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G. E. OAKLEY ET AL
TRAIN LINE RELIEF VALVE

1,934,205

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FIG. 1

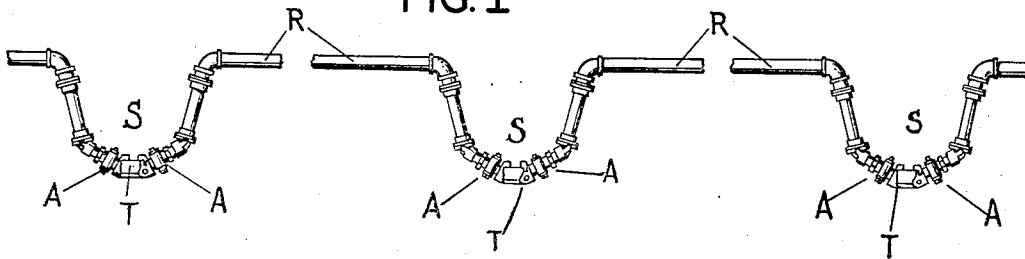


FIG. 2

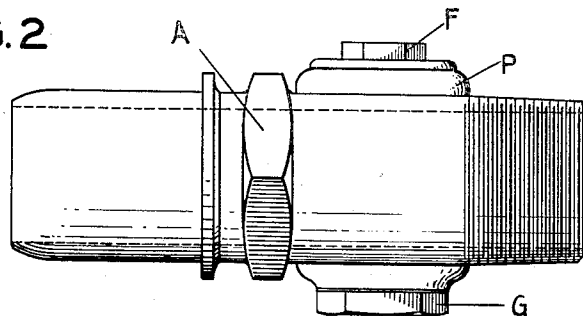


FIG. 3

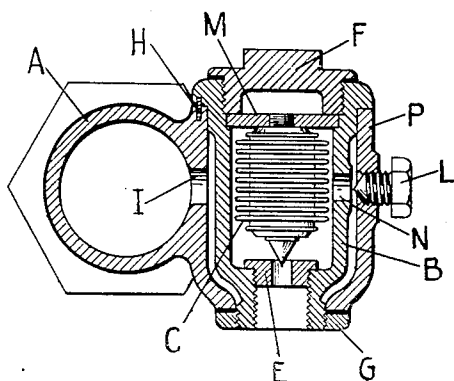
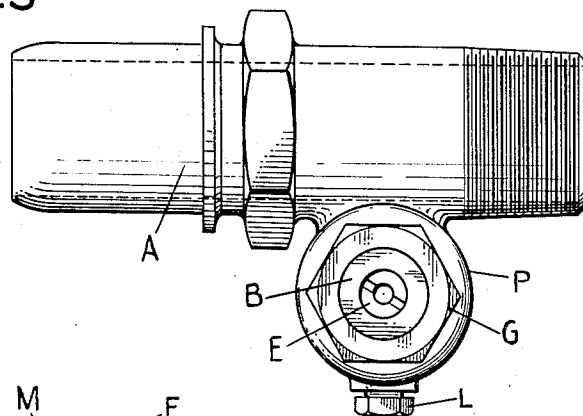


FIG. 4

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TRAIN LINE RELIEF VALVE

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6 Claims. (Cl. 236—56)

For a detailed description of the present form of our invention, reference may be had to the following specification and to the accompanying drawing forming a part thereof, wherein

Fig. 1 shows a train line provided with our valve;

Fig. 2 is a side elevation of a nipple carrying our device;

Fig. 3 is a plan of the same, and

Fig. 4 is a vertical transverse section thereof.

Our invention relates to a device for keeping the train line of a railway steam system free at all times of water or other condensate.

In such a system, the sections of train pipe on each of the several cars are coupled end to end, the section on the forward car being coupled to the steam supply pipe on the locomotive. The section on the rear car is provided at its rear end with an end cock that can be closed or opened manually. On the several cars branch pipes lead from the train line to heating radiators on the respective cars. Heretofore in practical train operation it has been the customary practice to clear the train line of condensate by opening the aforesaid end cock at the rear of the train and blowing steam from the locomotive through the entire length of the train line and into the atmosphere at the rear. That will expel the condensed water contained in the train line out into the atmosphere at the rear of the train. When the train line has thus been cleared the end cock is closed except that at times a small crack is left in that valve through which a little steam "bleeds" from the train line continuously. No other means are now in practical use to clean out the condensate from the train line and it is necessary in cold weather to keep watch of the line and open the aforesaid rear end cock periodically to blow out the condensate by live steam, as above described. Moreover, in the types of installations now in general use, the connecting sections of train line between adjacent cars hang down in flexible loops, the coupler itself being at the bottom of each loop. This loop is necessary in order to permit the required play of each car with respect to its neighboring car. In the operation of such installations, unless the train line is constantly watched in severe weather and the condensate blown out of it periodically as aforesaid, the condensate in the depending loops may freeze and block the train line. Even if the train pipe is not blocked by freezing, the rapid accumulation of condensate in the several connecting loops tends to reduce the free area therein through which the steam may pass from car to

car. That clogging condition grows between the succeeding blow-off operations and adds materially to the pressure needed for forcing steam through the train line. It may be noted that in modern practical installations the radiating pipes on the several cars, which have always been provided with traps to drain off the condensate, are at a higher level than the train line and the aforesaid loops therein. Hence the ordinary trap has no draining effect on the train line which has heretofore had to be blown out manually as we have explained.

It is our purpose to provide an automatic relief valve or trap which is formed as a part of the train-line pipe itself and may therefore be applied at the low point of the dip in said line formed by the flexible connecting loops between cars, and may swing freely with said loop in such movements as the loop may have in the relative play of the cars on curves and longitudinally. Moreover, this valve is heat-controlled and responsive in its closure to the live-steam temperature, rather than the temperature of the condensate. Thereby it is not dependent on the steam pressure, nor on the accumulation of a definite amount of condensate, to bring it into action. As soon as the live steam comes in contact with it, the valve closes and only when the temperature falls lower, as by the formation of a film of condensate, will it open. Thus the condensate is being constantly drawn off as fast as it forms, while the steam itself, although it is the causative agent, does not escape. In its construction the valve carries its thermostatic element in a segregating enclosure to which it is secured and with which it may be removed or applied. Into this enclosure the steam has access through a passage that may be opened or closed from outside the casing, while out of this enclosure the valve opens into the atmosphere. Thus the steam can escape into the atmosphere only by passing over the practically segregated thermostatic element which thereupon closes the valve and stops the outflow. The device also operates while the steam pressure is on and, by closing from the outside the passageway for the steam into said valve enclosure, the thermostatic element may be removed or replaced while the device is in position and the steam is still flowing in the train line. By placing our valve in the nipple, it is no only at the lowest point of each train-line loop, but permits the use of any of the different forms of couplers that are usable with the one standard nipple. The nipples and couplers form a short section of the train line.

Referring to the drawing, R in Fig. 1, represents a train line shown herein as having three inter-car connecting loops S. At the bottom of each loop are a pair of couplers T, each screwed on an adjacent nipple A. As appears in the plan Fig. 3, there is cast on one side of the nipple a small cylindrical valve casing P. Seated inside this casing, but spaced therefrom, is a sleeve B. A passage I leads from the interior of the nipple A to the interior of casing P. Diametrically opposite passage I is a passage N which leads from the interior of casing P to the interior of sleeve B. The said sleeve forms the enclosure which contains and segregates the thermo-responsive element C and in the bottom of sleeve or enclosure B is the valve seat E which opens downward from said enclosure to the atmosphere. The said element C consists of a sealed corrugated tube containing a suitable liquid which, at a given temperature, evaporates and creates an expanding gas-pressure in the element causing it to elongate. The element, at its upper end, is secured to a plate M which is seated on an interior shoulder of sleeve B and secured in place thereon by a screw-plug F. In the wall of the casing is a second screw-plug L, which, when screwed in from outside the casing will enter and close the passage N, the entrance to the sleeve B. Thereby at any time the steam may be cut off from the sleeve or segregating enclosure and from the element C therein. Then, by unscrewing the top plug F, the plate M and the element C carried thereby can be removed from sleeve B. All of these manipulations can be carried out while the steam is still flowing in the train pipe and a new or repaired thermal element C substituted for the one removed. This is a great convenience and results from the inclusion of the element C in the compartment formed by the sleeve B which is accessible from outside of the casing and from which the drip is delivered, while it can also be shut off from the casing by the plug L which is also manipulated from outside the casing. A dowel pin H is interposed between the sleeve B and the casing to insure that the passage N will come in line with plug L. The sleeve B is secured in the casing by the bottom nut G.

By virtue of our invention the train line is automatically kept clear of condensate at all times. Since the thermal element is set to close the valve at live-steam temperature, any lesser temperature will find the valve open, so that the slightest accumulation of condensate will, by lowering the temperature of the element automatically, drop out or be forced out by the steam pressure. Whatever condensate there may be in the train pipe, including any that may fall therein from the radiators, will naturally gravitate into the connection loops and there be subjected to this automatic and local expelling action. This obviates the need for constant observation of the train line and manual manipulation of the rear-end valve of the train to blow out through that valve the condensate in the train pipe. A train pipe which is thus kept clear of water by our method does not require any super-steam pressure at the locomotive to overcome the resistance due to a train pipe partly clogged by the condensate.

Our relief valve is formed on the train-pipe itself, involving only a small enlargement thereof at local points, viz., at the bottom of each inter-car loop. Being thus mounted the valve swings freely with the pipe loop in its movements. It is extremely simple and cheap to manufacture.

The thermal element can be repaired or renewed while steam is still in the steam-pipe and the thermal valve chamber disconnected at will by manipulation external to the train-line. While the location of our device on the nipple is preferred, for the reason stated, we may also locate it on the coupler. In either case, it will be at each of the low points of the line and the expulsion of the condensate will take place locally at each of these points in contrast to the mode heretofore followed of expelling it at the rear end of the train.

What we claim as new and desire to secure by Letters Patent is:

1. A relief valve of the character described comprising a train-line coupler member provided with a casing communicating with the interior thereof, a tubular member in said casing removable therefrom and communicating with the interior thereof, a thermally responsive element in said tubular member and secured thereto, an outflow valve member controlled by said thermally responsive element and controlling the communication between the interior of the tubular member and the atmosphere, and means for closing the communication between said tubular member and said casing so that the thermally responsive member may be repaired while steam is flowing through the coupler.

2. A relief valve of the character described comprising a train-line coupler member provided with a casing communicating with the interior thereof, a tubular member located within said casing and communicating with the interior thereof, said tubular member projecting at both ends into the atmosphere through the casing wall, a cover for one end of said tubular member, and a thermally responsive element mounted in said tubular member and controlling the opening in the other end thereof.

3. A relief valve of the character described comprising a train-line coupler member provided with a casing communicating with the interior thereof, a tubular member within said casing communicating with the interior of the casing and opening into the atmosphere through the casing wall, a thermally responsive element supported within said tubular member and removable therefrom through an end thereof, and a cover for the opening through which said thermally responsive element is removable, said element controlling the outflow from the coupler member to the atmosphere.

4. A relief valve of the character described comprising a train-line coupler member provided with an external casing communicating with the interior thereof, a thermally responsive element within said casing, a tubular member within the casing enclosing said thermally responsive element, said tubular member having open ends at its top and bottom projecting into the atmosphere through the casing wall, a cover for the top opening serving to secure the said thermally responsive element in place, and a valve for the bottom opening controlled by said thermally responsive element.

5. A relief valve of the character described comprising a train-line coupler member, a tubular member constructed and arranged to provide a thermostat chamber having a normally open inlet communicating with said coupler member so that the chamber and the coupler member are always in open communication while the valve is in operation, said tubular member also having an outlet discharging to the atmosphere,

a thermally responsive valve member located within said chamber and so positioned as to open and close said outlet, being set to normally close the outlet during the presence of live steam in said chamber, and means for closing the inlet opening so that the thermally responsive valve will be accessible for repairs while steam is flowing through the coupler.

6. A relief valve of the character described comprising a train-line coupler member provided with a casing communicating with the interior thereof, an internal tubular member located with-

in said casing and having an opening to the atmosphere and an inlet opening from the casing, thermally responsive means controlling the communication between the tubular member and the atmosphere, and manually operable means for closing said inlet so that the thermally responsive means will be accessible for repairs while steam is flowing through the coupler, said means being operable from the outside of the casing.

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