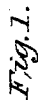


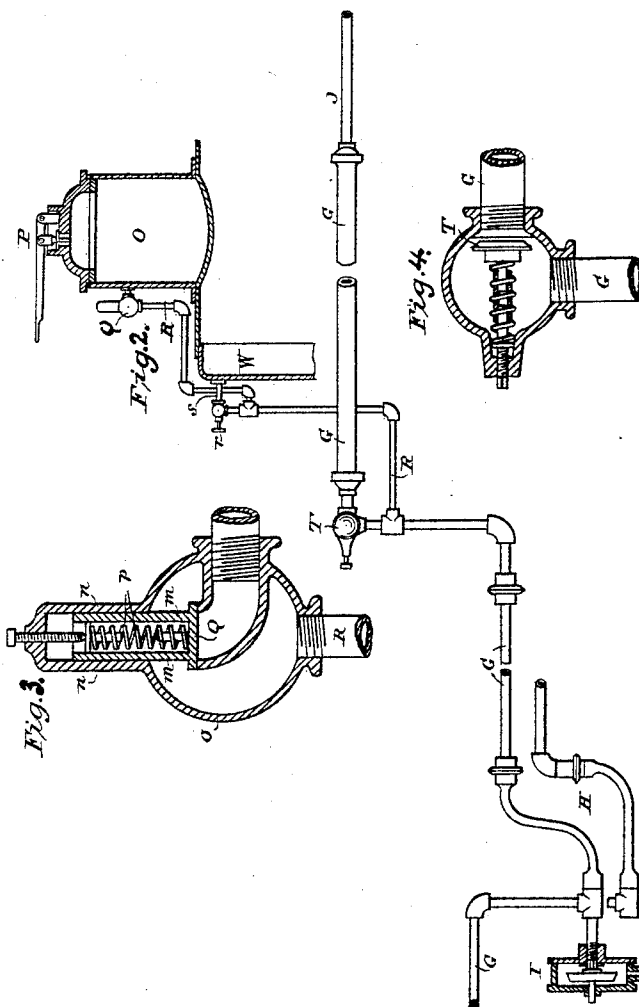
C. H. ROBINSON.
STEAM HEATING APPARATUS.

Patented Jan. 26, 1892.



Witnesses

Jos. S. Latimer
Maude H. Howlett.



Inventor

Charles Henry Robinson

by Arthur S. Brown
his Attorney

UNITED STATES PATENT OFFICE.

CHARLES H. ROBINSON, OF ST. PAUL, MINNESOTA, ASSIGNOR TO ARTHUR S. BROWN, OF WASHINGTON, DISTRICT OF COLUMBIA.

STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 467,900, dated January 26, 1892.

Application filed April 5, 1887. Serial No. 233,804. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HENRY ROBINSON, of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Steam-Heating Apparatus, of which the following is a specification.

The object of the present invention is to regulate the steam at excessive pressure within the steam-generator of a locomotive for heating purposes. When a locomotive stops or is running on a downgrade, the steam is shut off from the steam-cylinders, and as a consequence not only is the steam unutilized for purposes of propulsion, but also the steam, being constantly generated in the generator, rises to a pressure beyond the safety limit and blows off through the safety-valve and is thus wholly lost. To save this excess of live steam and utilize it for heating a railway-train is the object of the invention. To accomplish this the generator is equipped with an automatic relief-valve, which opens at a pressure less than that of the safety-valve of the locomotive, but greater than the normal working steam-pressure. This relief-valve communicates on its reduction side with a system of radiating-pipes extending throughout the train, so that the surplus live steam which would otherwise be lost is conveyed into the radiating system, where it heats the cars. The relief-valve is wholly automatic in character, so that it requires no attention, and the specified pressure at which it opens permits only steam which would otherwise be lost to be used for heating purposes. It takes no steam which would be used for propulsion, and it does not interfere with the functions of the safety-valve. Preferably this means of utilizing the surplus live steam is used conjointly with means for utilizing for heating purposes the exhaust-steam from the steam-cylinders.

The present improvements are illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of a railway-locomotive and a portion of a railway-train provided with the improvements. Fig. 2 is a detail view of the piping and pipe connections, showing their relation to the generator. Fig. 3 is a vertical section in detail of the automatic

relief-valve which is employed, and Fig. 4 is a vertical section in detail of a check-valve which is employed.

A is a locomotive of the usual type for passenger traffic. B is one of the steam-cylinders thereof. D is the smoke-stack of the locomotive. E is the tender. F is the front end of the first passenger-car. G G is the system of radiating-pipes which conveys steam to and throughout the train. H is a coupling, and I a steam-trap employed with the coupling. All of these parts are or may be of usual and known construction.

The radiating system is preferably connected with the exhaust of the steam-cylinder B, as by a pipe J, so as to utilize the exhaust-steam as well as the surplus live steam. The utilization of the exhaust-steam, however, constitutes in itself no part of the present invention, and the exhaust may be made to enter the radiating system by any of the means known in the art—as, for example, by the means set forth in Letters Patent of the United States, granted to me November 10, 1891, No. 462,740.

W is the steam-generator, having the usual steam-dome O and the usual weighted main safety-valve P.

Q is the auxiliary automatic relief-valve opening outwardly from the steam-dome. This relief-valve may be of any known and suitable construction; but, as shown in Fig. 3, it is a disk valve having a tubular guide-stem *m* sliding in a cylindrical prolongation *n* of a valve-casing *o* and is weighted by a spring *p*, the tension of which is adjustable. The relief-valve should be weighted at a pressure just below that, at which the main safety-valve opens, so that, while it will open before the main safety-valve, it will, nevertheless, not open at so low a pressure as to interfere with maintaining the proper working pressure within the generator. A pipe R leads from the valve-casing *o* to the steam radiating system, and preferably communicates directly therewith.

In order that steam may be admitted into the radiating system before the train starts and before the steam-pressure is sufficient to operate the automatic relief-valve, a pipe S,

controlled by a hand-valve *r*, is shown connecting directly from the generator to the pipe R, and thence with the radiating system.

In order that in case the steam-cylinders are not working the pressure in the radiating system need not fall, a check-valve T, as shown in detail in Fig. 4, is located at any convenient point in the piping. This valve is preferably located on the piping on the locomotive between the pipe J, leading from the exhaust, and the point where the pipe R connects with the radiating system, so that the effect of the live steam will not be lost by backing into the piping on the locomotive.

I claim as my invention—

1. In a steam-heating apparatus, the steam-radiating system, the steam-generator, and a safety-valve to said generator, in combination with an auxiliary automatic relief-valve located upon said generator, and a pipe connecting said valve with said radiating system, substantially as set forth, whereby when said valve is opened by the pressure within the generator steam is admitted into said radiating system.

2. In a steam-heating apparatus, the steam-radiating system, the steam-generator, and the safety-valve thereof, in combination with an auxiliary automatic relief-valve located upon said generator, which opens at a pressure less than that at which the safety-valve opens, and a pipe connecting said relief-valve directly with said radiating system, substantially as set forth.

3. In a steam-heating apparatus, the steam-radiating system and the steam-generator, in combination with the safety-valve of the generator, a pipe leading directly from the generator to the steam-radiating system, and an

auxiliary automatic relief-valve located in said pipe, which valve when open discharges the steam into the radiating system and which automatically opens under a less pressure than the safety-valve, substantially as set forth.

4. In a system for heating railway-trains, a steam-radiating system connected to the cylinders of the locomotive, in combination with the safety-valve of the generator, a pipe leading from the generator direct to the steam-radiating system, and an auxiliary automatic relief-valve located in said pipe, which opens automatically at a less pressure than the safety-valve and discharges steam when opened into the steam-radiating system, substantially as set forth.

5. In a system for heating railway-trains, a steam-radiating system extending through the train, the exhaust-pipes leading from the cylinders of the locomotive, and pipes connecting said exhaust-pipes with said radiating system, in combination with the steam-generator, the usual safety-valve thereof, a pipe connecting said generator directly with said radiating system, and an auxiliary automatic relief-valve located in said pipe, which valve is balanced so as to open automatically at a less pressure than the safety-valve and which when opened admits steam direct from the generator into said radiating system, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES H. ROBINSON.

Witnesses:

R. B. WHITACRE,
C. N. WOODWARD.

Correction in Letters Patent No. 467,900.

It is hereby certified that the name of the assignee in Letters Patent No. 467,900 granted January 26, 1892, upon the application of Charles H. Robinson, of St. Paul Minnesota, for an improvement in "Steam Heating Apparatus," was erroneously written and printed "Arthur S. Brown," whereas said name should have been written and printed *Arthur S. Browne*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 9th day of February, A. D. 1892.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

N. L. FROTHINGHAM,
Acting Commissioner of Patents.