

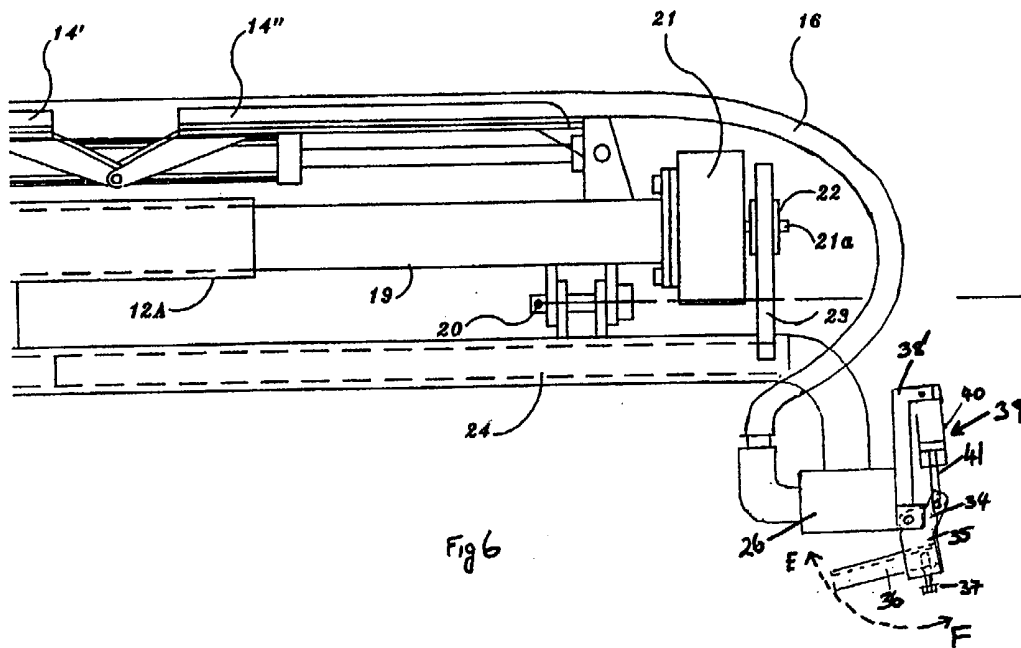
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(54) Abstract Title  
**An improved boom for a road repair vehicle**

(57) An improved boom for a road repair vehicle of the type including a head (26) at the free end of the boom for dispensing a road repair material and at least one hose extending along the boom for delivering said material to the head from a supply of said material on the vehicle is disclosed. The boom comprises a deflection member (36) movably mounted on the boom from a first state in which it is, in use, deployed beneath the head, to a second state in which it is substantially clear of the head.



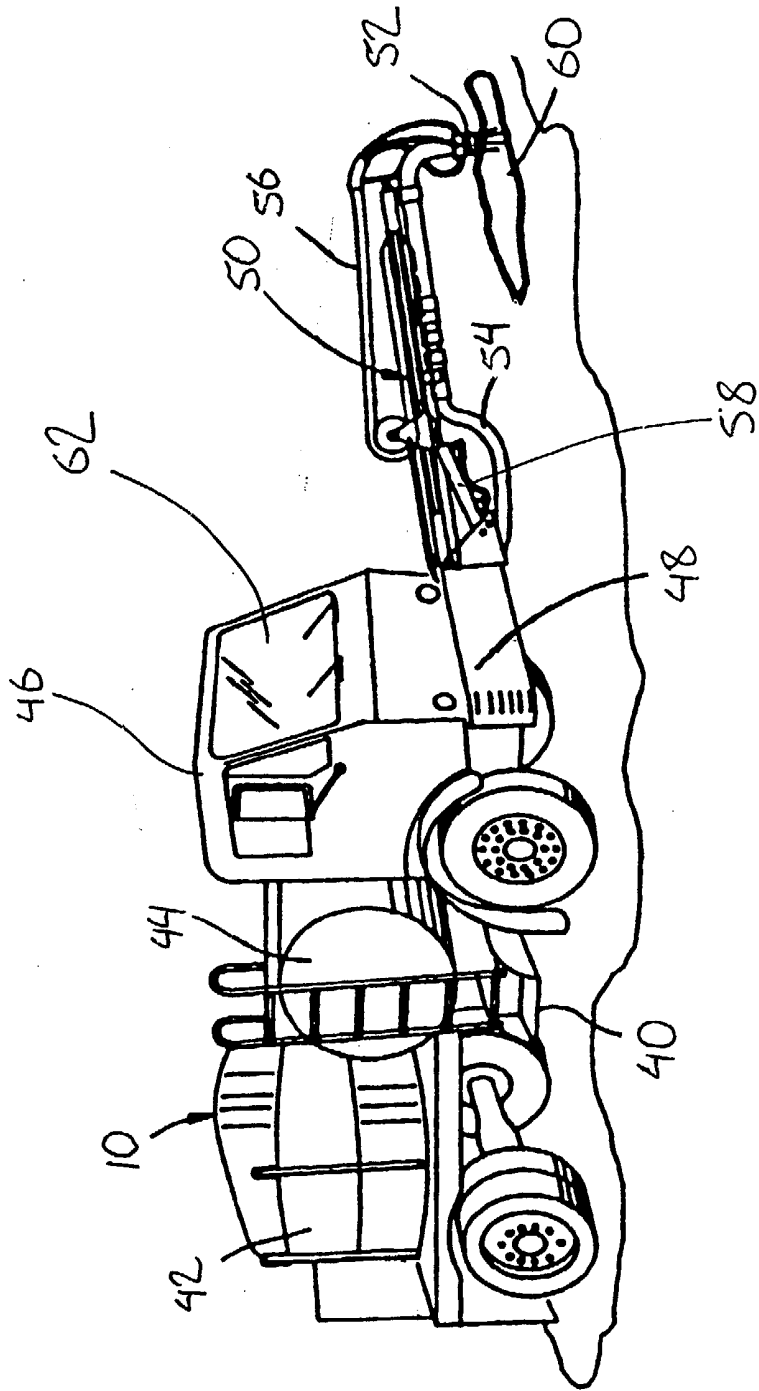


Figure 1

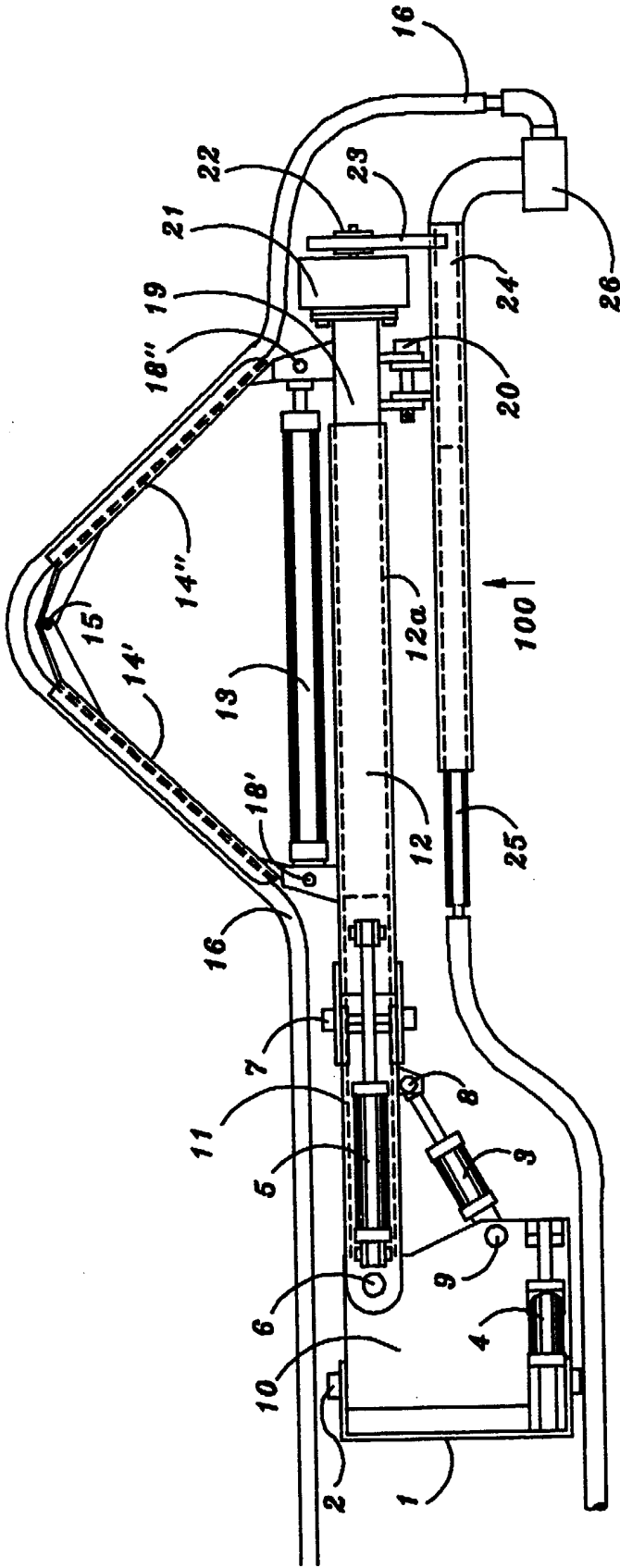


Fig. 2

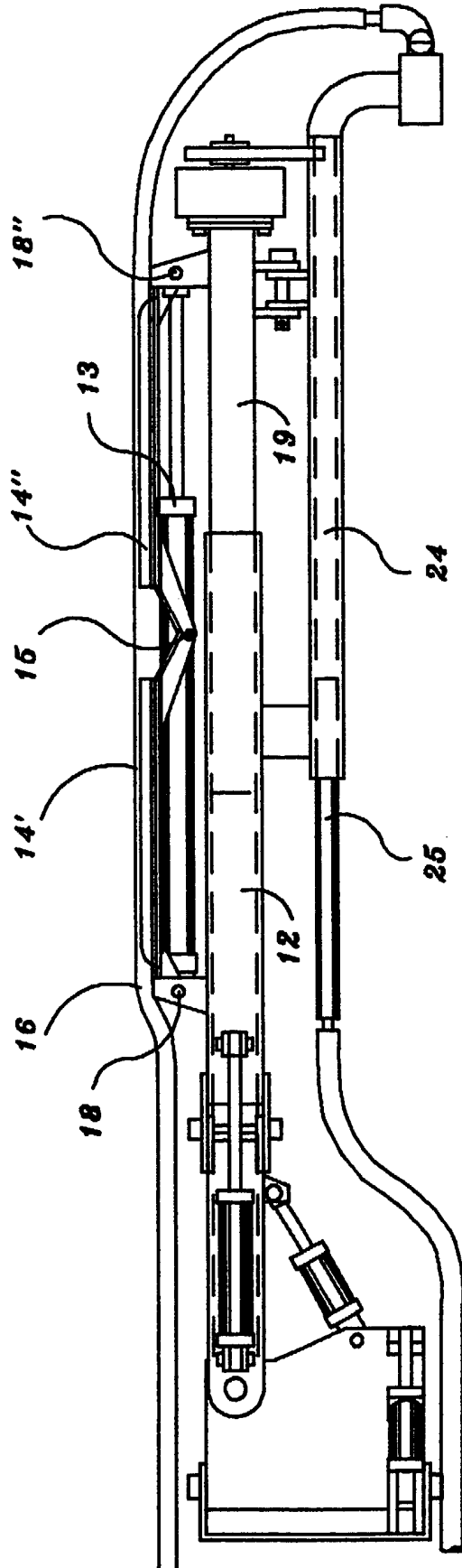


Fig 3

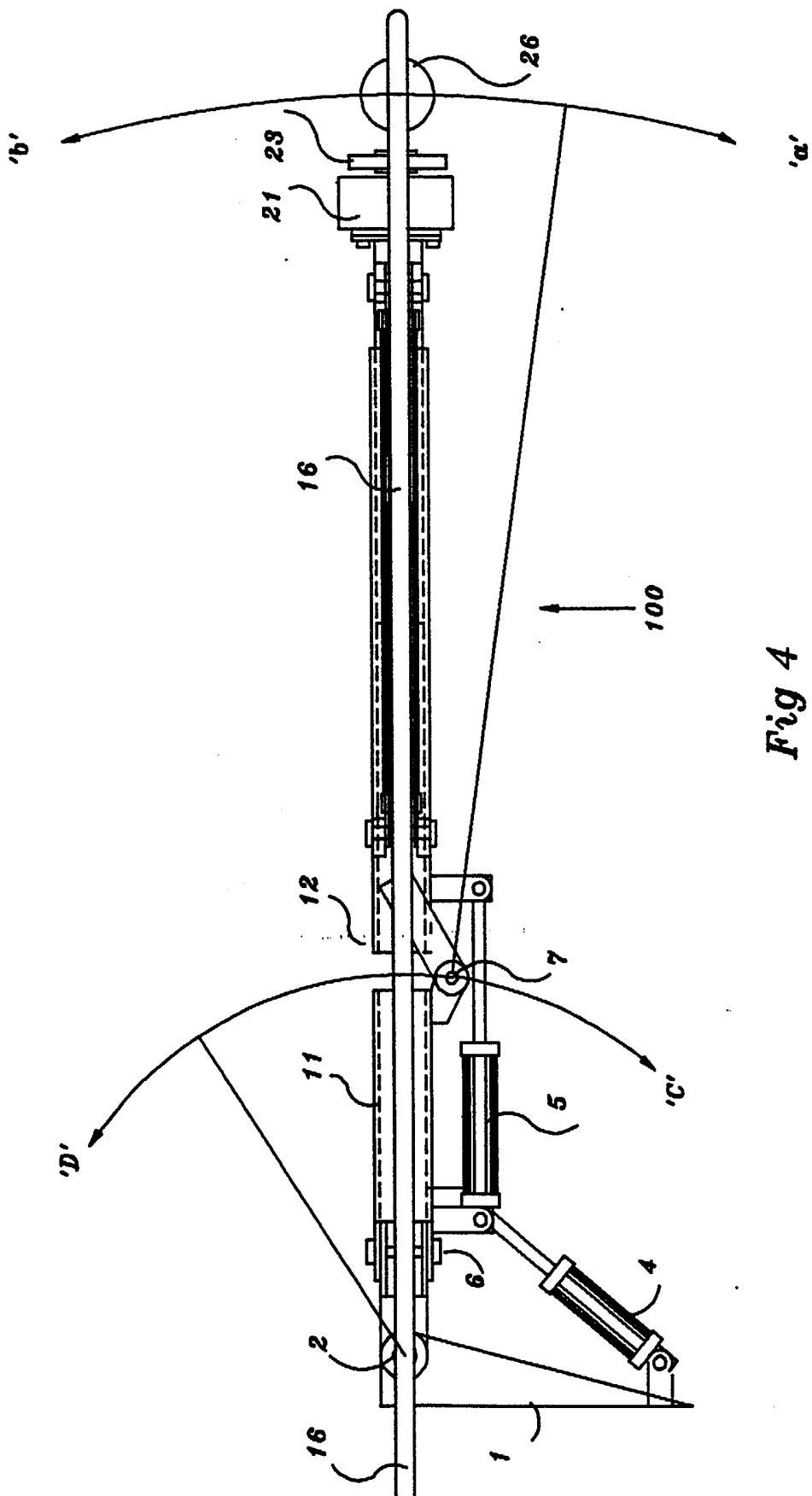


Fig 4

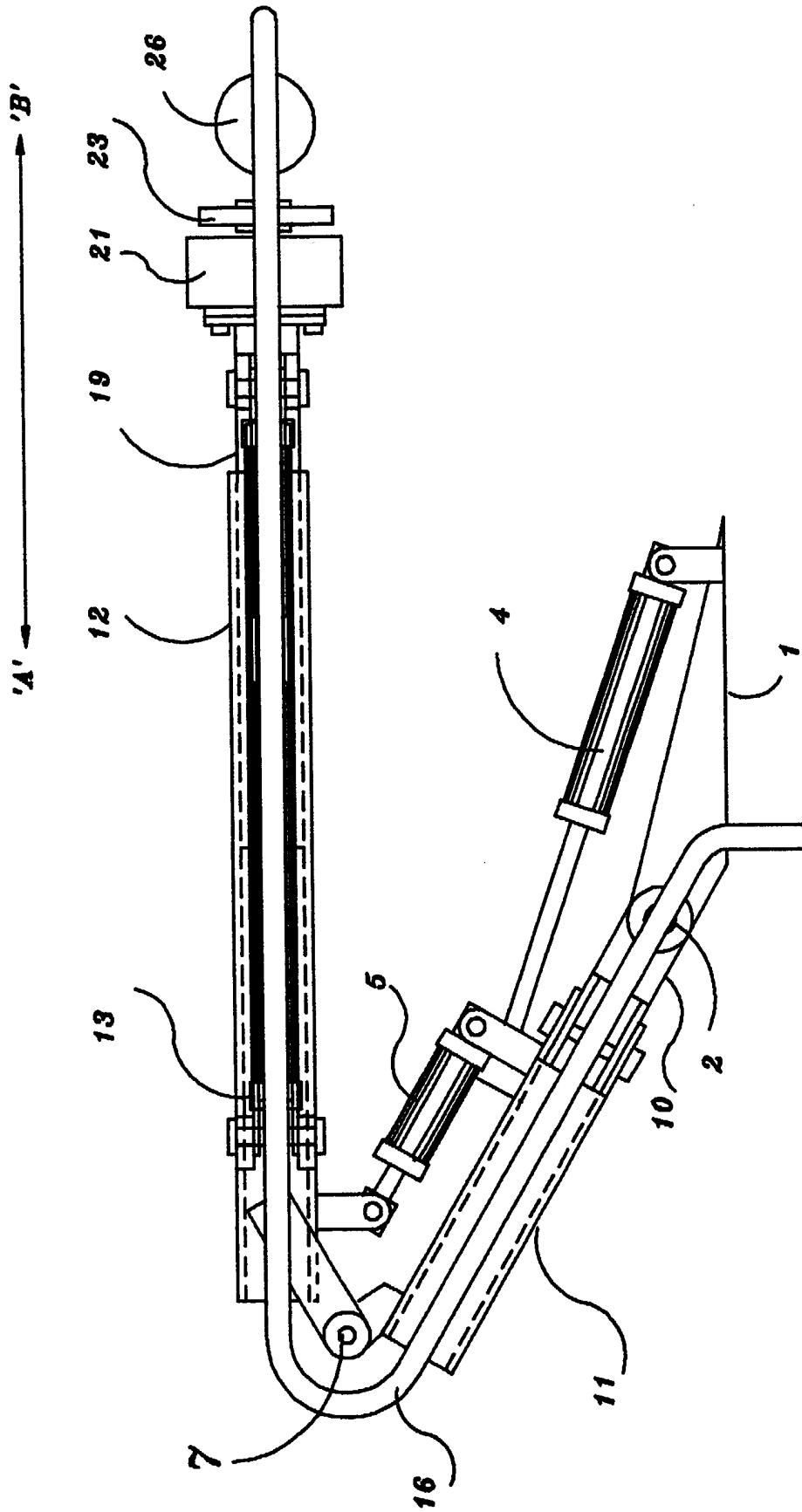


Fig. 5

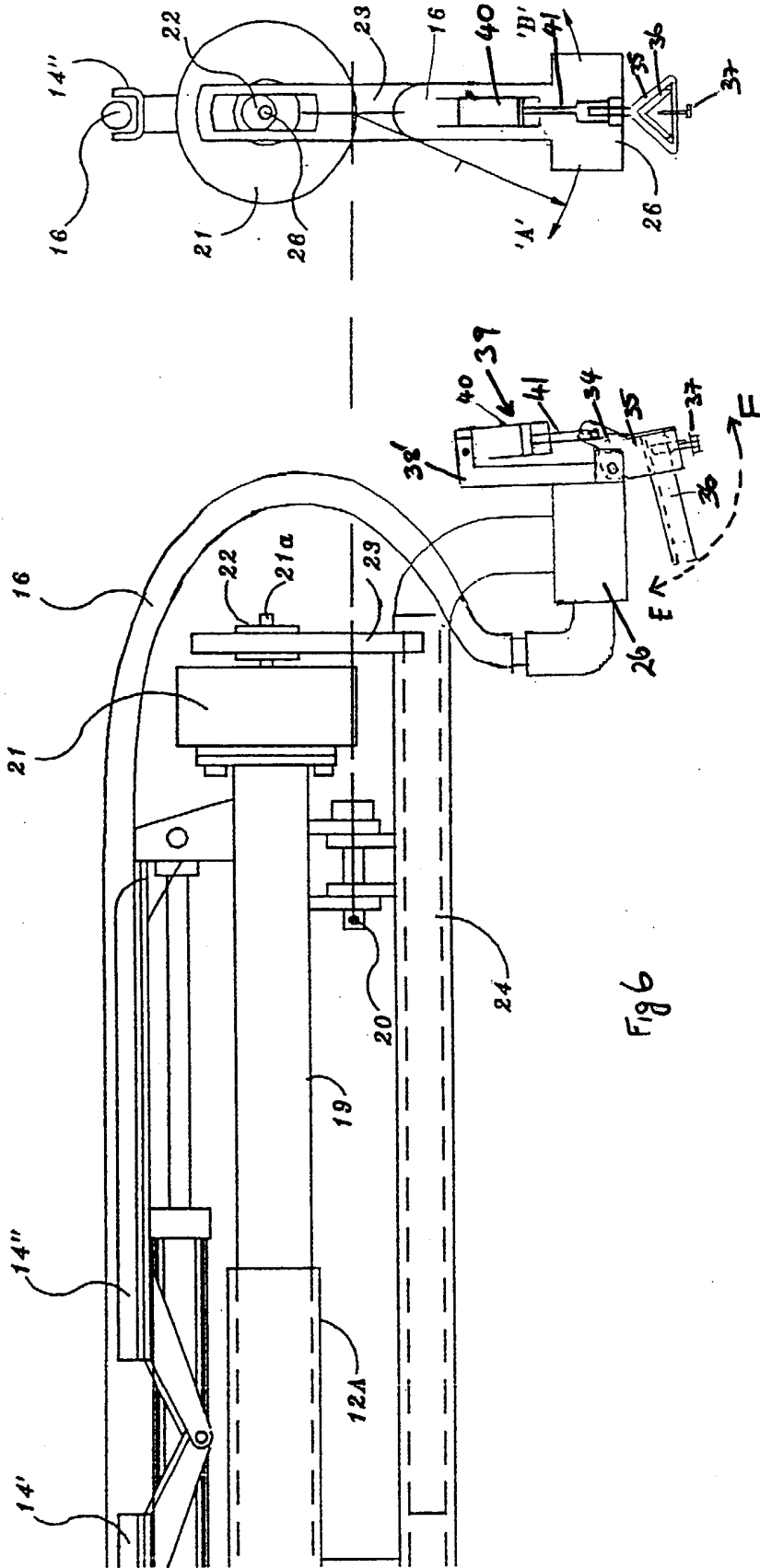


Fig 6

Fig 7

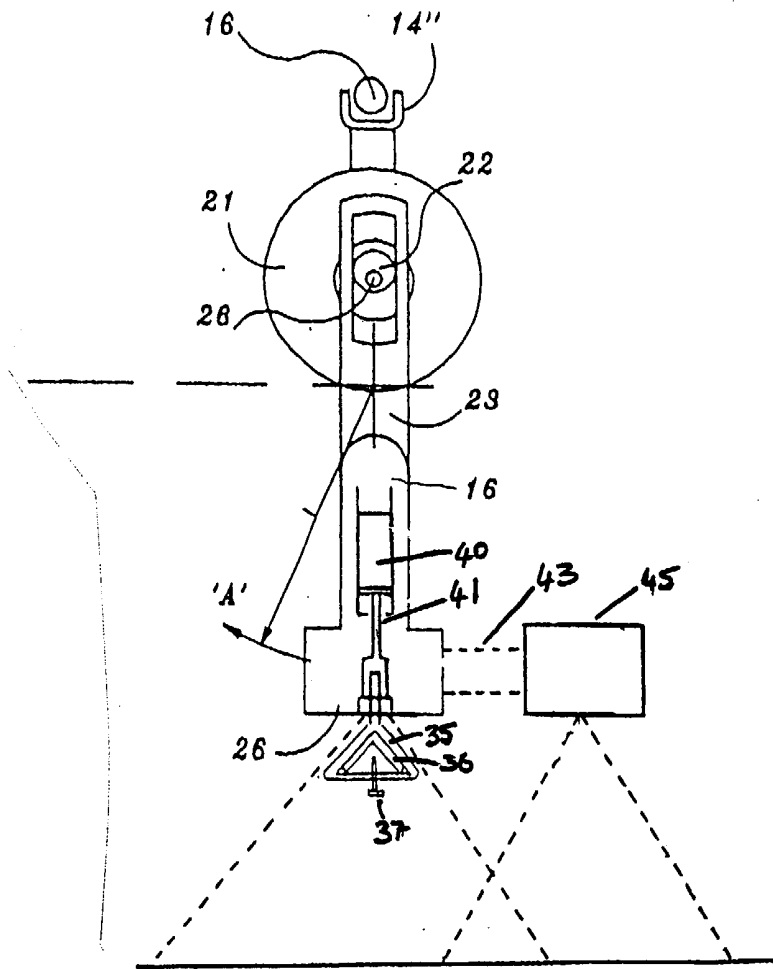


Fig. 8



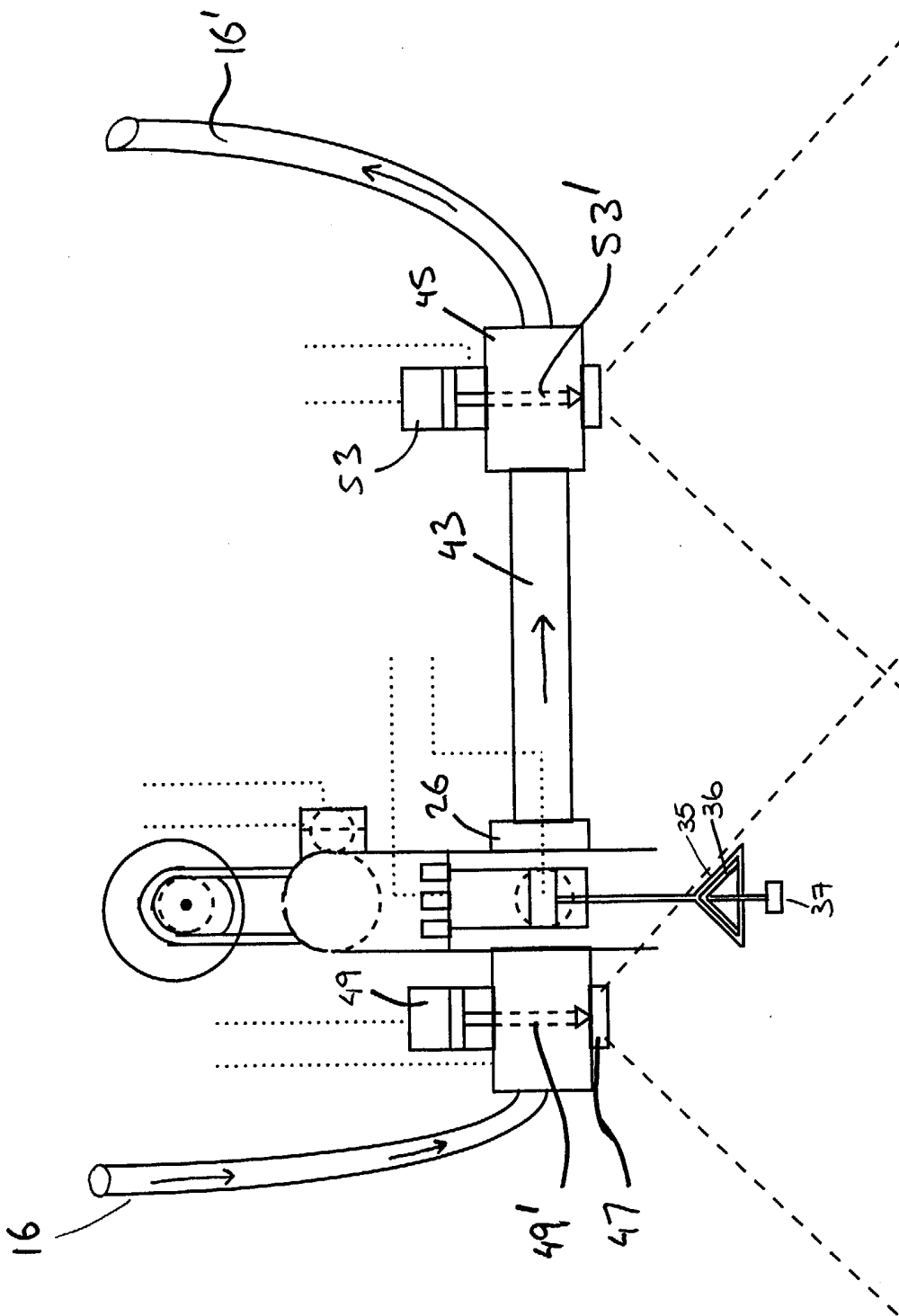


Fig 9

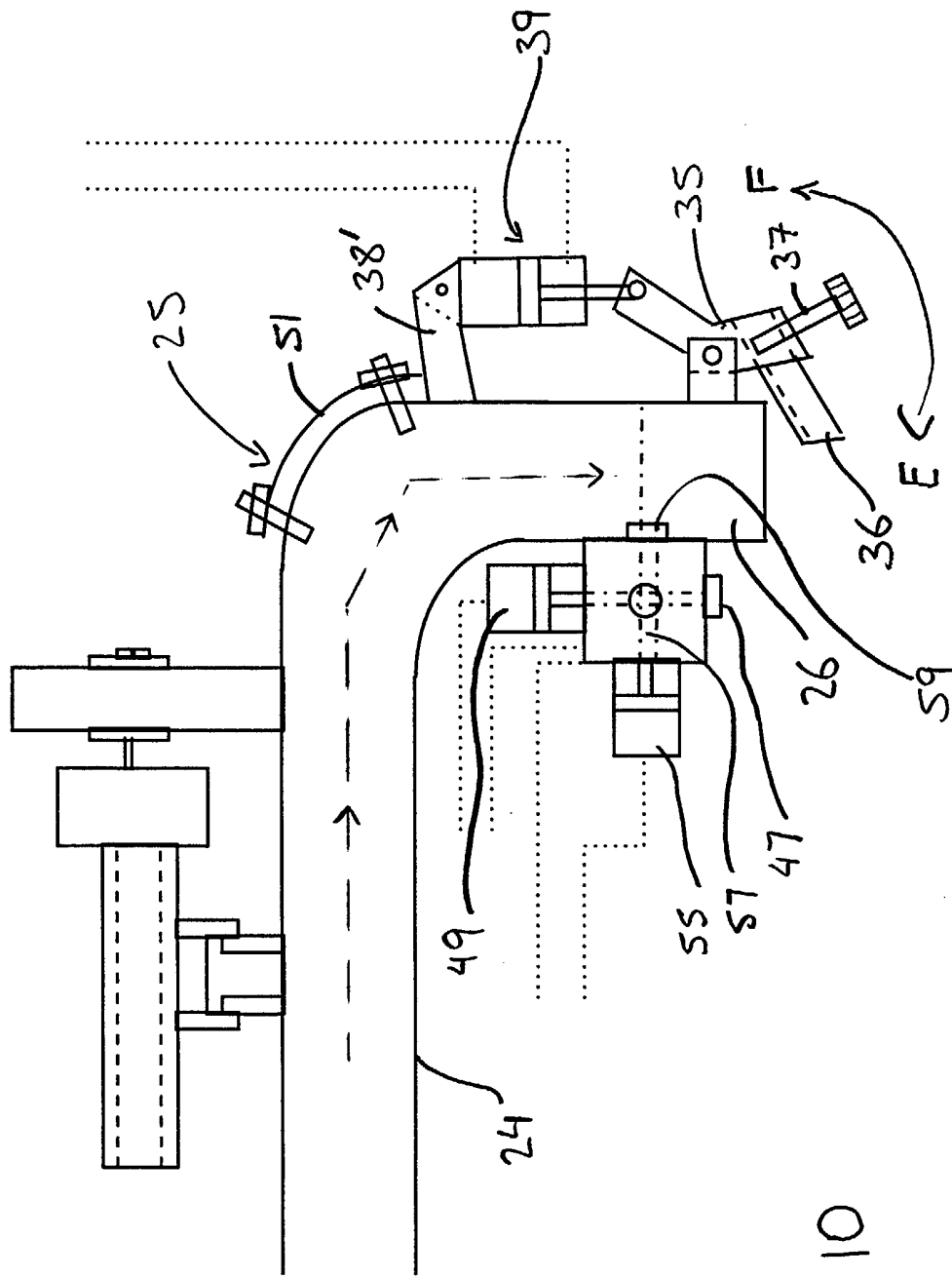


Fig 10

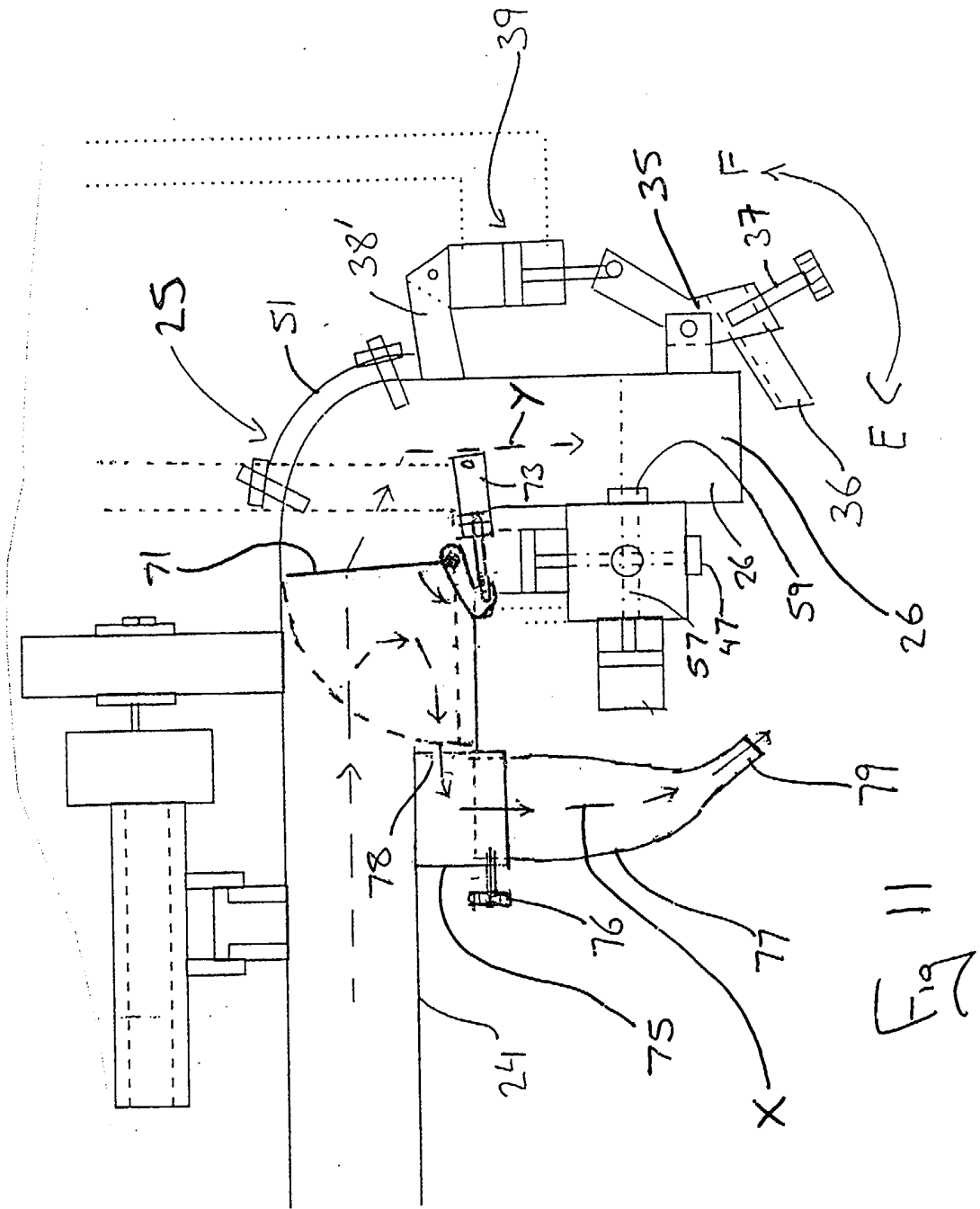


Fig 11

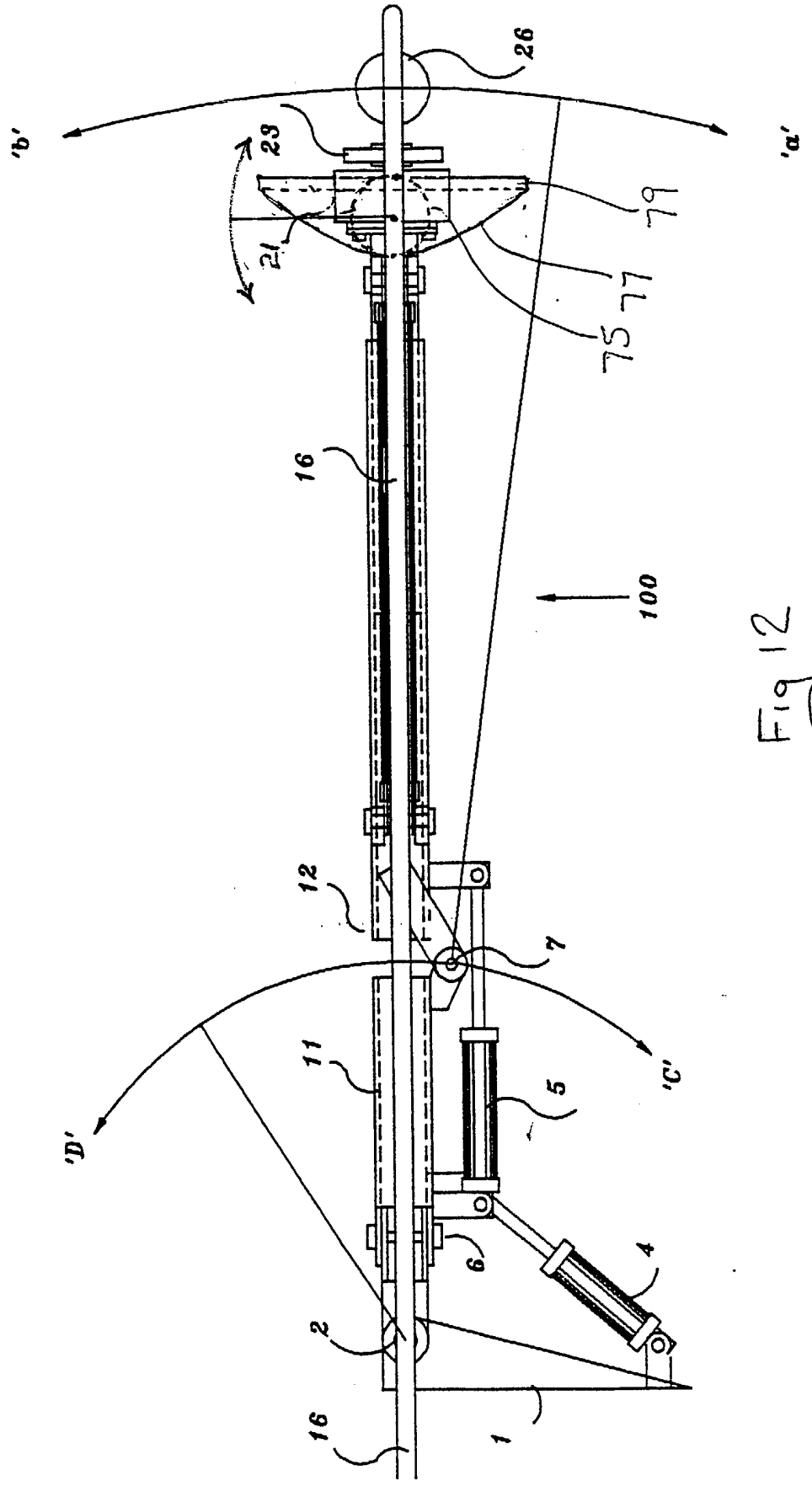


Fig 12

### An Improved Boom for a Road Repair Vehicle

The present invention relates to an improved boom for a road repair vehicle.

5

GB 2,315,795 discloses an extendible and retractable boom 100 pivotally mountable to the front of a cab of a road repair vehicle, Figures 2-5. The vehicle 10 is of the type disclosed in US Patent specifications US 10 5,263,790 and US 5,419,654, and comprises a wheeled chassis 40 on which a gravel hopper 42, a tank 44 for holding liquid asphalt or tar and the cab 46 are mounted, Figure 1.

15 Referring to Figures 2 to 5, a head 26 is carried at the free end of the boom 100 for mixing and applying an asphalt-gravel mixture to a pothole, the gravel being supplied to the head 26 from the hopper via a first hose 25 carried by the boom 100 and the asphalt being 20 supplied to the head 26 from the tank via a second hose 16 also carried by the boom 100. The boom pivots from side to side and is also articulated at at least one point along its length such that the boom may be folded concertina-like for storage substantially horizontally 25 across the front of the vehicle.

This boom is, however, best suited for filling potholes, as the tarred stones are dispensed directly into a pothole disposed directly beneath the head (or 30 at least within the scope of the side-to-side motion of the head).

According to the present invention there is provided an improved boom for a road repair vehicle including a 35 head at the free end of the boom for dispensing a road

repair material and at least one hose extending along the boom for delivering said material to the head from a supply of said material on the vehicle, characterised in that a deflection member is movably mounted on the boom from a first state in which it is, in use,  
5 deployed beneath the head, to a second state in which it is substantially clear of the head.

Without employing the deflection member, the boom, if  
10 used to re-dress an entire road surface, will either use the entire gravel dispensing capacity of the vehicle, causing lumps of gravel to be spread unevenly across the road surface or will require the vehicle to operate with a reduced gravel dispensing rate, so  
15 slowing the process of re-dressing the road surface.

Because the deflection member allows gravel to be selectively dispensed over a larger area, the full gravel dispensing capacity of the vehicle can be  
20 employed both to quickly fill potholes and to evenly re-dress a road surface. The invention thus enables the boom to be used both in the process of redressing a road which requires that the tar and asphalt be roughly evenly distributed over the entire surface of the road,  
25 as well as to the delivery of the tar and asphalt to a limited part of the road for filling potholes.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying  
30 drawings, in which:

Figure 1 is a perspective view of a prior art road repair vehicle disclosed in US Patent Nos. 5,263,790 and 5,419,654;

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Figure 2 is a side view of a prior art boom for a road repair vehicle disclosed in UK Patent No. 2,315,795;

5 Figure 3 is a side view of the prior art boom of Figure 2 of the drawings in an extended state;

Figure 4 is a top plan view of the prior art boom of Figure 2;

10 Figure 5 is a top plan view of the prior art boom of Figure 2 in a storage position;

Figure 6 is a detailed side view of a dispensing head of an improved boom according to a first embodiment of the invention;

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Figure 7 is a front view of the head of Figure 6;

Figure 8 is a front view of a dispensing head of an improved boom according to a second embodiment of the invention;

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Figure 9 is a detailed front view of a dispensing head of an improved boom according to a third embodiment of the invention;

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Figure 10 is a side view of the head of Figure 9; and

Figures 11 and 12 are a side view and a plan view respectively of an improved boom according to a fourth embodiment of the invention.

30

Referring now to Figures 2 to 5, the prior art boom 100 is, as is the boom of the invention, mounted on the front of a road repair vehicle via a plate 1 fixed to

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the front of the vehicle. The vehicle is not shown but it may be a vehicle of the type shown in figure 1 having a gravel hopper and asphalt tank. The boom 100 comprises, as its main structural components, a  
5 vertical bracket 10, a first arm member 11 and a second arm member 12.

The bracket 10 is pivotally connected to the plate 1 by means of a bolt 2 for rotation about a substantially  
10 vertical axis. In turn, one end of the first arm member 11 is pivotally connected to the bracket 10 by means of a bolt 6 for rotation about a substantially horizontal axis. Finally, one end of the second arm member 12 is pivotally connected to the other end of  
15 the arm member 11 by means of a bolt 7 for rotation about a substantially vertical axis, assuming the arm member 11 is horizontal.

The first arm member 11 is of hollow square cross-  
20 section, and the part 12a (Figure 2) of the arm member 12 connected to the arm member 11 is also of hollow square cross-section. However, the arm member 12 has an insert 19 slidably accommodated in the part 12a so that the overall length of the arm member 12 can be  
25 varied in the manner of a telescope, to correspondingly vary the overall length of the boom.

A head 26 is carried at the free end of the boom 100 for mixing and applying an asphalt-gravel mixture to a  
30 pothole in a road to be repaired. The gravel is supplied to the head 26 from the vehicle gravel hopper via a first hose 25 carried below the boom 100 and the asphalt is supplied to the head 26 from the vehicle asphalt tank via a second hose 16 carried above the  
35 boom 100.



A first hydraulic cylinder 4 is pivotally connected at each end to the plate 1 and the bracket 10 respectively, and a second hydraulic cylinder 5 is  
5 pivotally connected at each end to the first arm member 11 and the part 12a of the second arm member 12 respectively, on the same side of the boom as the bolt 7. Extending and retracting the cylinder 4 causes the first arm member 11 to pivot about the axis of the bolt  
10 2 to describe a path indicated by the line D-C in Figure 4. Extending and retracting the cylinder 5 causes the second arm member 12 to pivot about the axis of the bolt 7 to describe a path indicated by the line B-a relative to the first arm member 11.

15

A third hydraulic cylinder 3 is pivotally connected at each end to the first arm member 11 and the bracket 10 respectively, by bolts 8 and 9 respectively. Extending  
20 and retracting the cylinder 3 causes the first arm member 11, and hence the entire boom 100, to pivot about the axis of the bolt 6 so that the end of the boom carrying the head 26 may be raised and lowered as required when in use.

25 Finally, a fourth hydraulic cylinder 13 is pivotally connected at each end to the part 12a of the second arm member 12 and the insert 19 respectively. Extending and retracting the cylinder 13 slides the insert 19 into  
30 and out of the part 12a to lengthen and shorten the boom 100.

In normal operation the hydraulic cylinder 5 is extended to maintain the first and second arm members 11 and 12 in alignment, Figures 2 to 4. Then, by  
35 appropriately extending and retracting the hydraulic

cylinders 4, 3 and 13 respectively the boom 100 is swung from side to side, and/or lifted and lowered, and/or extended and contracted as necessary according to the requirements of the repair, the asphalt/gravel mixture being applied to the repair by the head 26.

However, the articulation of the boom at the bolt 7 connecting the first and second arm members 11 and 12 allows the boom to be folded into a storage position, from a position in which the boom extends horizontally forwardly of the vehicle, by extending the cylinder 4 and retracting the cylinder 5, Figure 5. In the storage position the boom 100 is folded concertina-like substantially horizontally across the front 48 of the vehicle. Therefore, gravel or asphalt dripping from the head 26 does not pose a hazard. Articulation of the boom at the bolt 7 enables the storage length of the boom to be sufficiently short to fit across the front face of the vehicle without projecting out from either side of the vehicle.

Both hoses 16 and 25 are long enough to accommodate extensions and contractions of the boom 100 in operation of the boom. However, in the case of the top hose 16, precautions are taken to ensure that the hose 16 does not fall into and foul the boom mechanism in the contracted state of the boom. When the boom 100 is extended to its full length, Figure 3, the hose 16 lies flat against the top surface of the arm members 11, 12. In order to prevent the hose 16 dropping over the edge of the boom 100 when contracted, Figure 2, the outer ends of a pair of U-channel guide members 14', 14" are pivoted to the upper surfaces of the part 12a of the arm member 12 and the insert 19 respectively using the same bolts 18' 18" which connect the ends of the

hydraulic cylinder 13 to the part 12a and insert 19. The inner ends of the guide members 14', 14" are pivoted together at 15. The hose 16 rests in the U-channel of the members 14' 14" so that when the boom  
5 100 is contracted the arms 14', 14" rise up while retaining the hose 16 in their respective U-channels. When the boom 100 extends, the guide members 14', 14" drop towards the arm member 12 with the hose 16 still resting in the respective U-channels, Figure 3.

10

A hydraulic motor 21 is fixedly mounted on the free end of the insert 19. The spindle 21a of the motor extends away from and parallel to the longitudinal axis of the insert 19. An offset cam 22 is fixed to the spindle  
15 and a slotted arm 23 acting as a cam follower is located over and extends downwardly from the cam 22. The lower end of the slotted arm 23 is fixed to a rigid front end 24 of the hose 25. The front end 24 of the hose carries the head 26 and is pivotally connected to  
20 the underside of the insert 19 by a bolt 20. Thus the head 26 is mounted for arcuate side-to-side motion below the free end of the boom along an arcuate path, having a centre of curvature co-incident with the bolt 20. Rotation of the motor spindle causes the head 26 to  
25 be deflected side-to-side along the arcuate path, so that use of this apparatus reduces the need for the operator to constantly move the boom 100 back and forth to spread gravel/asphalt over a large pothole or a section of road.

30

However the process of redressing a road requires that the tar and asphalt be roughly evenly distributed over the entire surface of the road, as opposed to the delivery of the tar and asphalt to a limited part of  
35 the road for filling potholes.

When employing the prior art boom to redress a road surface, the tar and asphalt are either distributed in clusters, thereby leading to an uneven distribution of the tar and asphalt along the road or a reduced  
5 dispense rate must be used so slowing down the process of re-dressing the road.

Referring now to Figures 6 and 7, where a first  
10 preferred embodiment of the present invention is shown. As opposed to the prior art boom of Figures 2 to 5, the hose 16 of the first embodiment supplies asphalt/tar to the rear of the head 26, although the invention is not limited to either arrangement. A pair of spaced apart  
15 parallel generally vertical flanges 30 extend from the front of the head 26 and a spindle is mounted horizontally between the flanges 30. A bracket 34 is pivotally mounted on the spindle between the two flanges. The bracket 34 includes a generally triangular  
20 holding member 35 disposed below the flanges, whose apex points upwardly towards the spindle and whose axis runs parallel to the longitudinal axis of the boom. A threaded bolt 37 is inserted in a threaded hole in the underside of the holding member 35. A retractable  
25 deflection plate 36 comprising a conventional piece of angle iron is slidably inserted into the holding member with its apex pointing upwardly and is retained in position within the holding member 35, by screwing the  
bolt 37 into the holding member 35.

30

An upwardly pointing arm 38 is connected to the front of the head 26. A crosspiece 38' extends from the otherwise free end of the arm 38 and points away from the head 26. A pneumatic cylinder 40, comprising a  
35 piston 41 and a sleeve, is pivotally connected via its

sleeve to the free end of the crosspiece 38'. The free end of the piston 41 is, in turn, pivotally connected to the top of the bracket 34 so that the bracket is entrained to the piston.

5

In use, the piston 40 is extended from the pneumatic cylinder 39 under operator control to cause the deflection plate 36 to pivot along the path E-F and so be deployed beneath the head 26, Figure 6. When  
10 deployed, the deflection plate 36 causes the asphalt-gravel or gravel mixture dispensed from the head to be dispersed over a larger area than without the deflection plate, so enabling gravel to be generally uniformly dispensed at a high rate over a larger area.

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If, however, the operator causes the piston to be retracted to in turn cause the deflection plate to be retracted away from and clear of the head 26, asphalt-gravel is dispensed as in the prior art of Figures 2 to  
20 5.

Because the length of the deflection plate 36 may be adjusted by loosening the bolt 37 and sliding the plate within the holding member 35, this ensures not only  
25 that the deflector may be replaced when worn, but also that an optimum length for the plate 36 may be selected. If too short, then not enough spread will be achieved, thus resulting in uneven dressing of the road surface. If too long, then a "dead spot" will result  
30 again resulting in uneven dressing.

In a second embodiment of the invention, Figure 8, a second tar spraying jet 45 is employed. The jet 45 is linked by a beam 43 carrying a tar supply from the head  
35 26. The head 26 further incorporates two tar spraying

jets, described in more detail later, but which nonetheless can be thought of as disposed horizontally and pointing downwardly from the head 26. Each of the three jets is selectively connectable to the tar supply hose 16 via a mixer (not shown). When dispensing a tar/gravel mixture, the horizontal one of the jets within the head 26 is used to spray the falling gravel with tar. This can be done with or without the deflection plate 36 being deployed.

10

However, when it is desired simply to spray a road surface with tar, then one or both of the downwardly pointing spray jet within the head 26 and the jet 45 can be used to spray the tar. Where the downwardly pointing spray jet is actually located within the head 26, the deflection plate should be retracted when the spray jet is in use. In this case, the operator controls can be suitably configured to ensure that the downwardly pointing spray jet cannot be employed with the deflection plate deployed.

15

In the first and second embodiments, it will be seen that a single tar supply hose is used. This causes problems when the boom is out of use for sustained periods or even if a spray jet, such as the jet 45, is not in use for sustained periods.

20

In a third embodiment of the invention, Figures 9 and 10, a re-circulating tar supply is employed. (In these figures, control lines for each of the components of the boom are shown as dashed lines.) In this case, tar is supplied as before through a hose 16. Rather than terminating at the second spray jet 45 as before, however, the tar is re-circulated to the tar tank via second hose 16'. Thus, heated tar can be continually

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pumped around a circuit so prevent the spray jets from getting clogged with cooling tar.

In this embodiment, a downwardly pointing jet 47, which  
5 in the first embodiment, was housed within the head 26  
is now disposed to the side of the head 26, Figure 9. A  
pneumatically controlled plunger 49,49' is disposed  
above the spray jet 47 and when actuated this stops tar  
which may be flowing to the jet 47 from being sprayed.  
10 A similar pneumatically controlled plunger 53,53' is  
also disposed above the second spray jet 45 and again  
when this is actuated by an operator this stops tar  
which may be flowing to the jet 45 from being sprayed.

15 Referring now to Figure 10, behind the jet 47, a  
further pneumatically controlled plunger 55 controls a  
mixer 57 which determines whether tar will flow to the  
horizontally disposed jet 59 located within the head  
26, where it will spray dispensed gravel, or to the  
20 jets 47 and 45, which may be employed to spray a road  
surface directly.

Thus, using the third embodiment of the invention, in  
particular, an operator can select a number of modes of  
25 operation of the boom according to the state of the  
various pneumatic, or alternatively electric or  
hydraulic controls:

- tar only is sprayed. In this case, the mixer 55 is  
set to supply tar to the spray jets 45 and 47 and  
30 their respective controls 49 and 53 are set to turn  
on one or both of the spray jets 45, 47. This is used  
to prepare a road surface to be re-dressed. The  
deflection plate 36 can either be deployed or  
retracted as it preferably does not interfere with  
35 tar being sprayed from either of the jets 45, 47.

- gravel only is dispensed through the head. In this case, the mixer 55 is set to supply tar to the spray jets 45 and 47 and their respective controls 49 and 53 are actuated to cut off the spray jets. The  
5 cylinder 39 is extended or retracted according to whether or not the operator wants the gravel to be dispensed widely or locally. Usually, the operator would deploy the deflection plate to spread gravel widely over a pre-tarred surface;
- 10 • tarred gravel is dispensed through the head. The mixer 55 is set to supply tar only to the spray jet 59 within the head 26. (The controls 49 and 53 can be in any state.) The deflection plate can be either deployed or retracted. Usually, it will be retracted  
15 to fill a pothole with tarred gravel and deployed to re-dress either a pre-tarred road or an untarred road.

In the prior art and first to third embodiments, where  
20 the boom is used both to clear a road of debris prior to dressing/repairing the road and subsequently to dress/repair the road, the boom can be arranged to cut off the stone supply and to either simply blow air through the head 26 or propel gravel with the air.  
25 However, if only a single air supply rate is used and if the supply rate is only sufficient to dispense the gravel, then this is not satisfactory for clearing the road. If on the other hand a higher supply rate, sufficient to clear the road is used, then this causes  
30 dispensed gravel to bounce when dressing the road. A solution to this problem is to provide a dual speed air supply, however, this is relatively expensive to produce.



In a fourth embodiment of the invention, Figure 11, a flap 71 is disposed within the front end 24 of the hose 25. The flap is under the control of a pneumatic cylinder 73 mounted externally of the hose and  
5 connected to the flap via a hinge traversing the hose. The cylinder 73, under operator control, is extendible to cause the flap to move from a substantially vertical state (anticlockwise as shown) to a horizontal state where it lies adjacent the bottom surface of the hose.  
10 A downwardly projecting collar 75 extends to define a second outlet in the hose 25 and includes an aperture 78 disposed adjacent the end of the flap when in the horizontal state.

15 A funnel shaped restrictor 77, with a long narrow opening 79 directed at an angle to the road surface Figure 12, is attached to the boom by a spigot and socket (not shown) and locked in place with a threaded bolt 76. Slackening the bolt 76 allows the operator to  
20 rotate the restrictor in a horizontal plane and so to choose the direction of the opening 79. The opening may be positioned at an angle away from a kerb when blowing away debris or it may be directed away from the centre of a road to sweep in loose chips. (It will be seen  
25 that this adjustment can also be carried under hydraulic control.)

When in the horizontal state, the flap allows excess air to bleed off via a path X through the aperture 78,  
30 the collar outlet and the restrictor opening 79, while the main airflow carries the gravel chips via the head 26 along the path Y. The bleed off of the excess air reduces the velocity at the head 26, thereby reducing bounce when the stones hit the road surface.

When in the vertical state, during work preparation or sweeping up after work, the flap blocks access to the head 26 and all of the airflow is directed through aperture 78, from where it enters the restrictor 77.

5 The air exits the restrictor opening 79 along its length at a higher velocity than air exiting the head 26, so creating an air brush effect. Thus the air brush can be used to blow away debris and water from an area to be repaired/dressed; or to sweep in any loose chips  
10 which may lie on a road surface adjacent to the repaired area, eliminating a potential traffic hazard.

In any of the above embodiments, where an operator is setting the various controls from the cab 46, it will  
15 be seen that either individual controls can be made available to the operator or controls can be combined so that an operator need only select one of a number of operating modes from, for example, a panel and appropriate control logic then sets the controls as  
20 appropriate. Nonetheless, this invention is applicable to any manner of control of the componentry of the boom.

Finally, it will be seen that the point where the front  
25 end 25 bends to dispense stones downwardly through the head 26, will be prone to wear due to stones deflecting on its internal surface. To obviate the need to replace a major component of the boom, a replaceable plate 51 is bolted to the external curved surface of the bend,  
30 Figure 10. When this plate begins to fail, it can be replaced simply by bolting on a replacement.

The invention is not limited to the embodiments described herein which may be modified or varied  
35 without departing from the scope of the invention.

**Claims:**

1. A boom for a road repair vehicle including a head at the free end of the boom for dispensing a road repair material and at least one hose extending along the boom for delivering said material to the head from a supply of said material on the vehicle, characterised in that a deflection member is movably mounted on the boom from a first state in which it is, in use, deployed beneath the head, to a second state in which it is substantially clear of the head.
2. A boom as claim 1 in claim wherein said material comprises one or more of air, tar or gravel.
3. A boom as claimed in claim 2 comprising a second downwardly directed tar spraying jet, a third downwardly directed tar spraying jet and fourth horizontally directed tar spraying jet, each in fluid communication with a tar supply carrying tar to the head.
4. A boom as claimed in claim 3 wherein said second jet is disposed remotely from said head, said third jet is disposed adjacent said head and said fourth jet is arranged to spray tar in the path of material being dispensed from said head.
5. A boom as claimed in claim 3 wherein each of the second, third and fourth jets are selectively connectable to the tar supply.
6. A boom as claimed in claim 2 wherein tar supplied to said head is re-circulated through said tar supply.

7. A boom as claimed in claim 1 wherein said deflection member is releasably mounted on the boom.

8. A boom as claimed in claim 1 wherein said deflection member is adjustably mounted on the boom so that the extent to which said deflection member extends beneath the head may be adjusted.

9. A boom as claimed in claim 2 wherein said head comprises a second outlet, and wherein the boom comprises means for selectively directing said material to said head or said second outlet, said second outlet being arranged to direct air flow at a road surface at a higher rate than gravel propelled by the same air flow is dispensed from said head.

10. A boom for a road repair vehicle substantially as described herein with reference to Figs. 6 and 7 or 8 or 9 and 10 or 11 and 12 of the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0120151.6  
Claims searched: 1-10

Examiner: D. Haworth  
Date of search: 1 February 2002

### Patents Act 1977 Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.T): E1G (G57X3)

Int CI (Ed.7): E01C 19/21, 23/06

Other: Online: WPI, EPODOC, PAJ

#### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2315795 A (McNamee)	

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.