When required, additional water can be supplied to the condensed steam contained in the intermediate tank 15.

I claim:

1. In a locomotive driven by a steam-power engine and provided with a surface condensing plant, which plant comprises auxiliary machines driven by steam-power

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engines and means for reconveying the condensed steam into the boiler of the locomotive, a device for heating the condensed steam that has to be conducted from the surface condenser back into the boiler, said device comprising a feed heater heated by the exhaust steam of said auxiliary machines, a feed heater heated by the combustion gases of the boiler, and means for conducting the condensed steam successively through said two feed heaters.

2. In a locomotive driven by a steam-power engine and provided with a surface condensing plant, which plant comprises auxiliary machines driven by steam-power engines and means for reconveying the condensed steam into the boiler of the locomotive, a device for heating the condensed steam that has to be conducted from the surface condenser back into the boiler, said device comprising a first feed heater heated by the exhaust steam of said auxiliary machines, and a second feed heater heated by the combustion gases of the boiler, said second feed heater being arranged in series with the first feed heater.

3. In a locomotive driven by a steam-power engine and provided with a surface condensing plant, which plant comprises auxiliary machines driven by the steam-power engines and means for reconveying the condensed steam into the boiler of the locomotive, a device for heating the condensed steam that has to be conducted from the surface condenser back into the boiler, said device comprising a feed heater heated by the exhaust steam of said auxiliary machines, a feed heater heated by the combustion gases of the boiler, means permitting the condensed steam to pass successively through said two feed heaters, and an intermediate tank arranged behind said two feed heaters and from which the heated condensed steam is drawn out by the pump forcing it into the boiler.

In testimony that I claim the foregoing as my invention I have signed my name.

CONRAD KOHLER.

Witnesses:

ARNOLD LEHNER,
JEAN SCHAAD.