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US 4448352 A **US 4274586 A**

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(54) Abstract Title: **Road repair material dispensing system**

(57) The road repair material dispensing apparatus, primarily for dispensing a flowable material such as tar for filling cracks and joints, comprises a dispensing head 10 that defines a chamber 16 with an inlet 18 through which a road repair material may be supplied to the chamber, a nozzle 22 defined by an aperture in a side wall of the dispensing head and an actuator 24 operable to selectively render the nozzle in fluid communication with the chamber. The nozzle may be defined solely by the aperture in the side wall of the dispensing head. The chamber preferably has an outlet 20 from which the road repair material may be withdrawn from the chamber. The actuator may comprise a gate valve mounted within the chamber that defines a passage 32 and is displaceable between a first position occluding the nozzle from the chamber and a second position exposing the nozzle to the chamber. When in the second position, the inlet, the outlet and the nozzle may each be in fluid communication with each other. The actuator may include a handle 30 located externally of the dispensing head. The chamber is preferably cylindrical with the gate valve being a ball valve. The apparatus preferably includes a reservoir for unheated tar, which is pumped to the dispensing head with any unsprayed tar being returned to the reservoir. The apparatus may also include a hopper and a system for conveying material from the hopper onto a bead of tar which has been sprayed from the dispensing head. The apparatus may include at least one drive wheel and a brush positioned downstream of the nozzle for spreading tar dispensed from the apparatus.

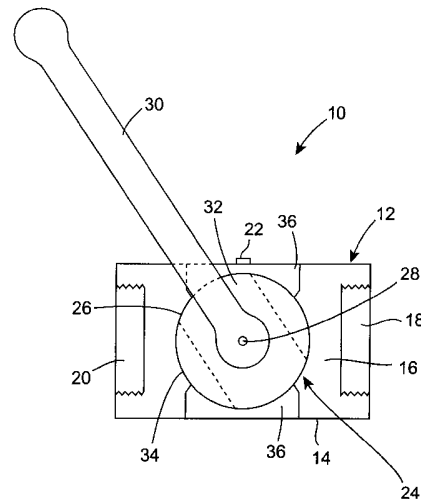


Fig. 2

GB 2420144 A continuation

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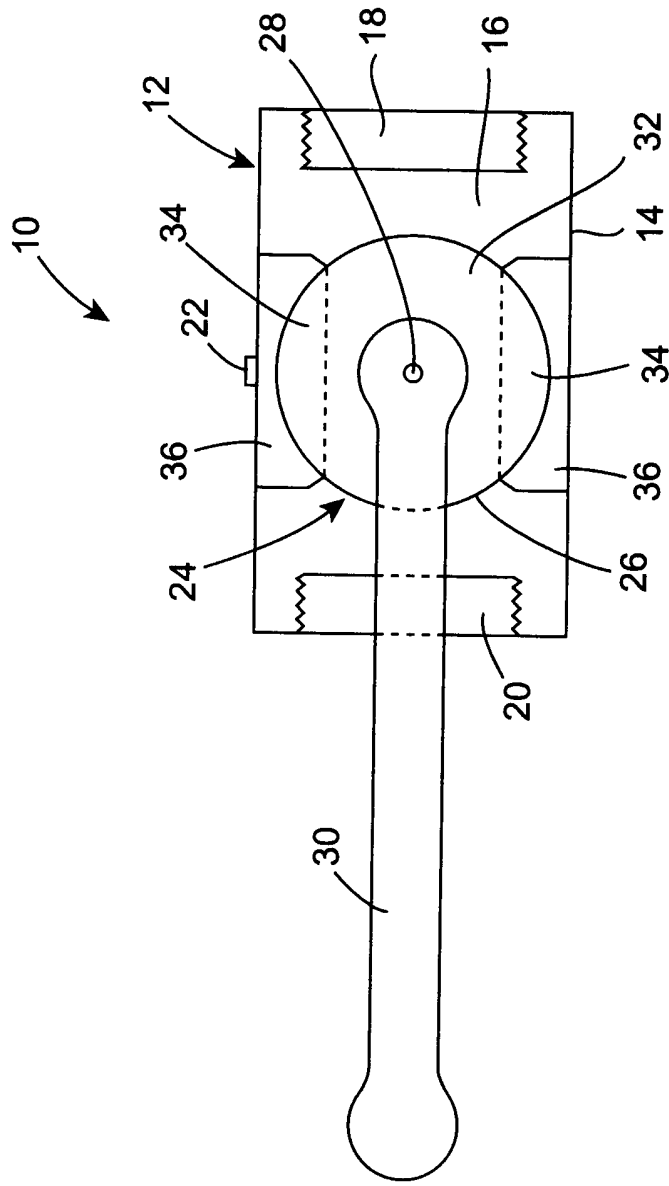


Fig. 1

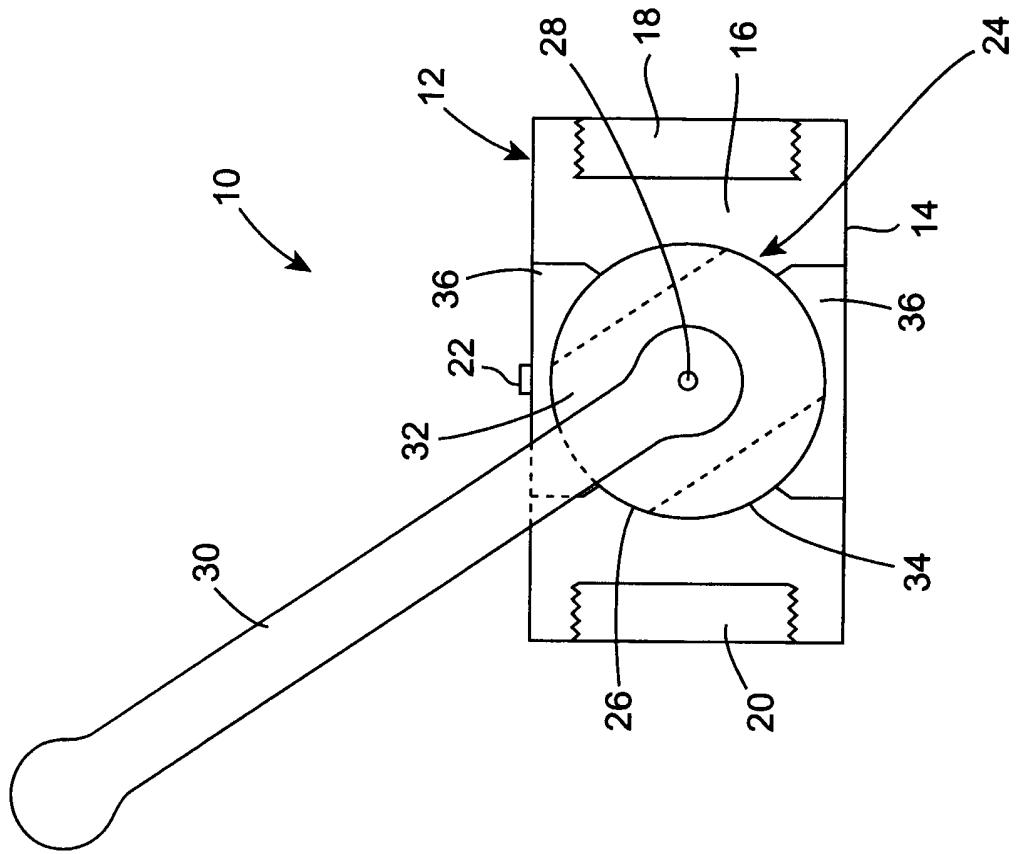


Fig. 2

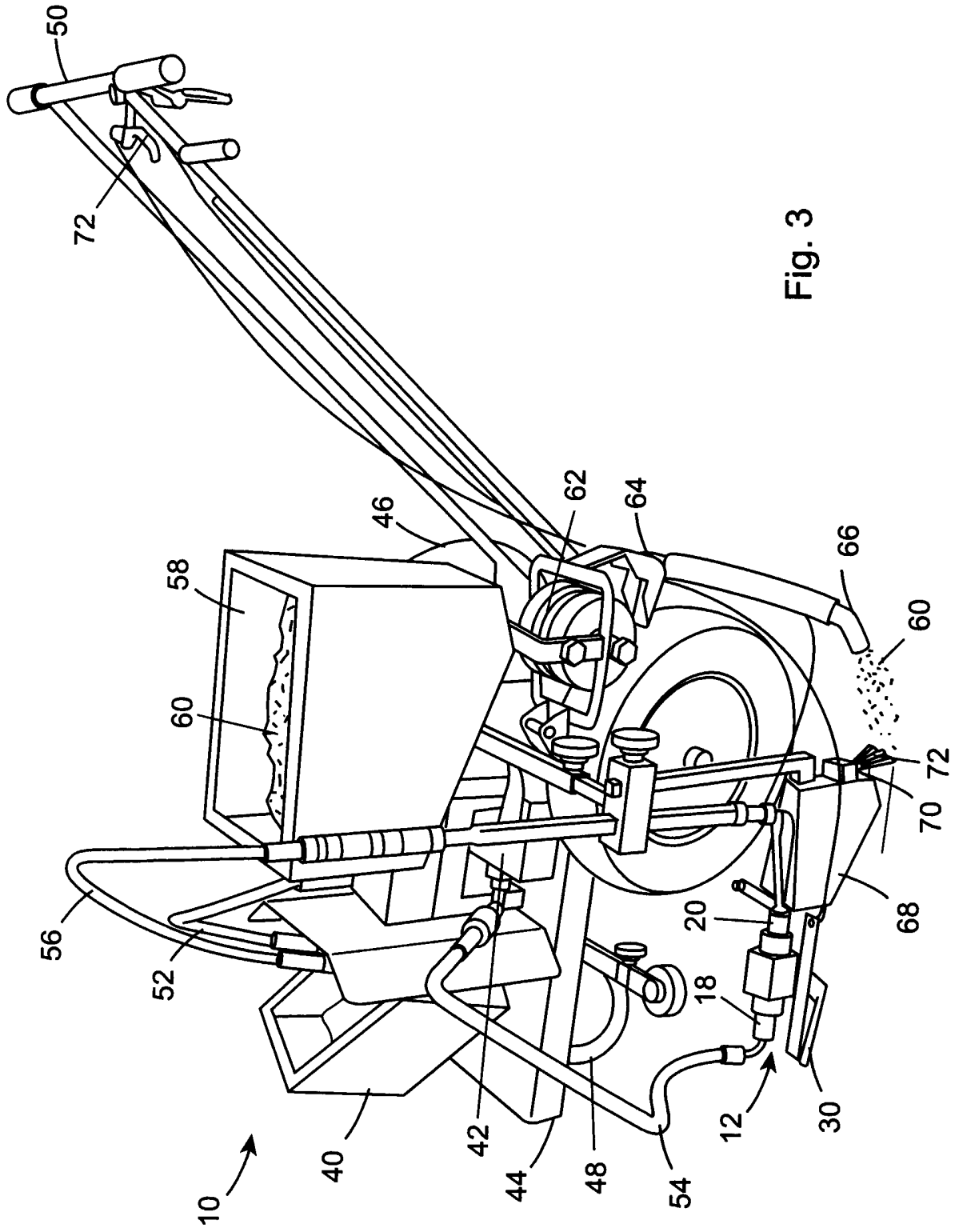


Fig. 3

A Road Repair Material Dispensing Apparatus

The present invention relates to a road repair material dispensing apparatus, and in particular a dispensing apparatus capable of dispensing flowable material such as tar or the like, and most particularly for dispensing such materials at temperatures below those conventionally used.

10 During both road production and repair, one of the most important procedures which must be undertaken in order to ensure the longevity of the road surfaces, and the structural integrity thereof, is the application of a road repair material such as tar or a similar sealant to the various joints within and around the road surface. Where a road is formed from a plurality of concrete slabs, it is necessary to apply a filling of tar between adjacent slabs, and between the outermost slabs and the kerb/pavement or the like. If the road is formed with a continuous upper surface of tarred gravel, it is then generally only necessary to seal the interface between the road surface and the adjacent kerbing/pavement, which will normally be formed from concrete.

25 The application of the above mentioned sealants provides two very important functions. It is well known that roads/pavements undergo expansion and contraction as a result of temperature variation. If no gaps or joints are left between sections of road/pavement, buckling may occur. However, if

gaps/joints are simply created, but left unfilled, incompressible materials such as stones etc. will eventually migrate into the gaps, preventing the requisite expansion. Filling the joints with tar prevents such incompressible materials from entering and lodging within the joints, while also allowing expansion/contraction of the road/pavement surface, due to the compressibility of tar or the like.

Secondly, the joints between sections/edges of roadways, if left unfilled, provide points at which water can enter and migrate beneath the roadway, from which a large number of problems can result. In particular, subterranean water causes potholes and undermining, in addition to possible "blow-ups". These "blow-ups" occur when water trapped beneath the road begins to boil, or freeze, in extreme temperatures, finally resulting in the road surface being lifted.

As a result of the above mentioned problems, road maintenance agencies utilise crews of workers which are provided with tar heating and spraying equipment, conventionally comprising a compressor and a tar kettle drawn by, or mounted to, a truck. Hot tar is used both for the reduced viscosity thereof, and because the heat of the tar ensures that the tar does not solidify in the spraying nozzles, thereby blocking same. However, tar does initially flow when cold, but once exposed to air will rapidly cure, and has thus previously not been used cold in spraying applications, due to the likely blockage of spraying nozzles, etc.

The use of hot tar does however suffer from a number of drawbacks. The most obvious problem is the requirement to heat the tar, which adds to the cost of the
5 procedure, but also is a significant hazard due to the reservoir of hot tar which must be maintained, in addition to hot tar being sprayed from one or more nozzles, which obviously poses a safety hazard. In addition, when such hot tar is sprayed onto non
10 horizontal surfaces, in particular vertical surfaces such as kerb sidewalls or the like, the reduced viscosity of the tar, as a result of heating, may result in significant quantities of the tar flowing off the area to be coated, thereby significantly reducing
15 the effectiveness of same.

The present invention has therefore been developed with a view to mitigating the above mentioned problem, by providing an apparatus which is capable of dispensing
20 unheated tar or the like.

The present invention therefore provides a road repair material dispensing apparatus comprising a dispensing head defining a chamber having an inlet through which a
25 road repair material may be supplied to the chamber; a nozzle defined by an aperture in a side wall of the dispensing head; and an actuator operable to selectively render the nozzle in fluid communication with the chamber.

Preferably, the nozzle is defined solely by the aperture in the side wall of the dispensing head.

5 Preferably, the chamber has an outlet from which the road repair material may be withdrawn from the chamber.

10 Preferably, the actuator comprises a gate valve mounted within the chamber and displaceable between a first position occluding the nozzle from the chamber, and a second position exposing the nozzle to the chamber.

15 Preferably, the gate valve defines a passage which, when the actuator is in the first position, communicates at a first end with the inlet and at a second end with the outlet, while bypassing the nozzle.

20 Preferably, when the actuator is in the second position, the inlet, the outlet, and the nozzle are each in fluid communication with one another.

Preferably, the actuator comprises a handle connected to the gate valve, the handle being located externally of the dispensing head.

25 Preferably, the chamber is cylindrical in form, and the gate valve is a ball valve having an exterior diameter substantially equal to an interior diameter of the chamber.

30 Preferably, the apparatus further comprises a reservoir for unheated tar; means for pumping tar from the

reservoir to the dispensing head; and means for returning unsprayed tar from the dispensing head to the reservoir.

- 5 Preferably, the apparatus comprises a hopper and means for conveying material from the hopper for deposition onto a bead of tar which has been sprayed from the dispensing head.
- 10 Preferably, the conveying means comprises a conduit positioned, in use, beneath the hopper, and a valve disposed between an outlet of the hopper and the conduit.
- 15 Preferably, the valve comprises a metering wheel.

Preferably, the apparatus comprises at least one drive wheel to facilitate locomotion of the apparatus, the metering wheel being driven by the at least one drive
20 wheel.

Preferably, the apparatus comprises a brush positioned, in use, downstream of the nozzle to contact and spread tar dispensed from the dispensing head.

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The present invention will now be described within reference to the accompanying drawings, in which;

Figure 1 illustrates a schematic side view of a
30 preferred embodiment of dispensing head forming part of a road repair material dispensing apparatus according

to present invention, in which an actuator thereof is
in a first position;

Figure 2 illustrates a side elevation of the dispensing
5 head illustrated in Figure 1, in which the actuator is
in a second position; and

Figure 3 illustrates a perspective view of the road
repair material dispensing apparatus incorporating the
10 dispensing head illustrated in Figures 1 and 2.

Referring now to the accompanying drawings, and in
particular Figures 1 and 2, there is illustrated a
preferred embodiment of a road repair material
15 dispensing apparatus according to the present
invention, generally indicated as 10, for use in
dispensing/spraying a non heated road repair material
such as tar or the like. Figures 1 and 2 illustrate
the main component of the apparatus 10, namely a
20 dispensing head 12, from which a spray of tar actually
issues during use, although the apparatus 10 does
comprise additional components as illustrated in
Figure 3, which will be described in greater detail
hereinafter.

25

The dispensing head 12, in the preferred embodiment
illustrated, is formed from a cylindrical side wall 14
which defines a chamber 16 therein. It will be
appreciated however from the following description that
30 the dispensing head 12 need not be cylindrical in form,
and has been chosen for practical purposes, allowing

connection of the dispensing head 12 to the additional componentry of the apparatus 10, for example hydraulic circuitry including hoses or the like, as will be described hereinafter with reference to Figure 3.

5

The dispensing head 12 is provided with an inlet 18 at one end, and an outlet 20 at an opposed end, with the chamber 16 extending therebetween. Both the inlet 18 and the outlet 20 are internally threaded, in order to
10 allow a supply line/hose or equivalent to be connected to the inlet 18, and similarly an exhaust line or hose to be connected to the outlet 20, again as will be described further with reference to Fig. 3. It will of course be appreciated that both the inlet 18 and outlet
15 20 could be externally threaded to facilitate connection of the requisite lines to the dispensing apparatus 10. In addition, any other suitable means (not shown) may be employed to allow the supply and withdrawal of a road repair material to the dispensing
20 head 10.

It will therefore be appreciated that the provision of the inlet 18 and outlet 20 means that the dispensing head 12 is designed for use in a circuit configured to
25 provide a re-circulating tar supply, whereby tar is provided under pressure from a reservoir 40 (not illustrated in Figures 1 and 2) forming part of the apparatus 10, to the dispensing head 12, to be sprayed therefrom while passing through the dispensing head 12,
30 as will be described hereinafter in detail with reference to Fig. 3. The tar does not therefore

terminate in the dispensing head 12, and is re-circulated back to the tar reservoir 40, such that the tar is continually moving or circulating within the circuit or lines employed with the dispensing apparatus 10. In this way the unheated tar will not have an opportunity to partially or fully solidify within either the dispensing head 12, or the associated lines, thereby preventing a blockage of the dispensing head 12. This re-circulating functionality is particularly important where the dispensing apparatus 10 may be out of use for sustained periods, and it will therefore be appreciated that the outlet 20 could be omitted/occluded, such that the tar supply terminates at the dispensing head 12, if the dispensing apparatus 10 is in substantially constant use.

As mentioned above, the dispensing head 12 is adapted to selectively emit a spray of tar or other road repair material therefrom, and in this regard the dispensing head 12 is provided with a nozzle 22 provided in, and defined by, the side wall 14, and in the preferred embodiment illustrated at approximately half way along the length of the dispensing head 12.

As will become apparent from the following description, the dispensing head 12 is adapted to selectively render the nozzle 22 in fluid communication with the chamber 16, in order to allow a pressurised jet of tar (not shown) or the like to issue from the chamber 16, through the nozzle 22, to be coated onto a surface (not shown) or the like. In this regard, the dispensing

head 12 is provided with an actuator 24 which is adapted to selectively expose the nozzle 22 to, or occlude the nozzle 22 from, the chamber 16. In the embodiment illustrated, the actuator 24 comprises a ball valve 26 which is substantially spherical in form, and which is pivotably mounted within the chamber 16 about a longitudinal axis 28 of the ball valve 26. The actuator 24 further comprises a handle 30 connected to the ball valve 26, the handle 30 being located externally of the dispensing head 12 in order to be manually or otherwise engagable and operable.

The ball valve 26 has a diameter substantially equal to the internal diameter of the dispensing head 12, such that the ball valve 26 would substantially occlude the chamber 16, were the ball valve 26 solid in form. However, the ball valve 26 is provided with a passage 32 extending completely therethrough, thus defining a pair of walls 34, one on either side of the passage 32. The actuator 24, and in particular the passage 32, is displaceable between a first position as illustrated in Figure 1, and a second position as illustrated in Figure 2, by effecting the manual rotation of the handle 30. It will of course be appreciated that the handle 30 could be replaced with any other suitable alternative, and in addition need not be manually operable. For example, a solenoid (not shown) or the like could be utilised to effect the pivotal displacement of the ball valve 26, as could one or more hydraulic or pneumatic rams (not shown) or the like.

In the first position as illustrated in Figure 1, the passage 32 extends in a direction longitudinally of the dispensing head 12, and renders the inlet 18 and the outlet 20 in fluid communication with one another, allowing the uninterrupted flow of tar (not shown) or the like through the chamber 16. However, in this first position, it can be seen that one of the walls 34 is disposed adjacent the nozzle 22, thereby occluding the nozzle 22 from the chamber 16, and thus preventing the pressurised tar within the chamber 16 from being sprayed from the nozzle 22. In order to further improve the seal effected between the ball valve 26, and in particular the respective wall 34 thereof, and the nozzle 22, and to provide further support to the ball valve 26, the dispensing head 12 is provided with a pair of shoulders 36, one disposed on either side of the ball valve 26, each being secured to or formed integrally with the side wall 14. Each shoulder 36 meshes closely with the ball valve 26, both to support same and to prevent the migration of tar between the ball valve 26 and each shoulder 36. At either end thereof, each shoulder 36 extends away from the side wall 14 into the chamber 16, thereby effectively acting as a baffle directing the tar away from the side wall 14 in the region of the ball valve 26, both to guide the tar through the passage 32, and to direct the tar away from the nozzle 22.

Thus with the actuator 24 in the first position, cold or unheated tar enters the chamber 16 via the inlet 18, passes straight through the passage 32, consequently

bypassing the nozzle 22, and exits the chamber 16 via the outlet 20. Therefore when the actuator 24 is in the first position, tar is continually circulated through the dispensing head 12, without being sprayed from the nozzle 22. This continual circulation ensures that the tar does not solidify within the dispensing head 12, causing a blockage.

When it is desired to spray tar from the nozzle 22, the actuator 24 is moved into the second position as illustrated in Figure 2, by means of the manual or other displacement of the handle 30. In this second position, the chamber 32 extends in a direction diagonally across the chamber 16 such as to be in fluid communication with both the inlet 18, the outlet 20, and the nozzle 22. In this way tar is still capable of circulating through the dispensing apparatus 10, but as the nozzle 22 is exposed to the chamber 16, and consequently the pressurised tar flowing therethrough, a spray of tar will issue from the nozzle 22 as the tar passes through the chamber 16. Thus spraying may be effected by the dispensing apparatus 10 by displacing the actuator 24 into the second position, which still however allows the tar to circulate through the dispensing head 12 and associated circuitry, thereby preventing the tar from clogging either the dispensing head 12 or associated circuitry, as hereinbefore described.

When it is desired to cease spraying, the actuator 24 is simply displaced back into the first position,

whereby the nozzle 22 is again occluded by the respective wall 34, while the tar continues to circulate through the dispensing head 12.

- 5 Once a spray of tar has issued from the nozzle 22, and the actuator 24 displaced back into the first position, a small amount of tar will remain in the nozzle 22. If the nozzle 22 is not then used for a prolonged period, the tar within the nozzle 22 will solidify, as a result
10 of being exposed to air. Thus when the dispensing apparatus 10 is next used, and an attempt made to spray tar from the nozzle 22 of the dispensing head 12, the nozzle 22 will be blocked. For this reason the depth of the nozzle 22 is extremely shallow, with the nozzle 22
15 essentially being defined by an aperture in the side wall 14, such that the nozzle 22 has a depth substantially equal to the thickness of the side wall 14. As a result any plug of tar (not shown) which solidifies within the nozzle 22 will be very short in
20 length, and will have a relatively small surface area in contact with the nozzle 22. For this reason when the actuator 24 is displaced into the second position, the pressure of the tar passing through the chamber 16 will be sufficient to immediately dislodge the plug of
25 tar (not shown) from within the nozzle 22, thereby enabling spraying to be effected, regardless of whether or not the dispensing apparatus 10 has been out of use for a prolonged period.
- 30 It will be appreciated that the actuator 24, and in particular the ball valve 26, could be replaced with

any other suitable equivalent which provides the functionality of the actuator 24 as hereinbefore described. The ball valve 26 could be replaced with any other suitable valve (not shown) or the like which
5 enables tar to both flow through the dispensing head 12 without issuing from the nozzle 22, and to flow through the dispensing head 12 while also being emitted as a spray from the nozzle 22.

10 As the dispensing apparatus 10 is intended for use with a supply of unheated tar (not shown), no heating equipment (not shown) is required, thereby greatly reducing the cost and complexity of the dispensing apparatus 10. Thus the dispensing apparatus 10 simply
15 comprising a cold tar reservoir 40 and dispensing means in the form of a pump 42 arranged, as will be described hereinafter, to pump cold tar from the reservoir 40 through the dispensing head 12, in order to effect spraying from the nozzle 22 (not visible in Figure 3)
20 as hereinbefore described with reference to Figures 1 and 2. The apparatus 10 further comprises a frame 44 on which the reservoir 40 and pump 42 are mounted, the frame 44 having a pair of rear or drive wheels 46 and a front wheel 48 mounted therebeneath. Extending
25 rearwardly from the apparatus 10 is a handle 50 which enables the entire apparatus 10 to be manually driven forwards while tar is being dispensed from the nozzle 22 (not visible in Figure 3), in order to generate a linear bead of tar (not shown) for application to any
30 required surface, in particular to extend across and

between the interface of adjacent surfaces such as sections of road or the like.

The dispensing head 12 is in fluid communication with the tar reservoir 40 by means of a first hose 52 which extends from the reservoir 42 to the pump 42, a second hose 54 extending from the pump 42 to the inlet 18 of the dispensing head 12. A third hose 56, also forming part of the dispensing means, returns from the outlet 20 of the dispensing head 12 to the reservoir 40, in order to re-circulate unused or unsprayed tar from the dispensing head 12 back to the reservoir 40. The dispensing head 12 is positioned, as will be described hereinafter in detail, adjacent the ground in order that the apparatus 10 is capable of spraying a bead of tar (not shown) onto the ground, for example, to overlap and fill the gap between adjacent sections of road or the like. It will however be appreciated that the dispensing head 12 could be positioned at any other suitable location on the apparatus 10, in order to issue a spray of tar at a desired height/orientation, in order to suit a particular application, for example spraying the vertical face of roadside kerbing or the like.

25

The apparatus 10 further comprises a hopper 58 which in use houses a volume of grit 60 or similar aggregate, to be dispensed onto the bead of tar which issues from the dispensing head 12, as described hereinafter in detail. Located directly beneath the hopper 58, in register with an outlet (not shown) of the hopper 58, is

30

conveying means comprising a valve in the form of a metering wheel 62 which is driven, in the embodiment illustrated, directly by one of the rear wheels 46. Thus as the apparatus 10 is moved forwardly, whether manually by pushing on the handle 50, or by means of a suitable motor (not shown) or the like, the rear wheel 46 in question will rotate in an anticlockwise direction as seen in Figure 3, thereby driving the metering wheel 62, by virtue of friction therebetween, in an anticlockwise direction. Rotation of the metering wheel 62 allows a small but steady quantity of the grit 60 to issue from the outlet in the hopper 58, which is conveyed by the metering wheel 62 towards and into a funnel 64 forming part of the conveying means. From here the stream of grit 60 passes downwardly through a pipe 66 which terminates downstream of the dispensing head 12, and is positioned such that the grit 60 issuing from the pipe 66 is deposited directly onto the bead of tar which has just been sprayed from the dispensing head 12, before the tar has cured due to exposure to the air, such that the grit sticks to the upper surface of the tar bead.

Although the dispensing head 12 may be arranged such that the spray of tar issuing from the nozzle 22 (not visible in Figure 3) is directly applied to a road surface or the like, in the embodiment illustrated this spray of tar is directed into an extrusion chamber 68 which includes a narrow slot 70 at a rear thereof from which the tar then issues, having drained downwardly through the extrusion chamber 68. Mounted to the

extrusion chamber 68 and downstream of the slot 70 is a small brush 72 which spreads the tar to a desired width, for example 30mm-40mm. Having been spread to the desired width by the brush 72, the bead of tar is then coated with the grit 60, providing a wear-resistant outer surface to the tar bead. It should be appreciated that the extrusion chamber 68 and the brush 72 are not necessary to generate the bead of tar, and are used to focus or refine the shape/dimensions of same, such that no further finishing operations are required.

It will therefore be appreciated that the apparatus 10 can be manned by a single individual, greatly reducing the cost and time taken to effect the coating of various surfaces with tar or other repair material. The apparatus 10 is therefore preferably provided with an actuator in the form of a manually-operable lever 72 or the like, which is connected to the handle 30 in order to allow the dispensing head 12 to be operated directly from the handle 50. In addition, the ability of the apparatus 10 to work with cold or unheated tar, as a result of the configuration of the nozzle 22, and the constant recirculation of the tar, the apparatus is significantly safer and cheaper than prior art systems by virtue of being devoid of componentry to heat the tar, and thus being devoid of hot tar itself.

The present invention is not limited to the embodiment described therein, which may be amended or modified

without departing from the scope of the present invention.

Claims

1. A road repair material dispensing apparatus comprising a dispensing head defining a chamber having
5 an inlet through which a road repair material may be supplied to the chamber; a nozzle defined by an aperture in a side wall of the dispensing head; and an actuator operable to selectively render the nozzle in fluid communication with the chamber.
- 10
2. An apparatus according to claim 1 in which the nozzle is defined solely by the aperture in the side wall of the dispensing head.
- 15
3. An apparatus according to claim 1 or 2 in which the chamber has an outlet from which the road repair material may be withdrawn from the chamber.
- 20
4. An apparatus according to any preceding claim in which the actuator comprises a gate valve mounted within the chamber and displaceable between a first position occluding the nozzle from the chamber, and a second position exposing the nozzle to the chamber.
- 25
5. An apparatus according to claim 4 in which the gate valve defines a passage which, when the actuator is in the first position, communicates at a first end with the inlet and at a second end with the outlet, while bypassing the nozzle.

6. An apparatus according to claim 4 or 5 in which, when the actuator is in the second position, the inlet, the outlet, and the nozzle are each in fluid communication with one another.

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7. An apparatus according to any of claims 4 to 6 in which the actuator comprises a handle connected to the gate valve, the handle being located externally of the dispensing head.

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8. An apparatus according to any of claims 4 to 7 in which the chamber is cylindrical in form, and the gate valve is a ball valve having an exterior diameter substantially equal to an interior diameter of the chamber.

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9. An apparatus according to any preceding claim further comprising a reservoir for unheated tar; means for pumping tar from the reservoir to the dispensing head; and means for returning unsprayed tar from the dispensing head to the reservoir.

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10. An apparatus according to claim 9 comprising a hopper; means for conveying material from the hopper for deposition onto a bead of tar which has been sprayed from the dispensing head.

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11. An apparatus according to claim 10 in which the conveying means comprises a conduit positioned, in use, beneath the hopper, and a valve disposed between an outlet of the hopper and the conduit.

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12. An apparatus according to claim 11 in which the valve comprises a metering wheel.
- 5 13. An apparatus according to claim 12 comprising at least one drive wheel to facilitate locomotion of the apparatus, the metering wheel being driven by the at least one drive wheel.
- 10 14. An apparatus according to any preceding claim comprising a brush positioned, in use, downstream of the nozzle to contact and spread tar dispensed from the dispensing head.
- 15 15. A road repair material dispensing apparatus substantially as hereinbefore described with reference to the accompanying drawings.



Application No: GB0523035.4

Examiner: Mr Charles Jarman

Claims searched: 1-15

Date of search: 7 February 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 3-5, 7	AU694180 B (MATTHEWS BROS ENGINEERING PTY LTD) See whole document.
X	1, 3	GB2368084 A (MCNAMEE) See figures 9 and 10 and associated text particularly.
X	1, 3	US4448352 A (JACOBSON, JR ET AL) See whole document.
X	1, 3	US4274586 A (HILL) See whole document.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

E1G

Worldwide search of patent documents classified in the following areas of the IPC

B05C; E01C; F16K

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC