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W. S. DEEDS.

Railroad-Car Heaters.

No. 147,829. Patented Feb. 24, 1874.

Fig. 1

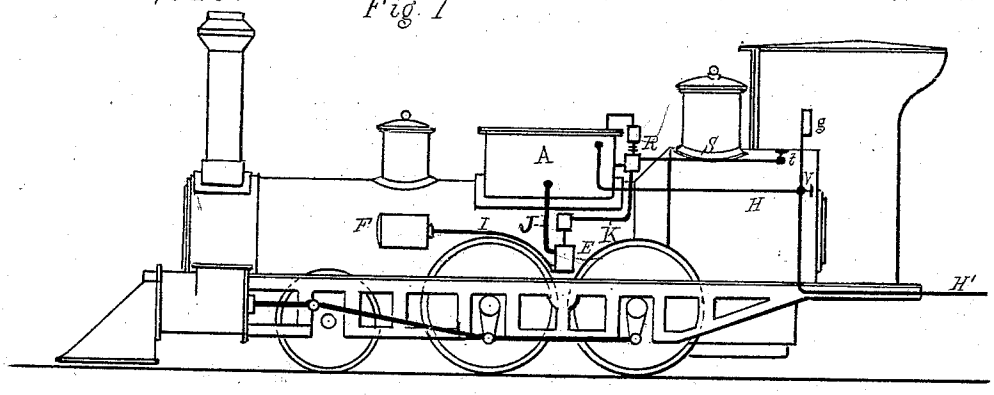


Fig. 2

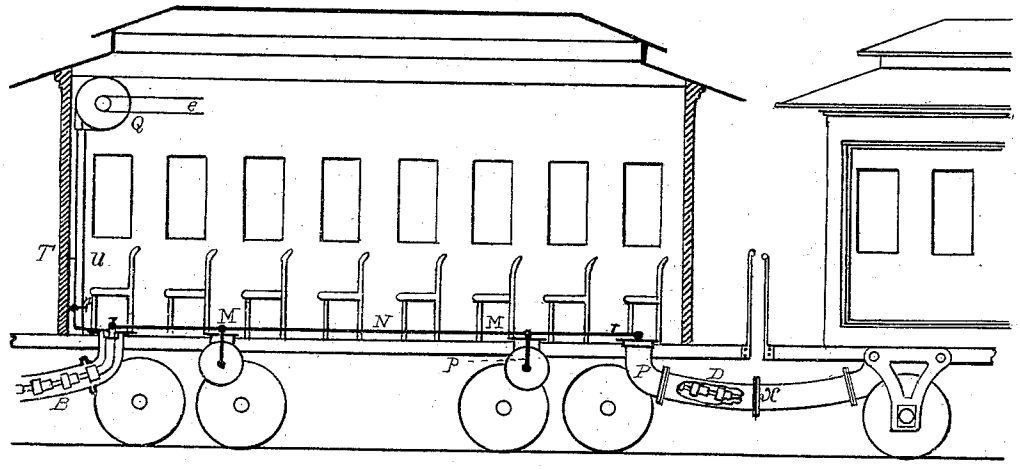
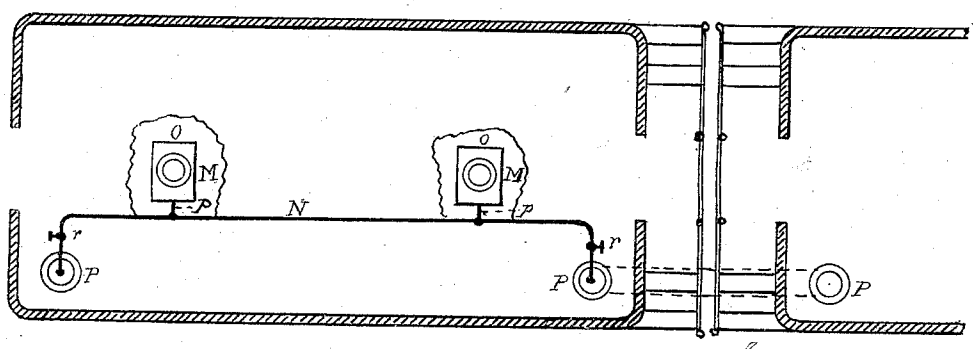


Fig. 3



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Railroad-Car Heaters.

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Fig. 4

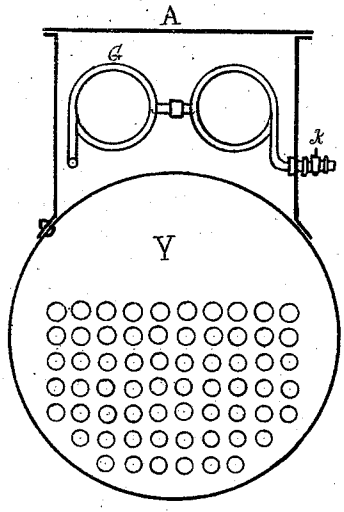


Fig. 5

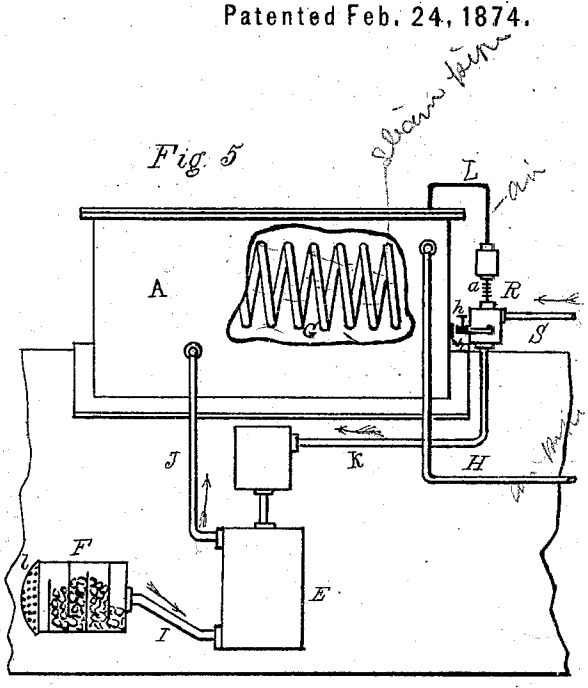


Fig. 6.

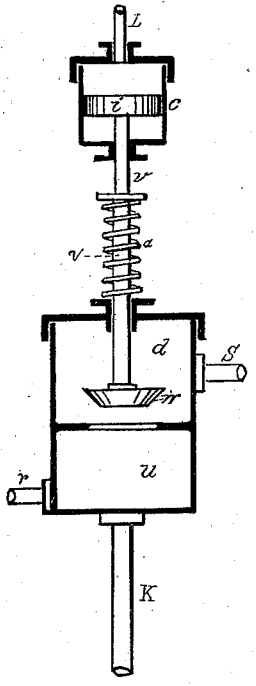
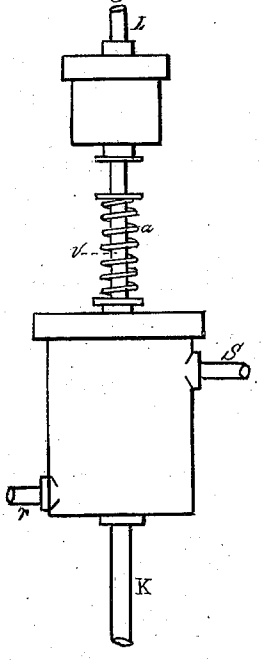


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM S. DEEDS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN RAILROAD-CAR HEATERS.

Specification forming part of Letters Patent No. **147,829**, dated February 24, 1874; application filed May 16, 1873.

To all whom it may concern:

Be it known that I, WILLIAM S. DEEDS, of the city of Philadelphia and State of Pennsylvania, have invented certain Improvements in Heating and Ventilating Railroad-Cars, of which the following is a specification:

My invention consists of the arrangement of an independent steam air-compressing engine operated by steam from the locomotive-boiler, an air-vessel or reservoir having a pipe-connection with the cars, and an air-filter with a locomotive and the steam-boiler of a locomotive, in the manner hereinafter described; and of combining with the above an automatic regulator, constructed and arranged with them in such a manner that the running of the air-compressing engine and the heating of the air are regulated automatically by the pressure of the air in the air-vessel, by which means the supply of hot air is regulated according to the consumption of it in the cars.

The main object of my invention is the heating or ventilating of railroad-cars by air which is heated mainly by compression, but, when necessary, to further heat them by steam, as hereinafter described; and to erect the devices for producing the air on the locomotive, and to obtain the steam-power for the purpose from the locomotive-boiler, so that the heating apparatus will not require independent firing up, but be put in operation by the firing up of the locomotive; and to provide the apparatus with a device for regulating the supply of air automatically, so that the supply will be perfectly regular—a condition which cannot be relied on with any degree of certainty when the apparatus is attended to by employés; and, also, to dispense with the cost of employés to attend the heating apparatus.

Another object of my invention is to avoid the danger of the cars taking fire from the heating apparatus, in the case of their breaking when accidents occur, and thus to lessen the disastrous effects which would otherwise occur.

Figure 1 is a side elevation of the frame-work and boiler of a locomotive, partly in section, having an air-compressing engine, air vessel or reservoir, air-filter, &c., erected thereon. Fig. 2 is a sectional elevation of one car and a portion of another, representing large air-chambers under the car bottoms and the air-pipes in the cars connected between the latter by a chain of flexible jointed short pipes enveloped by a large tube of flexible material opening into the cars by means of large elbow-tubes. Fig. 3 is a plan view of Fig. 2. Fig. 4 is a cross-section of the locomotive-boiler and the air-vessel A. Fig. 5 is a side elevation of a portion of a locomotive-boiler, representing the air-compressing engine E, air-filter F, automatic regulator B, and the air vessel or reservoir A, showing a part of the latter broken out to exhibit the interior. Fig. 6 is a large sectional view of the automatic regulator R. Fig. 7 is a side elevation of the same.

Like letters of reference in all the figures indicate the same parts.

A is an air vessel or reservoir, containing a coil of steam-pipe, G, and having a connection with the air-compression engine E by means of the pipe J, and a connection with the cars by means of the air-pipe H, and also a connection with the regulator R by means of the air-pipe L. The pump-cylinder of the air-compression engine E is connected with the air-filter F by means of the air-pipe I, and with the air-vessel A by means of the pipe J. The steam-cylinder of the engine is connected with the regulator R by means of the pipe K, to charge the engine. The regulator R is connected with a steam-boiler of a locomotive by means of the pipe S, and with the coil of steam-pipe G by means of the pipe *r*, and with the engine E by means of the pipe K; also, with the air-vessel A by means of the pipe L.

The regulator R operates to regulate the supply of air in the air-vessel A by means of a valve which opens and closes the charge-pipe of the engine, there being a small cylinder and piston in which the pressure of the air which is supplied by the pipe L operates on one side of the piston to close the valve, and at the same time contracts a spring which moves the piston and opens the valve when the pressure of the air is withdrawn or falls to a lower point, as hereinafter shown in detail.

There is a chain of flexible jointed pipes, B, which connect the pipes between the cars to admit of the necessary vibrations and other

movements of the connecting-pipes. The said pipes B connect with the air-pipes N in the cars below their bottoms and at the ends thereof by means of bent sections *n*, which extend down through the large elbow-tubes P, to the lower ends of which enveloping-tube D, of flexible material, is connected, as shown in Fig. 2. This tube is protected from contact with the pipes B by large rings slipped over the pipes B, there being smaller rings connected with them and separated by means of short stems.

The flexible jointed pipes B and the enveloping-tube D will, in practice, have union coupling-joints midway between the cars, one-half of the coupling-pipes being permanently attached to each end of the cars, so as to avoid the necessity of going under the cars to couple the pipes.

The air-pipes N connect with the large air-chambers O beneath the bottoms of the cars by means of the lateral pipes *p*. These chambers connect with the registers M in the bottoms of the cars, and should be of suitable capacity to allow the compressed air to expand somewhat and mix with a portion of the atmosphere of the cars prior to being discharged into them through the open registers. They may be plain hollow cylinders, constructed of sheet metal, and should be cased in with a good non-conductor of heat. The lateral pipes *p* should be adapted to admit the maximum quantity of air that may be required at any time to heat or cool the cars. The pipes N must have cocks, or other suitable device, near each end to prevent the escape of air when the cars are not connected. The steam-pipe S, for supplying the apparatus with steam from the boiler, passes through the cab, as shown in Fig. 1, where it is provided with a valve, *t*, by which the engineer or fireman controls the admission of steam to the apparatus when necessary. The air-pipe H, for conducting the air into the cars, also passes through the cab. It is provided with a valve, V, at this point, so as to be under the control of the engineer or fireman for closing the same when the locomotive is detached from the cars, or for other purposes. A gage, *g*, connected with the air-vessel A, is also placed within the cab to enable the engineer or firemen to discover when the apparatus gets out of order. The pipe *r*, which admits steam to the coil G, is provided with the cock *h*, shown in Fig. 5, to cut off the steam from the coil when not required to heat the air. The filter F, constructed in any suitable manner, contains charcoal, or other material ordinarily used for filtering, to absorb the smoke and gases which may be mixed in with the air in proximity to the locomotive, it being provided with a sieve, *l*, at the receiving end to keep out the cinders which would otherwise be drawn into the pump and clog the pipes. In Fig. 1, the different devices of the apparatus, which are in connection with the locomotive, are placed in convenient positions, yet other arrangements will answer. There are twin chambers *u d*, represented in Fig. 9, in the small cylinder *c*, which is provided with a piston, *i*. The twin chambers are provided with pipes S, K, and *r*, and the cylinder *c* with the pipe L. The piston *i* has a valve, *w*, in the chamber *d*, in connection by means of the rod *v*, around which is a spring, *a*. The pipe L, which extends to the air-vessel A, charges the cylinder *c* with compressed air, which, when the pressure of air rises to a given point, pushes the piston *i* down, and closes the valve *w*, and at the same time contracts the spring *a*, by means of a tappet on rod *v*, which presses upon it, bearing it against the end of the chamber *d*. When the pressure of the air falls to a given point, the spring forces the piston back and opens the valve. By this means the valve is opened or closed according to the pressure of the air in the air-vessel A; and when the pressure of the air falls below the point necessary to supply the cars with air, either for heating or ventilating them, steam is admitted from the chamber *d*, which is supplied by means of the pipe S, which is connected to the steam-boiler, into the chamber *u*, where it has access to the air-compressing engine E, by means of the pipe K, and operates it to increase the supply of air in the air vessel A; and when the supply increases in amount greater than the consumption in the cars, the valve is closed by the high pressure of the air operating upon the piston to resist the spring, whereby the engine is stopped until sufficient air is withdrawn from the air-vessel to release the spring and open the valve.

By the means above described, the labor of employés for attending the heating apparatus is dispensed with; and the production of the heat being regulated according to the consumption, convenience and economy are combined.

This mode of heating by means of compressed air is also superior to the usual mode of heating by means of stoves or steam-heaters, because the hot air is discharged directly into the cars, whereby all the heat generated by the apparatus is used; and the air can be discharged in any part of the cars, and can be caused to flow into them rapidly, and thus heat them quickly and at the same time equally throughout the whole train, the supply of hot air being always equal, whether it is used rapidly or slowly, because it is regulated automatically by the regulator R.

By combining the air-pipes with small rotary engines arranged to propel fans in the cars, or by passing the air through a refrigerator prior to discharging it into the cars, the apparatus can be used for cooling and ventilating the cars.

I claim as my invention—

1. The arrangement of the air-filter F, air-compressing engine E, regulator R, air-vessel A, the steam-pipe S, air-pipes H H′, the valves *t* and V, and the gage *g*, in the cab, with a locomotive and its steam-boiler, substantially in the manner and for the purpose specified.

2. In combination with an air-compressing engine E, air vessel or reservoir A, coil of steam-pipe G, and a steam-pipe, S, the regulator R, substantially in the manner and for the purposes described.

3. The arrangement of the regulator R, with an air-compressing engine, E, coil of steam-pipe G, air-vessel A, and the steam-boiler of a locomotive, substantially in the manner and for the purposes herein shown.

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Witnesses:

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STEPHEN USTICK.