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SAND PIPE NOZZLE

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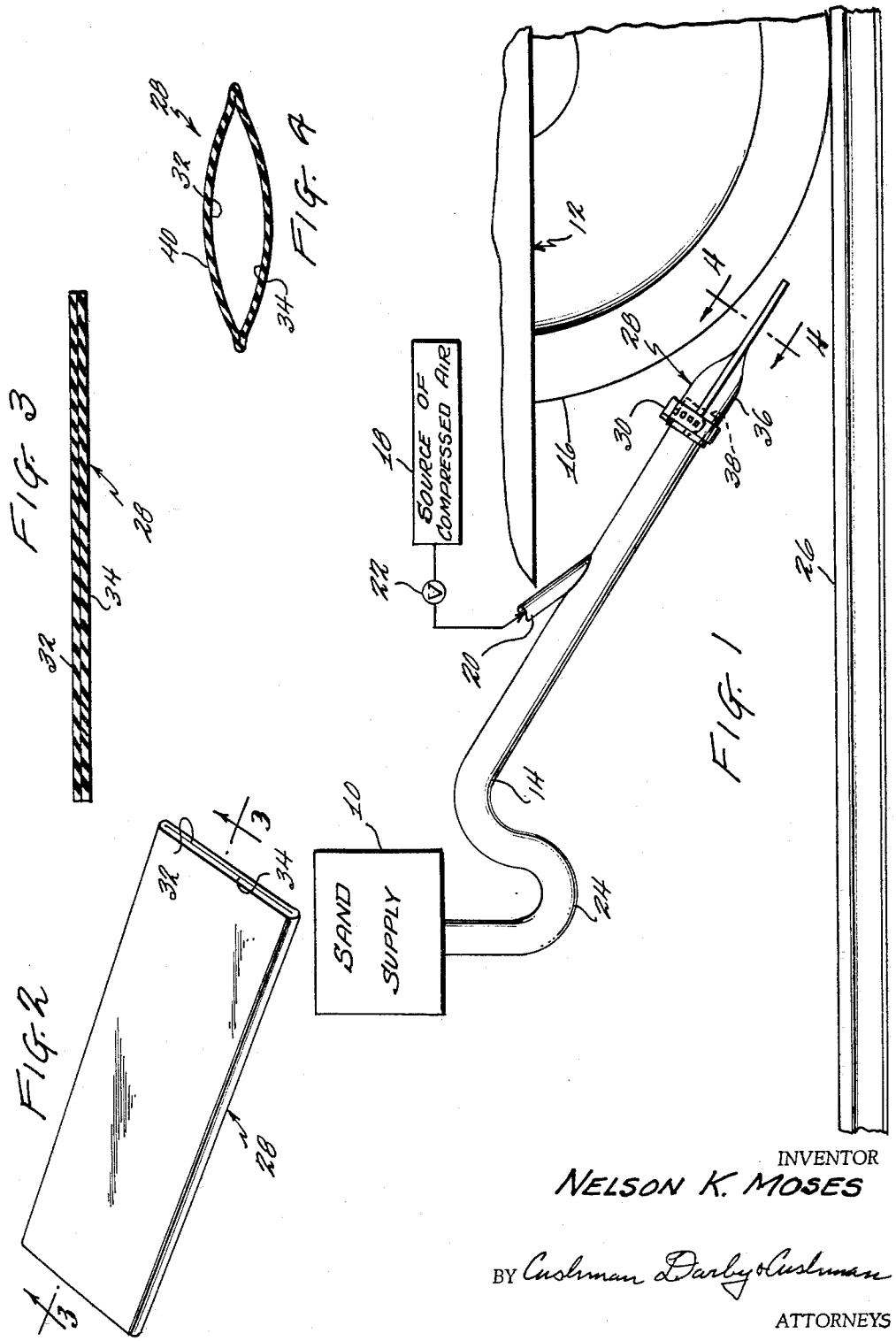

INVENTOR

NELSON K. MOSES

BY Cushman Darby & Cushman

ATTORNEYS

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SAND PIPE NOZZLE

Nelson K. Moses, Ashtabula, Ohio, assignor to Railroad Rubber Products, Inc., Ashtabula, Ohio, a corporation of Florida

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The present invention relates to sanding devices for directing sand in front of wheels of rolling stock and, more particularly, to a sanding valve nozzle for discharging sand from a delivery pipe onto railway rails beneath the wheels of railway rolling stock.

It is customary and well-known to discharge dry sand when required onto the rails and beneath the wheels of rolling stock to assist in the braking or the traction of the rolling stock. For many years, such equipment has comprised a sand hopper which is usually heated so as to maintain the sand therein dry, a discharge pipe leading from the hopper and extending to an area adjacent the wheels and rails and a source of compressed air for propelling or sucking the sand from the hopper through the discharge pipe. The source of compressed air, which is operable through suitable valve means by the railroad engineer, delivers air under pressure at approximately one pound per square inch through suitable tubing to the sand pipe and usually creates a suction to draw sand from the hopper, discharging the same through the end of the pipe.

The prior conventional sanding device described above and used by the railroads has a disadvantage of clogging should the sand in the pipe or hopper become wet from water or mist sprayed by the wheels of the rolling stock. Also, in inclement freezing weather the ends of the pipe would become clogged with dirt and water thrown up by the wheels, the dirt and/or water freezing over and blocking the end of the pipe. The air pressure normally needed for dispensing sand was not sufficient to blast through such frozen dirt or ice and, consequently, the railroads have heretofore carried an elongated rod in which the service men at frequent intervals would check the sand pipe and related equipment to free the same of any debris or ice. Since it was difficult to clean the pipe while the rolling stock is moving, oftentimes the sanding devices became inoperative at the very time their operation was needed, namely, when the railroad rolling stock is operating during inclement weather.

To obviate the above undesirable conditions, efforts have heretofore been made to provide nozzles on the sand pipe which will reduce or lessen the chance of the sand becoming wet or the end of the pipe being clogged. For example, mechanical valve structures have been proposed for closing the end of the pipe when not in use. However, such mechanical valve structures required special actuators and redesigning of existing equipment and their operation has not proven satisfactory in that their linkage and valve operating members became clogged under conditions of inclement weather, especially when the weather is freezing. The cleaning of such valve structure was a laborious operation. Railroads have been reluctant to use mechanically actuated nozzle valves because of the cost involved in installation and upkeep as well as because the operation was not completely satisfactory.

Other types of nozzles developed for the delivery end of sand pipes include one-piece tubular bodies formed of

an elastic material, the tubular bodies being so molded as to provide a tapered, constantly open outlet with special internal trap chambers and the like. In each instance, the tubular bodies of such nozzles have an opening of reduced area as compared to the outlet area of the sand pipe, the principle being that if the opening becomes clogged, the air pressure propelling the sand will flex the walls and break the ice therefrom. Such nozzles made of the elastic material have to some extent minimized the clogging but by being constantly open at their ends, they still permitted moisture and humidity to travel upwardly through the sand pipe which oftentimes caused the sand to become wet, thus clogging the same. In addition, when ice formed on the interior of the nozzle, as well as on the exterior of the nozzle, the normal air pressure used to dispense sand was not enough to cause the walls of the nozzle to flex sufficiently to break the clogged end of the same.

An object of the present invention is to provide a sand valve nozzle made of elastomeric material which normally coses the end of the sand pipe to the ingress of water or humidity but will open automatically by the application of the air pressure necessary to cause the flow of sand from the sand hopper.

Still another object of the present invention is to provide a sand nozzle having an automatic valve effect, the sand nozzle also having a discharge opening capable of extension to the full size of the cross-sectional dimension of the sand pipe so that the pressure necessary for opening the sand nozzle need not be increased over the normal low pressure used to discharge sand from the hopper.

A still further object of the present invention is to provide a sand valve nozzle made of an elastomeric material which can be inexpensively made by a simple extrusion and pressing process.

Another object of the present invention is to provide a sand valve nozzle made from elastomeric material and so constructed as to insure proper distribution of sand regardless of weather conditions, the valve nozzle being operated automatically by the air pressure dispensing the sand.

These and other objects and advantages of the present invention will appear more fully from the following specification, claims and drawings in which:

FIGURE 1 is a diagrammatic view illustrating the use of the present invention with the wheel of railway rolling stock;

FIGURE 2 is an enlarged perspective view of the sand valve nozzle of the present invention prior to its insertion or attachment onto the end of a sand pipe;

FIGURE 3 is a longitudinal sectional view taken substantially on the line 3—3 of FIGURE 2 and illustrating the relaxed condition of the walls of nozzle prior to attachment on the sand pipe; and

FIGURE 4 is a sectional view of the sand valve nozzle of the present invention taken substantially on the line 4—4 of FIGURE 1 but showing the end portion of the nozzle in its open position for dispensing sand rather than in the closed position as shown in FIGURE 1.

Referring now to the drawings wherein like characters or reference numerals represent like or similar parts, the present invention is illustrated as an attachment in sanding equipment ordinarily used with the railroad rolling stock or the like. It will be understood that the wheels of the rolling stock where the sanding equipment is ordi-

narily used may be either drive or traction wheels or any of the wheels of the rolling stock which may be braked. Also, while the invention is primarily intended for use with railway rolling stock, it could be used on any rolling stock where better traction or braking is desired, such as buses, automobiles and the like.

In more detail, the usual or conventional sanding equipment includes a sand supply hopper or reservoir 10 suitably supported on the frame structure of the railway rolling stock generally indicated at 12, a sand pipe 14 having one end connected to the sand hopper 10 and the other or discharge end positioned adjacent a wheel 16 and a source of compressed air 18. The source of compressed air 18 supplies compressed air at a pressure of approximately one pound per square inch through a pipe 20 to the sand pipe 14. A valve 22 operable by the train engineer controls the application of compressed air through the pipe 20 to the pipe 14, and it will be understood that when compressed air is applied through the pipe 20 it will cause the sand from hopper 10 to be supplied through the usual sand trap 24 to the pipe 14 where it is discharged beneath the wheel 16 onto the rail 26.

As mentioned at the outset of the specification, it is extremely important that the sand supply remain dry at all times in order that there can be a flow of the material when such a condition is desired. Consequently, it is the usual practice to position the sand hopper 10 on the frame structure 12 in such a place that no moisture can get into the same. Additionally, the hopper 10 is oftentimes heated by a dry heat so that the sand therein remains dry and flowable.

As illustrated in FIGURE 1, the sand valve nozzle 28 of present invention is shown attached to the end of the sand pipe 14 by means of a hose clamp 30 or other suitable clamping means. The sand valve nozzle 28 is made of an elastomeric material such as a natural rubber, neoprene, a combination of natural rubber and neoprene, a synthetic rubber, and plastics or the like. In other words, any elastomeric material having the resilient properties of rubber can be used for the sand valve nozzles of the present invention.

The sand valve nozzle 28 is made by extruding rubber or the like into a tubular piece of rubber having substantially the same interior diameter as the exterior diameter of the sand pipe 14 to which the nozzle is to be attached. The wall thickness of the extruded piece of tubular material is preferably approximately one-sixteenth of an inch, thus providing the necessary flexibility and resiliency to the tubing, as will be explained in more detail later in the specification. After the tubing is extruded, it is then passed through a pair of presser rolls so as to cause the tubing to assume a flat ribbon or band-like shape, as shown in FIGURES 2 and 3. When rolled flat, as shown in FIGURES 2 and 3, the interior of the tubing is defined by a pair of walls 32 and 34 which lie in substantially contiguous relationship because of the internal stresses in the elastomeric material resulting from the pressing operation. The tubing thus formed may then be cut into nozzles of suitable lengths of approximately six inches, the width of the tubing being approximately two inches.

The tubing after being cut to its proper length is then ready for installation on the end of the sand pipe 14, as shown in FIGURE 1. This is accomplished by expanding one end of the tubing over the end of the pipe 14, as shown in FIGURE 1 and then clamping the same thereon by the clamp 30. When this is accomplished, it will be noted that the longitudinal portion 36 of the tubing which is immediately adjacent the end 38 of the pipe 14 is circular in cross-section but tapers down to a flat ribbon-like end portion 40. Because of the internal stresses in the elastomeric material, the end portion 40 will have its internal walls normally in a contiguous closed relationship. However, additional stresses are created in the flat ribbon-like end portion 40 due to the expansion of the portion 36 from a flat section to a tapered section when it is applied over the end 38 of the pipe 14. These additional stresses assist the internal stress in returning the walls of the portion 40 to their contiguous closed relationship with each other.

As shown in FIGURE 4, the end portion 40 of the sand valve nozzle 28 opens up when compressed air is supplied to the pipe 14 to discharge sand therethrough. The internal walls 32 and 34 of the portion 40 spread apart and provide an unrestricted opening for discharging the sand in a spray substantially as wide as the spray from a sand pipe not having a valve nozzle. When the pressure of compressed air is cut off, the internal and other stresses in the end portion 40 cause the walls 32 and 34 to return to their normal closed position and thus prevent the ingress of moisture, dirt or the like. By having the thickness of the walls of the tubular band approxiimately one-sixteenth of an inch, the proper opening and closing may be obtained with a minimum pressure such as a pressure of approximately one pound per square inch normally used to dispense sand from conventional sanding equipment.

As will now be apparent, the present invention provides a simple, economical and efficient sand valve nozzle for use with conventional sanding equipment. The sand valve nozzle fully accomplishes the objects and advantages of the invention in that it positively prevents ingress of foreign matter, such as water, dirt and the like into the sand pipe, as it remains closed until the sand control valve is open. Because of its flexibility and because it has no moving parts, it will operate in any kind of inclement weather.

The improved sand valve nozzle heretofore described and illustrated in the drawings is susceptible to some modifications and changes without departing from the spirit and principles of the invention involved. Therefore, the terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being described in the claims.

What is claimed is:

1. A sand nozzle for directing sand adjacent the wheels of rolling stock, the nozzle being attached to an end of a sand pipe through which sand is delivered under air pressure, said nozzle comprising an elongated tubular element made of an elastomeric material having flexibility and resiliency, said tubular element being adapted to be disconnected from the end of the sand pipe and when attached to the end of the sand pipe having a longitudinal portion adjacent thereof tapering from a substantially circular cross-section into a flat ribbon-like portion, said flat ribbon-like portion having interior walls normally pressing together in a relaxed substantially contiguous relationship because of first internal stresses in the elastomeric material, said flat ribbon-like portion having additional stresses created therein due to expansion of the longitudinal portion tapering from the substantially circular cross-section into the flat ribbon-like portion, which additional stresses assist the first internal stresses in retaining the interior walls in contiguous relationship, said walls having a cumulative width substantially equal to the internal circumference of the longitudinal portion of the tubular element immediately adajcent its point of attachment to the sand pipe, said walls being opened by pressure of air when air is applied to dispense the sand beneath the wheels of the rolling stock.

2. In combination with a sand pipe to direct sand delivered by air pressure beneath the wheels of rolling stock, a sand valve nozzle made from an elongated flat band of elastomeric material having flexibility and resiliency, said band having a width equal to approximately one-half of the circumference of the end of said sand pipe to which the nozzle is attached and having a wall thickness in the order of one-sixteenth of an inch, one end of said flat band being expanded and extended over and attached to the end of the sand pipe with the

other end of said flat band remaining substantially flat and having its interior walls maintained in a contiguous relationship because of first internal stresses in the elastomeric material, said other end having additional stresses created therein due to said one end being expanded and extended over and attached to the end of the sand pipe, which aditional stresses assist the first internal stresses in retaining the interior walls in contiguous relationship, said other end defining a closed end of said nozzle, the closed end of said nozzle being adapted to be opened by pressure of the air delivering the sand and closed by the first internal stresses and additional stresses in the elastomeric material when air pressure is cut off.

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