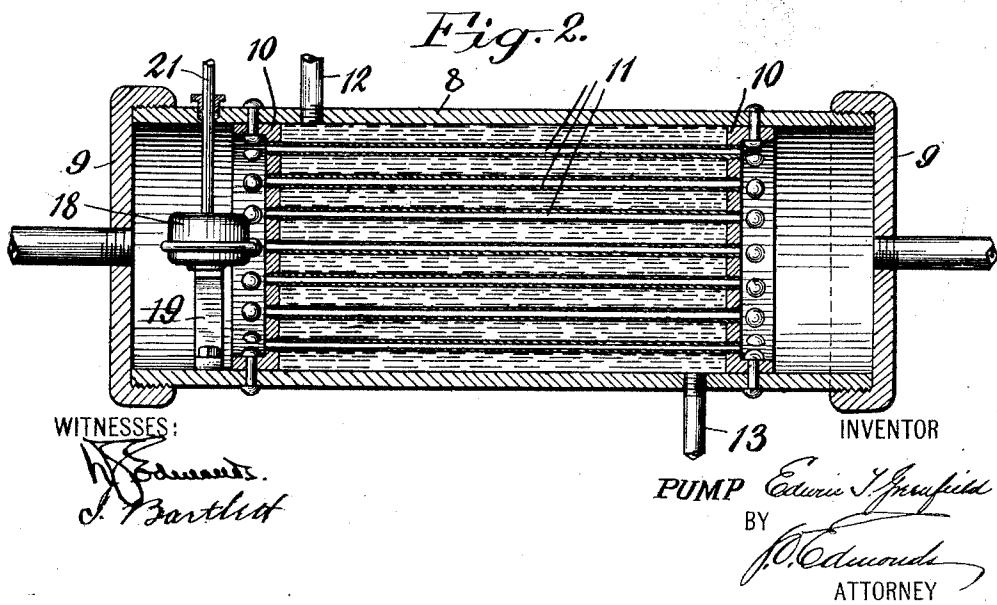
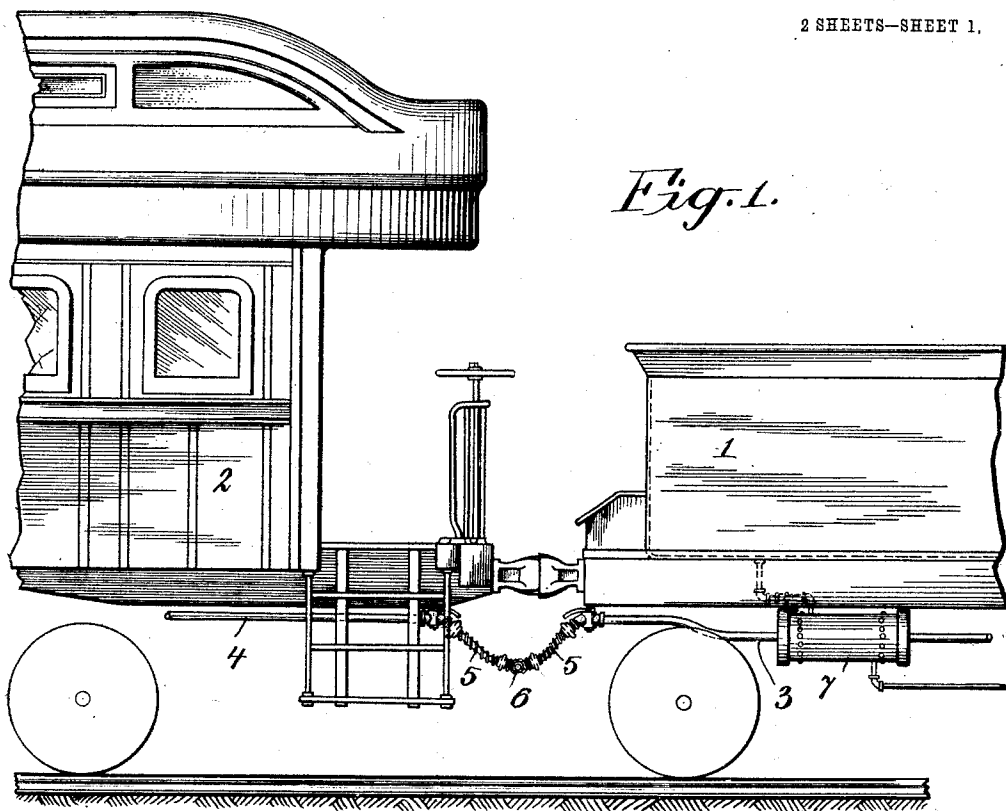


902,148.

Patented Oct. 27, 1908.

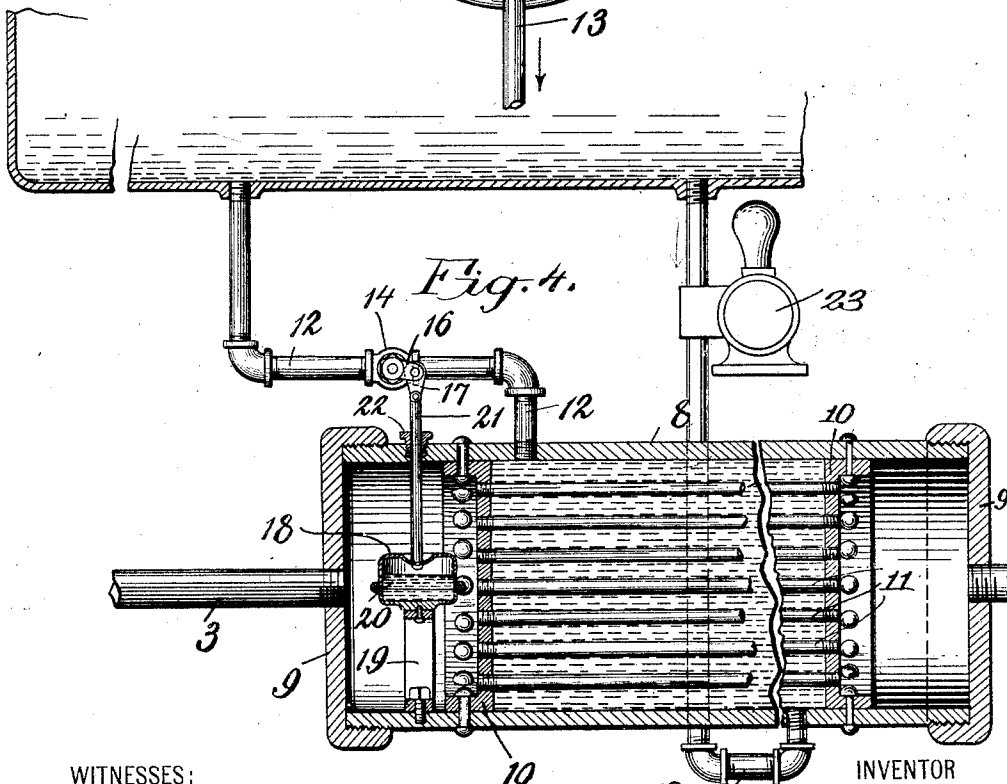
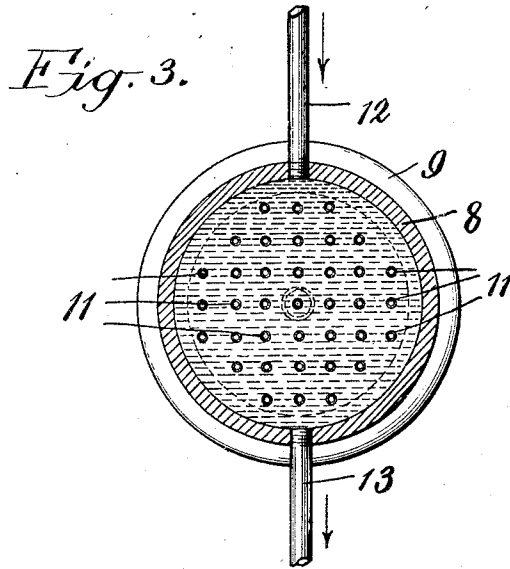
2 SHEETS—SHEET 1.



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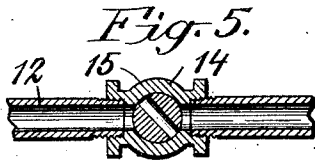
Patented Oct. 27, 1908.

2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF KIAMESHA, NEW YORK.

HEATING SYSTEM.

No. 902,148.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed January 20, 1908. Serial No. 411,584.

To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing at Kiamesha, in the county of Sullivan and State of New York, have invented a certain new and useful Improvement in Heating Systems, of which the following is a specification.

This invention relates to heating systems and more particularly to such a system employing steam as the heating medium.

The invention is especially applicable to heating systems for railway trains in which the cars of the train are heated by steam supplied from the boiler of the locomotive. In the heating system of a train, a steam-pipe is provided running from the locomotive back to all of the cars and the ends of the pipes for adjacent cars are connected by flexible end-connecting tubes. These tubes are usually constructed of a rubber composition and for this reason the steam carried thereby should not be at too high a temperature, since if it were, the rubber composition of the tubing would rapidly deteriorate. It is now common practice to heat the steam for running locomotives to a temperature above that which the flexible end-connectors of the steampipe may carry without injurious effect, so that steam at boiler temperature passing through the train-pipe makes it necessary to replace these end-connectors with new ones at comparatively frequent intervals.

The present invention contemplates the provision of means for regulating as desired the temperature of the steam which is led back to the cars of a train, so as to avoid such injury to the flexible end-connectors of the steam-pipes on the cars. A cooler is employed, through which the steam passes from the locomotive to the steam-pipe of the train and in which the temperature of the steam is reduced from the boiler temperature to that at which the steam may be safely carried by the flexible end-connectors of the train-pipe. The steam is cooled by a circulation of water about pipes through which the steam passes, this water being preferably drawn from the tank of the tender and, after being used in the cooler, returned to the tank. In the steam passage, a

thermostatic regulator is provided, which regulates the flow of water in the cooling system, so that the temperature of the steam after leaving the cooler will be that desired for use in the steam-pipes of the several cars.

The preferred embodiment of my invention is illustrated in the accompanying drawings, in which

Figure 1 is an elevation of a portion of the tender and one car of a train having the apparatus of my invention applied thereto; Fig. 2 is a sectional elevation of the cooler; Fig. 3 is a transverse section of the same between the headers thereof; and Figs. 4 and 5 are sectional detail views hereinafter referred to.

Referring to these drawings, 1 indicates the tender and 2 the first car of a train, these being coupled together in the usual manner. On the tender is a pipe 3 connecting at its forward end with the boiler of the locomotive and carrying steam therefrom to the cars of the train. Each car is provided with a steampipe 4. At the ends of each of the steampipes 4 and at the end of the pipe 3 is a flexible end-connector 5, this being formed of rubber composition and if desired wound with wire. The ends of the several end-connectors 5 are provided with detachable couplings 6, whereby the free ends of a pair of end-connectors 5 may be readily connected and disconnected, so as to form a continuous passage for the steam throughout the length of the train and to permit disconnection when uncoupling the cars.

In the pipe 3 on the tender is a cooler 7 constructed as shown in Figs. 2, 3 and 4. This cooler consists of a cylindrical casing 8, closed steam-tight at its ends by end-pieces 9 and having mounted therein two headers 10. Extending between these headers are a plurality of tubes 11, the ends of which are secured in openings in the headers 10 by steam-tight joints. Pipes 12 and 13 connect with the interior of the casing 8 between the headers 10 at diametrically opposite points, these pipes leading to the tank on the tender 1 and the pipe 13 having a pump 23 connected therein for circulating water from the tank on the tender through the pipe 12, the chamber within casing 8

and between headers 10 and the pipe 13. In the pipe 12 is a valve 14 having a movable member 15 (Fig. 5), the position of which determines the flow of water in the cooling system. The movable valve-member 15 has secured thereto, outside the valve casing, a crank 16, pivotally connected to a short link 17, the other end of which is pivotally connected to a rod 21. This rod is operated by a thermostatic regulator 18 mounted within the casing 8 and between the outlet end of the cooler and the header 10 adjacent thereto. The thermostatic regulator 18 consists of a casing one portion of which is of thin flexible metal mounted upon a support 19. Within the casing of the regulator is a volatile oil 20. The rod 21 extends through an opening in the casing 8, which is provided with a suitable bushing 22, and the lower end of rod 21 is connected to the flexible portion of the casing of the regulator 18.

As thus constructed, the steam from the boiler of the locomotive passes from the boiler through pipe 3 and into the casing 8 of the cooler. Within the casing the steam passes through the tubes 11 from one of the headers 10 to the other, and then passes out of the cooler, through pipe 3 and the flexible end-connectors 5 and couplings 6 to the train-pipes 4 of the several cars. The cooling water is kept in circulation by the pump from the tank of the tender through pipe 12 and valve 15 and into the casing 8 of the cooler between the headers 10. Within the casing the cooling water passes about the tubes 11 and reduces the temperature of the steam passing therethrough. The cooling water then passes out by pipe 13 to the pump and then back to the tank on the tender. It will thus be seen that the temperature of the steam is reduced before the steam enters the flexible couplings of the train-pipe, and this reduction may be such that the steam will not injure the rubber composition from which the flexible end-connectors of the train-pipe are formed. The thermostatic regulator 18 enables the temperature of the steam passing out of the cooler to the train-pipe to be predetermined. This regulator is affected by the steam after the latter has been cooled, and it operates in response to changes of temperature of the steam to move the rod 21 axially and thus vary the position of the movable valve-member 15 in the water-pipe 12. The volume of water flowing about the pipes 11 within the casing of the cooler is thus automatically changed as may be necessary to reduce the temperature of the steam from the boiler temperature to that desired for the steam which is to be carried through the flexible end-connectors of the train-pipe on the cars.

Having now described my invention, what

I claim as new therein and desire to secure by Letters Patent is as follows:—

1. In a heating system, a steam-pipe, a cooler connected therein having a plurality of pipes therein through which the steam passes, means for circulating a cooling agent about said pipes of the cooler, a thermostatic regulator mounted in the steam passage beyond the outlet of said pipes of the cooler, and means actuated by said regulator for controlling the flow of said cooling agent, substantially as set forth.

2. In a heating system for trains, a steam-pipe on each of the cars of the train, flexible connections between the several pipes, a cooler connected in one of said steam-pipes having a plurality of pipes therein through which the steam passes, means for circulating a cooling agent about said pipes of the cooler, a thermostatic regulator mounted in the steam passage beyond the outlet of said pipes of the cooler, and means actuated by said regulator for controlling the flow of said cooling agent, substantially as set forth.

3. In a heating system for trains propelled by steam locomotives, a steam-pipe on each of the cars of the train, flexible connections between the several pipes, a cooler mounted on the tender and connected in the steam-pipe thereon, said cooler having a plurality of pipes therein through which the steam passes, pipes connecting said cooler with the tank of the tender for circulating cooling water about said pipes of the cooler, a valve in one of said water-pipes, a thermostatic regulator mounted in the steam passage on the tender beyond the outlet of said pipes of the cooler, and a connection between said regulator and said valve, substantially as set forth.

4. In a heating system, a steam-pipe, a cooler connected therein comprising a casing, headers therein, a plurality of pipes extending between said headers and having their ends secured in openings therein, pipes for carrying a cooling agent entering said casing between said headers, a thermostatic regulator mounted within said casing between the header to which the outlet ends of said pipes are connected and the end of the casing adjacent thereto, a valve in one of said pipes carrying the cooling agent, and a connection between said regulator and said valve, substantially as set forth.

5. In a heating system for trains propelled by steam locomotives, a steam-pipe on each of the cars of the train, flexible connections between the several pipes, a cooler mounted on the tender and connected in the steam-pipe thereon, said cooler comprising a casing, headers therein, a plurality of pipes extending between said headers and having their ends secured in openings therein and a thermostatic regulator mounted within

said casing between the header to which the
outlet ends of said pipes are connected and
the end of the casing adjacent thereto, pipes
connecting the tank of the tender with the
5 casing of the cooler between the headers
therein for circulating cooling water about
said pipes of the cooler, a valve in one of
said water-pipes and a connection between

said valve and said regulator, substantially
as set forth.

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This specification signed and witnessed
this 14th day of January, 1908.

EDWIN T. GREENFIELD.

Witnesses:

WM. T. RUETT,

CHAS. E. WILSON.