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(54) **Particulate delivery device for a locomotive**

(57) A particulate delivery plumbing system (8) for a locomotive including a body portion (38) having a through hole (24) formed therethrough. A particulate charge inlet opening is provided at a first end (40) of the plumbing, and a particulate outlet opening is provided

at a second end (42) of the plumbing. A pair of spaced-apart protective guide members (54,55) extend from the body portion at the second end and straddle the particulate outlet opening to define a slot (64) between the protective guide members through which particulate may be deposited onto a locomotive rail.

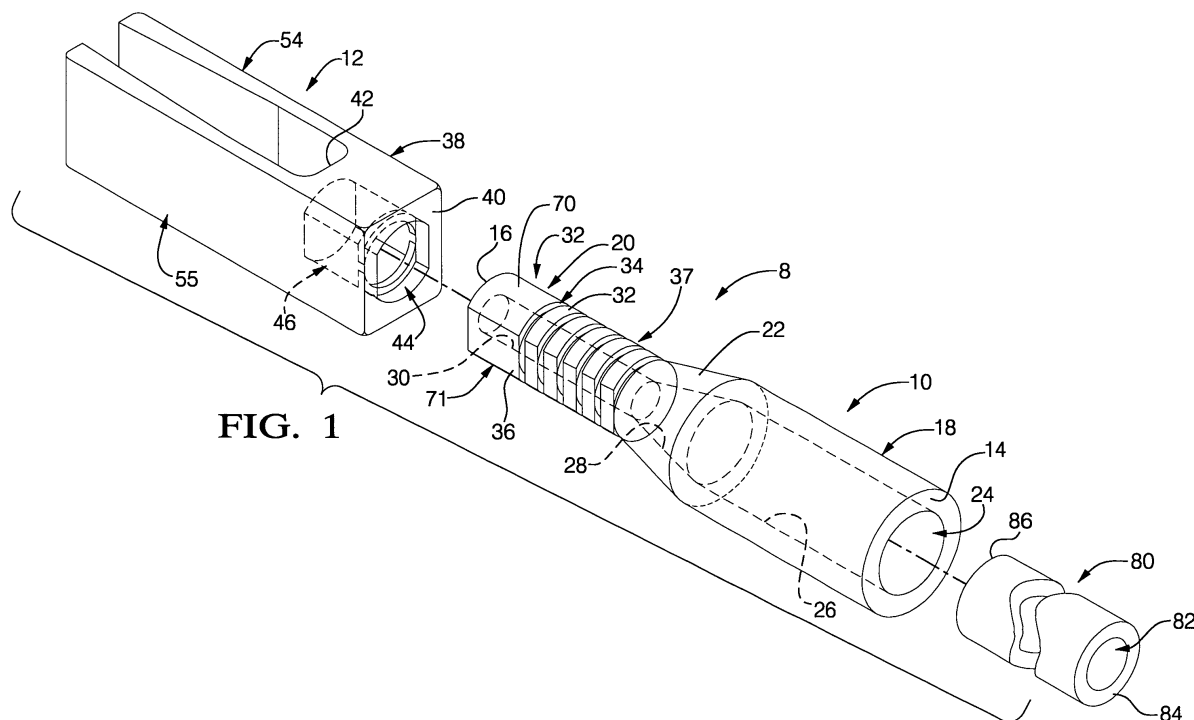


FIG. 1

Description

TECHNICAL FIELD

[0001] This invention relates to a particulate delivery system for a locomotive, and more particularly to a particulate delivery system including a particulate guide.

BACKGROUND OF THE INVENTION

[0002] Locomotive on-board particulate delivery systems have been used to deposit sand or another particulate onto the leading edge of a rail in front of the locomotive engine drive wheels to provide improved traction under a variety of circumstances. Typically, these systems have included a sand reservoir such as a storage bin filled with sand and constructed or arranged to either manually or automatically charge sand into a conduit, such as a flexible hose, that is connected to the sand bin at one end. A nozzle is usually attached to a second end of the hose. The nozzle is generally tubular shaped, having a through hole formed therethrough with one end of the nozzle receiving the hose and the other end having a round discharge opening for depositing sand onto a railroad track at a location immediately in front of the engine drive wheels.

[0003] These prior systems had a number of shortcomings. Typically, the nozzle was attached to the hose in a manner that made it difficult to adjust the positioning of the nozzle discharge opening to take in to account varying environmental and operating conditions. As a result, a substantial amount of sand would be discharged through the nozzle. Often, the discharged sand would have a wide path, with a substantial amount of the sand missing the rail. Further, the sand would be discharged at a relatively high velocity, resulting in the sand ricocheting off the rail. As a result, the storage bins were often quite large, taking up a substantial amount of room, and were very heavy.

[0004] Another problem associated with these prior art particulate delivery systems is that moisture could easily enter the discharge opening of the nozzle. As a result, sand would stick to the wet surfaces of the hose and the nozzle, causing blockages. Further, if moisture entered the discharge opening of the nozzle, it would often freeze and block the particulate delivery system. Another problem associated with these prior particulate delivery systems is that wind could blow the sand exiting the nozzle discharge opening, causing the sand to totally miss the rail.

[0005] The present invention overcomes some of the deficiencies of the prior art and provides alternatives and advantages thereto.

SUMMARY OF THE INVENTION

[0006] The present invention includes a particulate delivery system that deposits a particulate, such as

sand, onto a locomotive rail in a more precise and accurate manner and using substantially less particulate. The particulate delivery system prevents or dramatically reduces the impact of wind on the discharged sand, resulting in a higher percentage of the sand being accurately deposited on the rail. The system also drastically reduces the frequency of blockages due to moisture or freezing.

[0007] One embodiment of the invention includes particulate delivery plumbing having a body portion and a through hole formed therethrough. A particulate charge inlet opening is provided at one end of the body portion and an outlet opening at a second end. A pair of spaced-apart protective guide members extend from the body portion at the second end of the plumbing and straddle the particulate outlet opening. Each of the protective guide members may have a wall with a first end attached to the body portion and a second free end. Each wall has an inner face extending from the body portion to the free end to define a slot between the inner faces of the protective guide members. The inner faces may include first portions that are parallel to each other and second portions that are tapered toward each other. The particulate delivery plumbing may include a hose, a nozzle and a particulate guide. Preferably, the nozzle is connected to one end of the hose and a particulate guide connected to the nozzle. The hose, nozzle and particulate guide may be separate pieces that are connected together, or the particulate delivery plumbing may be a single continuous integral piece of material.

[0008] The particulate delivery plumbing system may include a nozzle having a body portion and a through hole formed therethrough to provide a particulate charging inlet opening at a first end and a particulate outlet opening at a second end. The body portion of the nozzle may include an outer surface having a first locking feature. The first locking feature may be a slot formed in the outer surface of the nozzle body portion. A particulate guide is provided having a body portion with a through hole formed therethrough to provide a particulate charging inlet opening at a first end and a particulate outlet opening at a second end, and a pair of spaced-apart protective guide members extending from the body portion at the second end and straddling the particulate outlet opening of the guide member. These spaced-apart protective guide members define a slot therebetween for discharging particulate from the particulate discharge plumbing system onto a locomotive rail. Preferably, the particulate guide includes an inner wall defining the through hole formed in the body portion of the particulate guide. The particulate guide inner wall may include a second locking feature mateable with the first locking feature on the nozzle to releasably lock the particulate guide and the nozzle together. The second locking feature may be a rib formed on the inner wall and extending inwardly into the through hole cavity. The particulate guide is constructed and arranged to receive a portion of the nozzle so that the rib extending from the

inner wall is received in the slot formed in the outer surface of the body portion of the nozzle to connect the nozzle and the particulate guide together. The nozzle may include a plurality of slots formed in the outer surface constructed and arranged so that the particulate guide may be adjustably connected to the nozzle so that the rib may be received in any one of the slots as desired to adjust the position of the guide. Preferably, the protective guide members of the particulate guide include a wall having a first end attached to the body portion of the particulate guide and a second free end. The wall includes an inner face extending from the body portion of the particulate guide to the free end so that a slot is provided between the inner faces of the protective guide members. Preferably, each of the inner faces of the wall includes a first portion and a second portion. The first portions of the inner faces are parallel to each other, and the second portions of the inner faces are tapered toward each other.

[0009] These and other objects, features and advantages of the present invention will become apparent from the following brief description of the drawings and appended claims and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Figure 1 is an exploded view of a particulate delivery system according to the present invention including a hose, a nozzle and particulate guide;

[0011] Figure 2 is an enlarged, sectional, side view of a nozzle and particulate guide in a coupled position according to the present invention;

[0012] Figure 3 is an enlarged, sectional, top view of a nozzle and particulate guide in a coupled position according to the present invention;

[0013] Figure 4 is an enlarged, sectional, end view of the particulate guide according to the present invention; and

[0014] Figure 5 is an illustration of a locomotive having a particulate delivery system according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Figure 1 illustrates a particulate delivery system 8 according to the present invention including a hose 80, a nozzle 10, and a particulate guide 12. The hose 80 has a through hole 82 formed therethrough from a first end 84 to a second end 86. The first end 84 of the hose 80 may be connected to a particulate reservoir such as a sand bin to be described in greater detail hereafter. The second end 86 of the hose 80 may be connected to the nozzle 10.

[0016] The nozzle 10 includes a first end face 14 and a second end face 16. A hose coupling section 18 is provided adjacent the first end face and a spout section 20 is provided adjacent the second end face 16. A transition section 22 is positioned between the hose cou-

pling section 18 and the spout section 20. A through hole 24 is formed through the nozzle 10 from the first end face 14 to the second end face 16. Accordingly, the first end face 14 has a particulate charging inlet opening formed therein by the through hole 24, and the second end face 16 has a particulate outlet opening formed by the through hole 24. The through hole 24 is defined by an inner wall 26 in the coupling section 18 and preferably is constructed and arranged so that the second end 86 of the hose 80 may be received in the hose coupling section 18. The transition section 22 includes an inner tapered wall 28 that defines a portion of the through hole 24. The spout section 20 includes an inner wall 30 defining a section of the through hole 24. The spout 20 includes an outer surface 32. A plurality of first locking members is formed on the outer surface 32 of the spout and preferably include a plurality of slots 34 formed in the outer surface 32 of the spout 20. The outer surface 32 of the spout is generally cylindrical but preferably includes a first flat face 36 and a second flat face 37 which serve as alignment features in coupling the nozzle 10 to the particulate guide 12. The spout section 20 also includes an upper curved surface 70 and a lower curved surface 71 that each bridge between the flat surfaces 36, 37.

[0017] The particulate guide 12 includes a body portion 38 having a first end face 40 and a second end face 42 and a through hole 44 extending from the first end face 40 to the second end face 42. The through hole 44 is defined by an inner wall 46 of the particulate guide 12. As can be best seen from Figure 4, the inner wall 46 (shown in Figure 1) includes a first flat face 48 and a second flat face 49. An upper curved surface 50 and a lower curved surface 51 are provided bridging the first and second flat faces 48, 49 of the inner wall of the particulate guide. A second locking member matable with the first locking member is provided on the inner wall 46 of the particulate guide. Preferably, the second locking feature is a rib 52 which extends from either or both of the curved surfaces 50, 51 and is constructed and arranged to be received in one of the slots 34 formed in the outer surface of the spout of the nozzle (Figure 2).

[0018] As shown in Figure 3, first and second protective guide members 54, 55 are provided, each having a first end 56, 57 attached to the body portion 38 of the particulate guide 12 and each include a second free end 58, 59. Preferably, the protective guide members 54, 55 include an outer flat face 60, 61 and an inner face 62, 63. A slot 64 is defined between the inner faces 62, 63 of the particulate guide members 54, 55. Each of the inner faces 62, 63 includes a first portion 74, 75 and a second portion 76, 77. The first portions 74, 75 of each particulate guide member are parallel to each other, and the second portions 76, 77 are tapered toward each other.

[0019] The spaced-apart protective guide members 54, 55 of the particulate guide and the slot 64 defined therebetween serve to focus and concentrate the sand

as it is being discharged from the through hole 44 in the particulate guide so that a greater percentage of the particulate (sand) being discharged from the particulate delivery system lands and stays on the locomotive rail. Further, the outwardly extending protective guide members 54, 55 prevent wind from blowing the sand away before it has an opportunity to land on the rail. The outwardly extending protective guide members 54, 55 also make it less likely for moisture to be splashed into the through hole of the particulate guide, nozzle or hose. The second portion 76, 77 of the inner face 62, 63 of the protective guide members focus the sand and prevent the sand discharge profile from widening and missing the rail. The spaced-apart protective guide member 54, 55 also reduces the force and velocity of the sand to greatly reduce the likelihood of the sand ricocheting off the rail. Preferably, the hose, nozzle and particulate guide are made from a resilient yet flexible material such as nitrile rubber. The particulate guide, nozzle and hose may be separate, individual pieces coupled together, or they may be a single piece of continuous integral material or combinations thereof.

[0020] Figure 5 illustrates a system according to the present invention including a sand bin or tank 100 including sand therein. A valve 102 may be provided at the bottom of the sand bin 100 at the discharge opening. The hose 80 is connected to the valve 102 at one end and to the nozzle 10 at the other end. A particulate guide 12 is connected to the nozzle 10 and positioned to deposit sand onto a rail 104 immediately in front of the drive wheel 106 of the locomotive. A computer processing unit 108 may be provided and connected to the valve 102 to automatically control the discharge of sand from the sand bin 100 based upon signals received from sensors on the locomotive under a variety of different operating conditions. The movement of the drive wheel and the locomotive in the forward direction is generally shown by the arrow labeled "Direction of Travel".

[0021] The present invention greatly reduces the amount of sand used for traction in locomotives compared to prior particulate delivery systems and therefore reduces the size of the sand bin required to be carried by the locomotive.

Claims

1. A product comprising:

particulate delivery plumbing comprising a body portion and a through hole formed therethrough to provide a particulate charging inlet opening at a first end of the plumbing and a particulate outlet opening at a second end of the plumbing, a pair of spaced-apart protective guide members extending from the body portion at the second end of the plumbing and straddling the particulate outlet opening.

2. A product as set forth in claim 1 wherein each of the protective guide members includes a wall having a first end attached to the body portion and a second free end, and an inner face extending between the body portion and the second free end to define a slot between the inner faces of the protective guide members.

3. A product as set forth in claim 2 wherein each of the inner faces includes a first portion and a second portion, and wherein the first portions of the inner faces are parallel to each other and the second portions are tapered toward each other.

4. A product as set forth in claim 1 wherein the particulate delivery plumbing includes a hose.

5. A product as set forth in claim 1 wherein the particulate delivery plumbing includes a nozzle.

6. A product as set forth in claim 1 wherein the particulate delivery plumbing includes a particulate guide.

7. A product as set forth in claim 1 wherein the particulate delivery plumbing includes a particulate guide connected to a nozzle.

8. A product as set forth in claim 7 wherein the particulate guide is adjustably connected to the nozzle.

9. A product as set forth in claim 1 wherein the particulate delivery plumbing includes a particulate guide connected to a hose.

10. A product as set forth in claim 9 wherein the particulate guide is adjustably connected to the hose.

11. A product as set forth in claim 1 wherein the particulate guide delivery plumbing comprises a single continuous integral piece of material.

12. A product as set forth in claim 1 wherein the particulate delivery plumbing comprises a particulate guide connected to a nozzle, and wherein the nozzle is connected to a hose.

13. A product as set forth in claim 12 wherein the particulate guide and nozzle comprise a single continuous integral piece of material.

14. A product as set forth in claim 12 wherein the particulate guide is adjustably connected to the nozzle.

15. A product comprising:

a locomotive particulate delivery plumbing system comprising a nozzle having a body portion and a through hole formed therethrough to pro-

vide a particulate charging inlet opening at a first end and a particulate outlet opening at a second end of the body portion of the nozzle, and wherein the body portion of the nozzle includes a first locking feature;

a particulate guide having a body portion with a through hole formed therethrough to provide a particulate charging inlet opening at a first end and a particulate outlet opening at a second end, and a pair of spaced-apart protective guide members extending from the body portion of the protective guide and straddling the particulate outlet opening, and wherein the spaced-apart protective guide members define a slot therebetween for discharging particulate from the particulate delivery plumbing system onto a locomotive rail.

16. A product as set forth in claim 15 wherein each of the protective guide members includes a wall having a first end attached to the body portion of the particulate guide and a second free end, and an inner face extending from the body portion of the particulate guide to the free end, and wherein the slot is located between the inner faces of the protective guide members.

17. A product as set forth in claim 15 wherein the body portion of the particulate guide further includes an inner wall defining the through hole through the body portion of the particulate guide, and the particulate guide further comprising a second locking feature matable with the first locking feature on the nozzle to connect the nozzle and a particulate guide together.

18. A product as set forth in claim 17 wherein the second locking feature comprises a rib formed on the inner wall defining the through hole through the body portion of the particulate guide.

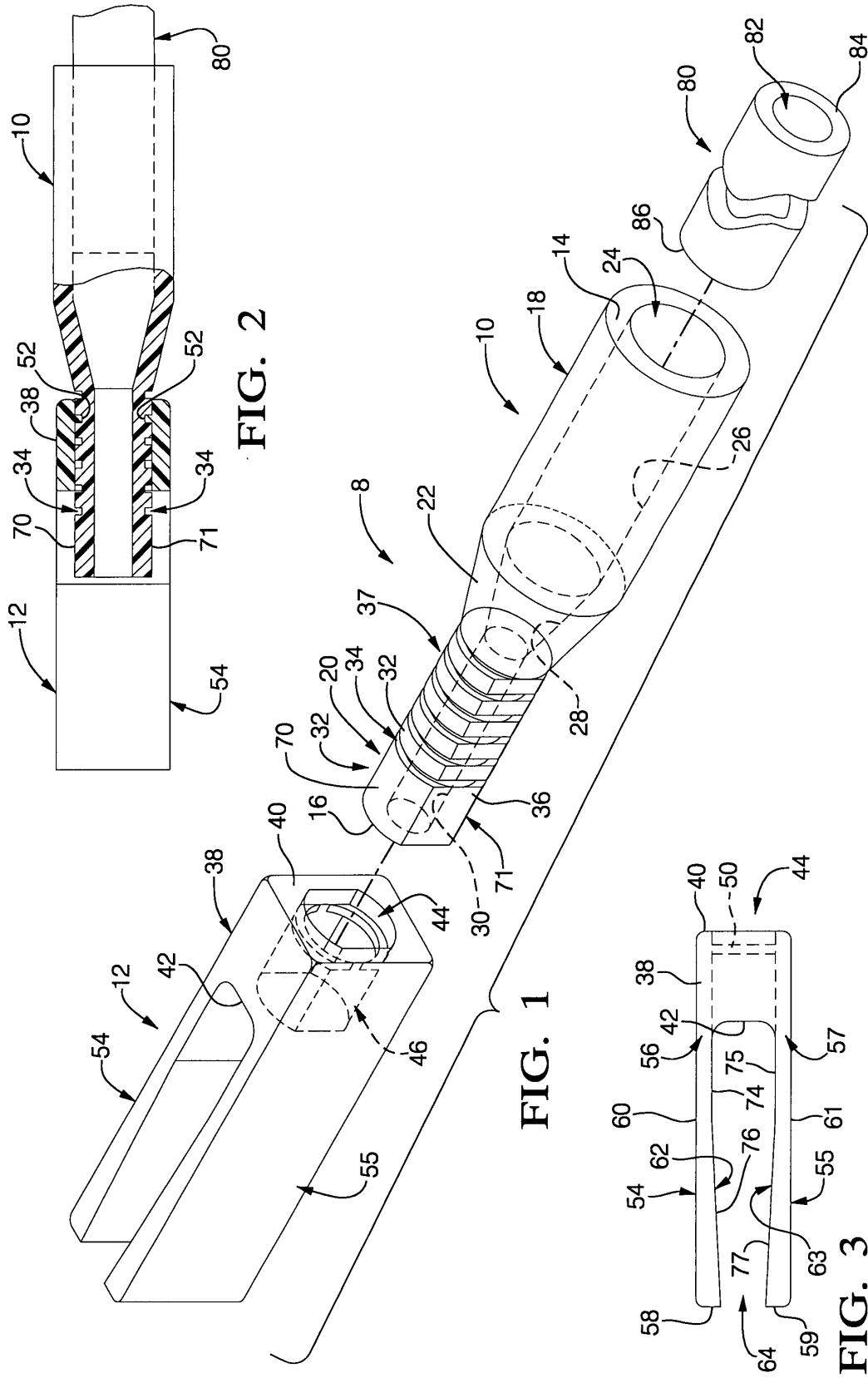
19. A product as set forth in claim 17 wherein the first locking feature on the nozzle comprises at least one slot formed in the outer surface of the nozzle and constructed and arranged so that the rib of the particulate guide may be received in the slot.

20. A product as set forth in claim 19 further comprising a plurality of slots formed in the outer surface of the nozzle and constructed and arranged so that the particulate guide may be adjustably connected to the nozzle wherein the rib may be received in one of the slots.

21. A product as set forth in claim 16 wherein each of the inner faces includes a first portion and wherein the first portions are parallel to each other, and wherein each of the inner faces further includes a

second portion, and wherein the second portions are tapered toward each other.

22. A product as set forth in claim 21 wherein the second portion is near the second free end of the particulate guide member.



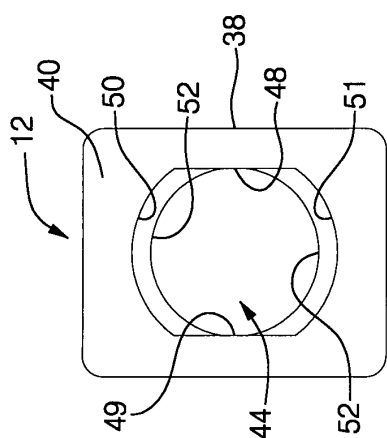


FIG. 4

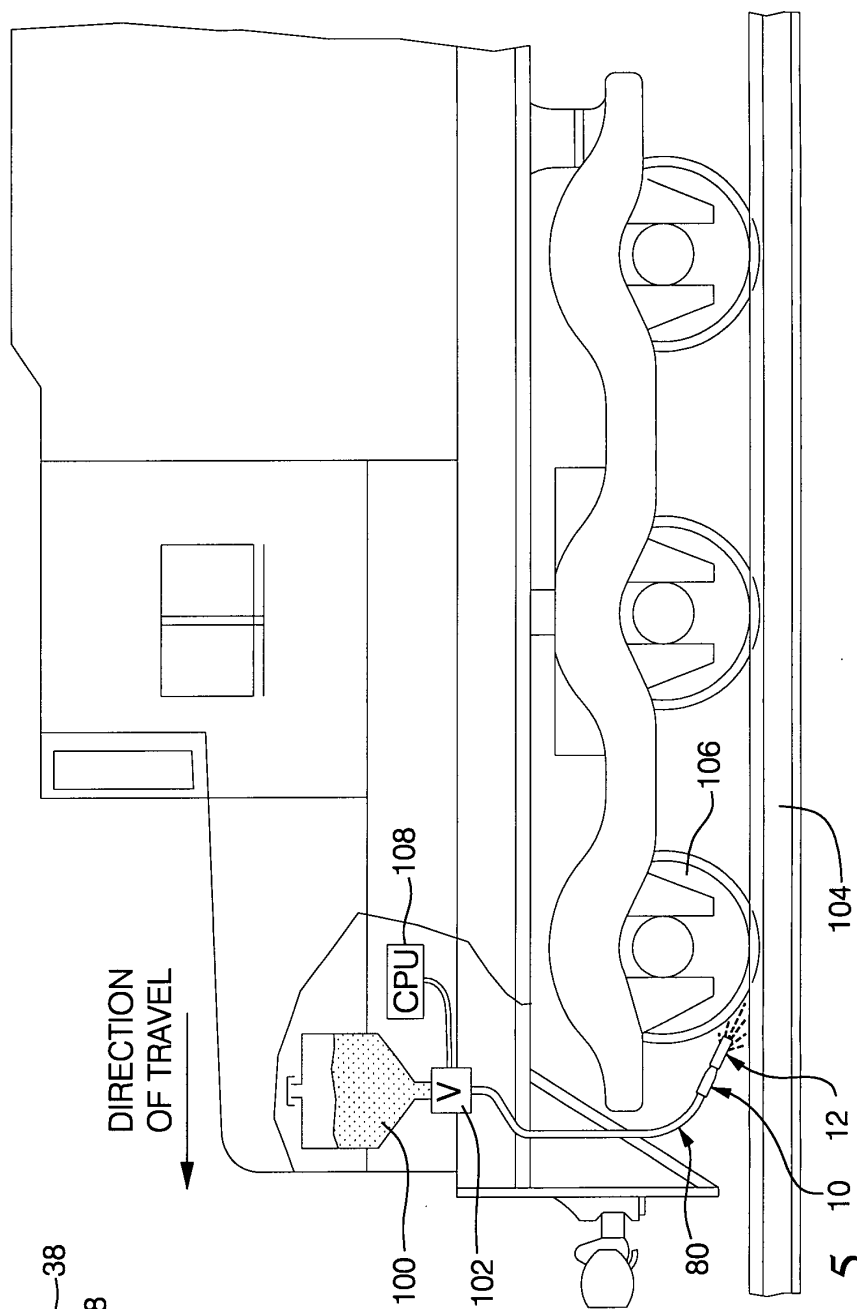


FIG. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 2199

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) B61C B60T B05B
Place of search MUNICH		Date of completion of the search 25 October 2002	Examiner Fuchs, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 02 01 2199

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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