SANDING DEVICE FOR LOCOMOTIVES

Harry G. Foster, Mullens, W. Va.

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11 Claims. (Cl. 201—3)

This invention relates to improvements in sanding devices for locomotives, and more particularly to sand discharge nozzles for directing the sand onto the track in advance of the locomotive wheels.

It is the customary practice to provide devices on locomotives for discharging sand on the track rails in advance of the locomotive wheels, to be used in wet or freezing weather, to increase the traction of the wheels. Usually, this involves the use of a pipe through which the sand is discharged, the lower end of which pipe is open and forms a nozzle for directing the sand on the rail in advance of the traction wheel.

Difficulty has been encountered heretofore in the accumulation of sand in the open end of the discharge pipe or nozzle, forming a bridge therein, which not only interferes with the discharge of the sand but also serves frequently to deflect the sand to one side or the other of the rail. This bridge or obstruction results from the accumulation of moisture in the open end of the nozzle due to the throwing of mud or moisture into the nozzle by the rotation of the driving wheel, which thereby causes a cake of sand to accumulate. Since the sand is needed during conditions of wet or freezing weather, those are the same conditions which cause the accumulation of sand in the discharge end of the nozzle.

It has been proposed herebefore to inject air or steam into the nozzle for the purpose of cleaning out the accumulation or plug of sand that occurs therein, but, because of the impractical effect of using a blast of air or steam for this purpose and its failure to discharge the accumulated sand from the nozzle, such proposals have not come into general use. No satisfactory means has been proposed heretofore which would be entirely effective to remove the accumulation of sand from the nozzle.

An object of this invention is to improve sanding devices so as to provide an effective means for removing an accumulation of sand from the nozzle in all weather conditions, and which will insure of the delivery of the sand, when needed, directly onto the rail surface.

Another object of the invention is to provide not only for the ejection of the sand from the nozzle, but also for the application of sufficient heat thereto so as to prevent the caking or accumulation of sand in the nozzle, whereby it will be discharged effectively in service.

Still another object of the invention is to improve the construction of a sand nozzle, by providing a relatively inexpensive and practical device for the discharge of a jet of air or other fluid in the nozzle, to remove the clogging action of the sand, and also providing for the application of heat to the nozzle, not only to prevent clogging of the wet sand, but also to prevent freezing of the moisture which would otherwise maintain the clogged condition of the sand.

These objects may be accomplished according to certain embodiments of the invention, by providing for the introduction of a jet or jets of air under high pressure into the nozzle in such position with respect thereto that the accumulated sand will be discharged therefrom. The air jet means may be attached to a conventional sand discharge pipe without requiring any special construction of nozzle, and will be retained thereby for the effective removal of the sand from the nozzle. It is also preferred that a suitable heater be provided which will dry up the moisture that causes an accumulation of sand in the nozzle and also prevents freezing of the moisture, thereby allowing the jet of air to take full effect in removing the sand from the nozzle. Either hot air or steam may be circulated through the heater from an available source on the locomotive, which will be effective in eliminating the moisture from the sand.

Certain embodiments of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a diagrammatic side elevation of a portion of a locomotive, showing an application of this invention thereto;

Fig. 2 is an enlarged longitudinal section through one form of sand nozzle constructed according to this invention;

Fig. 3 is a cross section therethrough on the line 3—3 in Fig. 2;

Fig. 4 is a view similar to Fig. 2, showing a modified form of heating means;

Fig. 5 is a cross section therethrough on the line 5—5 in Fig. 4; and

Fig. 6 is a partial sectional view, showing a further modification of the nozzle.

The invention is shown in Fig. 1 as applied to a locomotive traveling on a track formed by rails 1, in which, however, only portions of the locomotive are illustrated, including a driving wheel 2 thereof that is adapted to travel on the track formed by the rails 1. The remainder of the locomotive is omitted for simplicity of illustration, but it will be understood that the invention is applicable to any suitable type of rail or other vehicle in which it is desired to apply sand to the traction wheels thereof.
The conventional sanding device employed on locomotives includes a sand pipe 3 connected at one end with a head 4, which has a supply pipe 5 extending thereto from the sand box carried by the locomotive or other vehicle. A service air line is designated at 6, discharging into one side of the head 4, for forcing sand under pressure from the pipe 5 to the sand pipe 3. Air pressure may also be introduced into one side of the sand pipe 3 from a high pressure air line 7 connected thereto, if desired, although the latter is not required according to this invention.

Connected with the opposite end of the sand pipe 5 is a flexible hose 8, one end of a tunnel pipe 9, shown in the form of an elongated tube extending downwardly from the hose 8, with which it is connected, to a point directly over the rail 1 in front of the traction wheel 2. The lower end of the nozzle 9 is open. In the conventional sanding device of a locomotive, it has been the practice to discharge sand through the nozzle at desired intervals, according to track conditions, by injecting a jet of air through the pipe 5 and/or the pipe 7, which air is under high pressure and causes sand to force from the supply pipe 5, through the head 4 and the sand pipe 3 into and through the nozzle 9, discharging directly on the rail.

The rotation of the wheel frequently causes mud or moisture to be forced into the open end of the nozzle 9, which is in proximity to the rail, or such moisture may be splattered into the end of the nozzle from the top surface of the rail. In any event, it is known that moisture does collect in the open end of the nozzle, where it tends to cause a clogging of the sand and frequently forms a cake or accumulation of sand in the lower portion of the nozzle, which not only interferes with the discharge of the sand from the nozzle but also tends to deflect the sand laterally from the rail, so that the sand is not directed to its point of effective use. It is not directed on the rail at all but falls beside the rail in the trackway.

I have provided a heater which will apply a source of heat to the nozzle at or adjacent the discharge end thereof, to prevent the accumulation of moisture in the nozzle and to dry out any moisture that has accumulated therein, which thereby will release the clogged condition of the sand and cause it to be discharged. Such a heater may be supplied with hot air, steam or other suitable source of heat, according to the available source on the engine or vehicle, different forms of which are shown in the drawings.

In the form shown in Fig. 2, a hot air chamber is shown at 10 surrounding the nozzle 9. This chamber 10 is shown as an enlarged cylindrical chamber spaced at its periphery from the periphery of the pipe or nozzle 9 and closed at opposite ends. It may be slipped over the nozzle and is removable therefrom, if desired. A source of hot fluid from a convenient point on the locomotive or other vehicle is connected with the chamber 10 through a pipe 11, to the vehicle preferably having a suitable control valve within convenient reach of the engineer or operator for regulating the supply of air thereto. The chamber 10 is shown as open throughout, and the hot fluid is discharged therefrom at the opposite side and the opposite end, from the inlet pipe 11, through one or more orifices 12, as will be evident from Fig. 3.

The discharge orifices 12, preferably, are located at the bottom side of the hot air chamber 10 in position to direct the fluid downwardly onto the rail 1, in close proximity thereto. This serves not only for circulating the fluid through the heating chamber to obtain the heating effect thereof in removing the accumulated sand, but also for applying heat directly to the top of the rail to thaw any frozen condition that exists on the rail and remove ice and snow therefrom. This obtains a double heating action of the single source of hot fluid both for removing the moisture from the sand and also for thawing out and removing snow and ice from the rail.

 Provision is made also in this device for forcing out the accumulated sand by a jet or jets of fluid injected directly into the nozzle 9 at intervals under the control of the engineer or operator. An opening 13 is formed in the side of the nozzle 9, shown as an elongated slot, within which opening or slot 13 a head 14 is inserted and welded or otherwise secured rigidly to the nozzle 9. The head 14 has a reduced lower portion that fits directly in the slot 13, while the outer portion thereof sits or is fitted directly upon the periphery of the nozzle.

One or more orifices 15 are formed in the inner side of the head 14 to direct fluid into the discharge end of the nozzle 9 from a fluid supply tube 16 that is connected with the head 14. The fluid supply tube 16 leads to a suitable source of fluid under high pressure, and may be connected with the tube 7 referred to above.

In using the track sander according to this invention, when the operator or engineer encounters a slippery condition on the rail, it is necessary merely for him to manipulate the control valve to supply air to the tubes 7 and 9. This will inject a desired quantity of sand from the supply pipe 5 into the sand pipe 3, thence to the nozzle 9 for discharge onto the rail in advance of the driving wheel 2. Simultaneously, air is directed under pressure through the tube 16 and head 14 into the open end of the nozzle 9, as will be evident from Fig. 2. This air discharged from the orifice or orifices 15 will cause a complete discharge of the sand against any accumulation in the open end of the nozzle and move the sand to the trackway.

When a slippery condition is encountered on the track, the operator may open the valve to the fluid supply tube 16 to supply hot air or other fluid continuously through this pipe 11 to the heating chamber 10, so as to maintain a sufficiently heated condition in the discharge end of the nozzle 9 so that any moisture which may be thrown into the open end of the nozzle by the rotation of the wheel will be vaporized and prevent the accumulation of sand placed on the rail. This will keep the end of the nozzle and free for the discharge of sand, as desired. The hot fluid will be directed downward through the openings 12 directly onto the rail, tending to melt or remove any snow or ice that may accumulate on the rail, as well as to vaporize any moisture that occurs thereon.

When the heating chamber 10 is not required, it may be removed easily from the nozzle 9 by slipping it off the end of the nozzle, separating the parts sufficiently for that purpose. This makes it possible to gain access to the head 14 for repair, if required, or for replacing any parts of the device. This heating mechanism may be held in place on the nozzle by welding or by clamps, screws, or other fastenings.

Instead of using the heating chamber 10 in which the hot air or other fluid is circulated, I may employ a heating coil, as shown at 20 in
The coil 20 is connected through a pipe 21 with a suitable source of hot fluid that is available on the locomotive, and will be circulated through the coil for heating the nozzle to prevent the accumulation of moisture therein. This coil is shown as surrounding the head 14a through which a jet or jets of air may be injected into the nozzle to direct the sand therefrom. The lower end of the coil 20 is directed downwardly onto the rails for discharging the hot fluid onto the rail, to thaw any ice or snow accumulating thereon. This coil is shown as enclosed in a housing 22 that surrounds the nozzle 9a, although the housing may be omitted, if desired.

A further modification is shown in Fig. 6, in which the nozzle 9b is shown as provided with a projecting lip 23 forming a hood over the open end thereof to prevent the entrance of rain, snow or other moisture from gaining access into the nozzle. Such a hood may be applied to either of the nozzles shown in Figs. 2 and 4. While I have illustrated and described certain embodiments of the invention, it is recognized that other variations and changes may be made therein without departing from the invention, except as set forth in the claims.

I claim:

1. A track sanding device comprising a nozzle having an elongated tubular body and having an elongated longitudinally extending slot formed therein intermediate its ends, an elongated head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, a fluid conduit connected with one end of said head for injecting a fluid under pressure into said nozzle to discharge accumulated matter therefrom, an enlarged elongated cylindrical heater casing mounted on said nozzle and surrounding at least a portion of said nozzle and said head, the peripheries of said nozzle and said casing being spaced from each other and being in substantially coaxial alignment with respect to one another to form a heating chamber therebetween, means connecting said heating chamber with a source of heated pressure fluid for circulating said fluid around said nozzle in heat exchange relation therewith, and said casing having an aperture formed therein adjacent the discharge end of said nozzle and in position to discharge said heated pressure fluid onto the adjacent track rail.

2. A track sanding device comprising a nozzle having a tubular body and having a longitudinally extending slot formed therein intermediate its ends, a head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, a fluid conduit connected with one end of said head for injecting a fluid under pressure into said nozzle to discharge accumulated matter therefrom, an enlarged cylindrical heater casing mounted on said nozzle and surrounding at least a portion of said nozzle and said head, the peripheries of said nozzle and said casing being spaced from each other to form a heating chamber therebetween, means connecting said heating chamber with a source of heated pressure fluid for circulating said fluid around said nozzle in heat exchange relation therewith, and said casing having an aperture formed therein adjacent the discharge end of said nozzle and in position to discharge said heated pressure fluid onto the adjacent track rail.

3. A track sanding device comprising a nozzle having an elongated tubular body and having an elongated longitudinally extending slot formed therein intermediate its ends, said tubular body having a substantially semi-circular hood formed on the discharge end of said nozzle, said hood projecting outwardly from said discharge end of said nozzle at the discharge end and being contained in the curvilinear plane of said nozzle to protect the discharge end of said nozzle against the entrance of moisture thereto, an elongated head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, a fluid conduit connected with one end of said head for injecting a fluid under pressure into said nozzle to discharge accumulated matter therefrom, an enlarged elongated cylindrical heater casing mounted on said nozzle and surrounding at least a portion of said nozzle and said head, the peripheries of said nozzle and said casing being spaced from each other and being in substantially coaxial alignment with respect to one another to form a heating chamber therebetween, means connecting said heating chamber with a source of heated pressure fluid for circulating said fluid around said nozzle in heat exchange relation therewith, and said casing having an aperture formed therein adjacent the discharge end of said nozzle and in position to discharge said heated pressure fluid onto the adjacent track rail.

4. A track sanding device comprising a nozzle having an elongated tubular body and having a longitudinally extending slot formed therein intermediate its ends, a head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, a fluid conduit connected with one end of said head for injecting a fluid under pressure into said nozzle to discharge accumulated matter therefrom, an enlarged cylindrical heater casing mounted on said nozzle and surrounding at least a portion of said nozzle and said head, the peripheries of said nozzle and said casing being spaced from each other and being in substantially coaxial alignment with respect to one another to form a heating chamber therebetween, means connecting said heating chamber with a source of heated pressure fluid for circulating said fluid around said nozzle in heat exchange relation therewith, and said casing having an aperture formed therein adjacent the discharge end of said nozzle and in position to discharge said heated pressure fluid onto the adjacent track rail.

5. A track sanding device comprising a nozzle having an elongated tubular body and having an elongated longitudinally extending slot formed therein intermediate its ends, an elongated head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, a fluid conduit connected with one end of said head for injecting a fluid under pressure into said nozzle to discharge accumulated matter therefrom, a helical heating coil surrounding at least a portion of said head and said nozzle, one end of said heating coil being connected with a source of heated fluid, an enlarged cylindrical heater casing mounted on said
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nozzle, the peripheries of said nozzle and said casing being spaced from each other to form a heating chamber therebetween, means connecting said heating chamber with a source of heated pressure fluid for circulating said fluid around said nozzle in heat exchange relation therewith, said casing having an aperture formed therein adjacent the discharge end of said nozzle, said heating coil having its discharge end extended through said aperture.

6. A sanding device for railway vehicles comprising a sand discharge pipe having an open discharge end, means for directing an air jet into said open end at a point adjacent thereto to eject sand therefrom, said air jet means having the inner end thereof substantially at the surrounding wall of the pipe, and a heating element coiled around said open end portion of the pipe for preventing the accumulation of ice therein.

7. A track sanding device comprising a nozzle having an elongated tubular body and having an elongated longitudinally extending slot formed therein adjacent the discharge end thereof, air jet means including an elongated head mounted on said nozzle with a portion thereof extending in said slot and having one or more orifices formed therein and communicating with the interior of said nozzle, an enlarged cylindrical heater casing mounted on said nozzle in heat exchange relation therewith and with said head, and means for supplying a heated fluid to said casing.

8. A track sanding device comprising a nozzle having an elongated longitudinally extending slot formed therein adjacent the discharge end thereof, air jet means including an elongated head mounted on said nozzle with a portion thereof extending into said slot and having one or more orifices therein communicating with the interior of said nozzle, coiled heating means surrounding at least a portion of said head and said nozzle and in heat exchange relation therewith, an enlarged cylindrical heater casing mounted on said nozzle and surrounding said coiled heating means and a portion of said nozzle, and means for supplying a heated fluid to said casing.

9. A sanding device for railway vehicles comprising a sand discharge pipe having an open discharge end, said pipe having an opening in a side thereof in close proximity to said open discharge end, a head connected with the opening and terminating substantially at the periphery of the sand discharge pipe without projection into the pipe in the path of sand therethrough, heating means surrounding the sand discharge pipe in heat exchange relation therewith adjacent said open end, and means for supplying air under pressure to the head and discharging the air through the head into the pipe.

10. A track sanding device comprising a nozzle having an elongated tubular body and having an elongated slot in the surrounding wall thereof extending longitudinally of the body and formed therein adjacent the discharge end thereof, and an air jet head mounted on the nozzle and having an elongated portion thereof extending in the slot with an inner wall substantially at the surrounding wall of the body, said inner wall of the elongated portion having a plurality of orifices in the inner side thereof opening into the tubular body and spaced lengthwise of said head.

11. A track sanding device comprising a nozzle having an elongated tubular body with a surrounding wall, said surrounding wall having an opening in the side thereof adjacent the discharge end thereof, an air jet head having an enclosed chamber, means mounting the head on the body with a portion thereof extending in the opening and terminating substantially at the inner face of the surrounding wall without projecting into the interior of the body, said head having a plurality of orifices in said inner portion thereof arranged to direct fluid from the head into different longitudinally spaced portions of the nozzle to discharge sand therefrom, and means connected with the head for supplying fluid under pressure thereto.

HARRY G. FOSTER.

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