

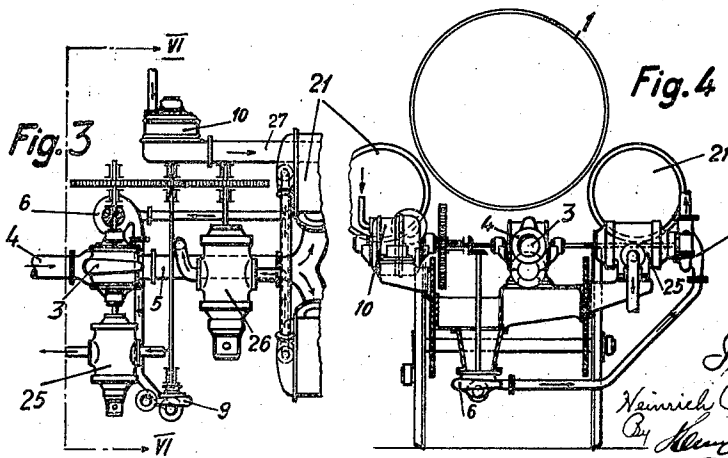
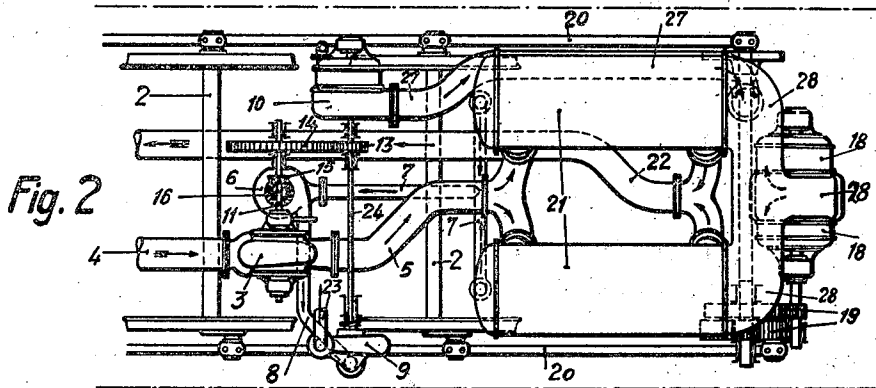
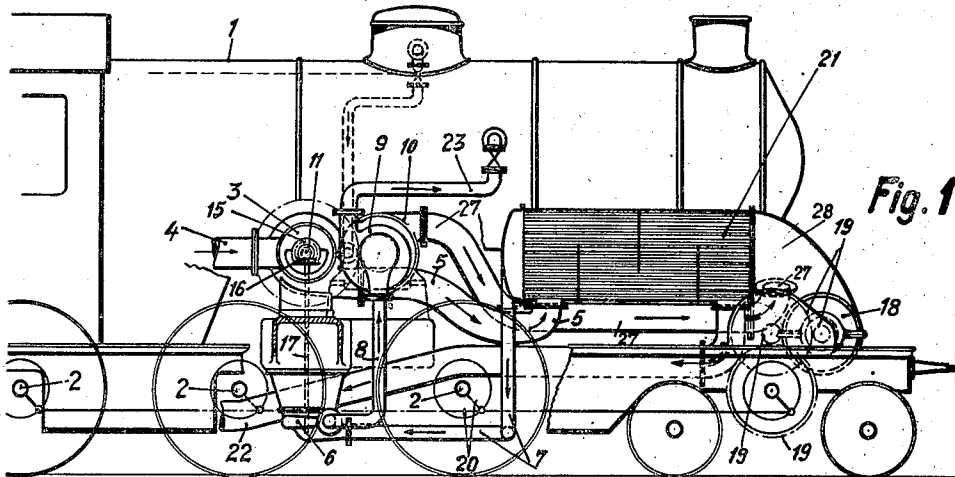
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H. BOLTSHAUSER

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STEAM LOCOMOTIVE

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Inventor
Heinrich Boltshauser,
att.

UNITED STATES PATENT OFFICE.

HEINRICH BOLTSHAUSER, OF ZURICH, SWITZERLAND.

STEAM LOCOMOTIVE.

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To all whom it may concern:

Be it known that I, HEINRICH BOLTSHAUSER, a citizen of the Republic of Switzerland, residing at Zurich, Switzerland, have invented certain new and useful Improvements in Steam Locomotives, of which the following is a specification, reference being had therein to the accompanying drawing.

With steam-locomotives working with condensation the quantity of water of condensation to be dealt with and the quantity of feed water to be forced into the boiler may vary considerably according as the locomotive stands still or runs under full load. If therefore the pump for water of condensation and the boiler feed pump are driven by separate engines the latter need continuous supervision and have to be adjusted by the driver according to the output they have to deliver. This is a considerable drawback as either the attention of the attendants is diverted from other important things or an uneconomical working of the engines driving these pumps has to be taken into account. This drawback can of course be overcome by providing the driving engines with a regulating device. However, the construction of these engines gets more complicated.

In order to do away with these disadvantages with the arrangement according to the present invention an auxiliary steam power engine driving the circulating pump for the cooling water utilized in the condenser serves at the same time to drive the pump for the water of condensation and the boiler feed pump. The power required for driving the condensate pump and the boiler feed pump amounts only to a fraction of the power required by the circulating pump. In consequence thereof with an unaltered supply of steam to the auxiliary steam power engine the condensate pump and the boiler feed pump may run idle without having to fear a racing of the auxiliary steam power engine. As the circulating pump runs continuously the auxiliary steam power engine needs no special attention with the arrangement according to the present invention.

The auxiliary steam power engine may further drive an air pump for the automatic air brake, which also has not to deliver constantly.

The auxiliary steam power engine may be designed as a turbine and all the pumps may be of the centrifugal type.

Constructional examples of the subject matter of the present invention are illustrated on the accompanying drawings, in which:

Fig. 1 shows partly in a front elevation and partly in a vertical cross-section a locomotive working with condensation and provided with the arrangement according to the present invention for driving the auxiliary machines.

Fig. 2 is a plan view of Fig. 1 with the locomotive boiler having been removed.

Fig. 3 shows in a plan view a modified arrangement and

Fig. 4 is a section along line IV—IV of Fig. 3.

In the drawings 1 denotes the locomotive boiler and 2 are the driving axles of the locomotive which are driven by a steam turbine 18 through a toothed gearing 19 and a parallel crank gear 20. 3 designates a circulating pump for the cooling water utilized in the condenser, which pump sucks the cooling water through the branch 4 from a container not shown and delivers it through the branch 5 to a condenser 21 which consists of two parts, from where it flows back to the aforementioned container through the pipe 22. 6 denotes a pump for the water of condensation which sucks the condensate through the conduit 7 and delivers it through the conduit 8 to a boiler feed pump 9 by which it is forced into a conduit 23. The pumps 3, 6 and 9 are driven by the auxiliary steam turbine 10 which is connected by the conduit 27 to the exhaust steam branch 28 of the main turbine 18. The feed pump 9 is directly driven by the shaft 24 of the auxiliary turbine (Fig. 2). The circulating pump 3 is driven by a shaft 11 to which rotary movement is imparted from the turbine shaft 24 by means of the gear wheels 13, 14 (Fig. 2). The drive of the condensate pump 6 is effected from the intermediate shaft 11 driven by the auxiliary turbine 10 by the interposition of the bevel gearing 15, 16 and shaft 17.

As is shown in Figs. 3 and 4, the turbine 10 may, if required, drive an air pump 25 for an automatic air brake and a vacuum air pump 26 for the condenser 21 besides

the pumps 3, 6 and 9. For sake of clearness the vacuum air pump is only shown in Fig. 3.

The pumps 3, 6, 9 are preferably of the centrifugal type. Instead of a steam-turbine any other suitable steam power engine may be provided for actuating the auxiliary machines.

I claim:

- 10 1. In a steam-locomotive in combination a steam power engine for driving the locomotive, a condenser for said steam power engine, a circulating pump for the cooling water utilized in the condenser, a pump for the water of condensation, a boiler feed pump, and an auxiliary power engine driving said circulating pump, said pump for the water of condensation and said boiler feed pump.
- 20 2. In a steam-locomotive in combination a steam power engine for driving the locomotive, a condenser for said steam power engine, a circulating pump for the cooling water utilized in the condenser, a pump for the water of condensation, a boiler feed pump, an air pump, and an auxiliary power engine driving said circulating pump, said pump for the water of condensation, said boiler feed pump and said air pump.
- 30 3. In a steam-locomotive in combination a steam-power engine for driving the locomotive, a condenser for said steam engine, a circulating pump of the centrifugal type for the cooling water utilized in the condenser, a pump of the centrifugal type for the water of condensation, a boiler feed pump of the centrifugal type, and an auxiliary steam turbine driving said circulating pump, said pump for the water of condensation and said boiler feed pump.

4. In a steam-locomotive in combination a steam power engine for driving the locomotive, a condenser for said steam power engine, a circulating pump for the cooling water utilized in the condenser, a pump for the water of condensation, a boiler feed pump, an air pump for an automatic air brake, and a vacuum air pump, and an auxiliary power engine driving said circulating pump, said pump for the water of condensation, said boiler feed pump, said air pump for an automatic brake and said vacuum air pump.

5. In a steam-locomotive in combination a steam power engine for driving the locomotive, a condenser for said steam-power engine, a circulating pump for the cooling water utilized in the condenser, a pump for the water of condensation, a boiler feed pump, an air pump for an automatic air brake and a vacuum air pump, and an auxiliary steam-turbine driving said circulating pump, said pump for the water of condensation, said boiler feed pump, said air pump for an automatic brake, and said vacuum air pump.

6. The combination in a condensing steam locomotive; of a steam power engine, a condenser for said engine, an auxiliary power engine, a pump driven by said auxiliary power engine for circulating the cooling water from the condenser, and a plurality of other pumps also driven from said auxiliary power engine, one of which pumps is a vacuum air pump for removing air from the condenser.

In testimony whereof I affix my signature.

HEINRICH BOLTSCHAUER.