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(54) Delivery nozzle for use with a mineral fibre pumping apparatus.

(57) A delivery nozzle (10) for application to pumping apparatus for mineral fibre at least when used as insulation comprises a body member (10) that substantially reduces in cross-section between an input part (12) of a first constant cross-section, e.g. 50 mm circular, and an exit part (15) of a second constant cross-section, e.g. 22 mm circular. The exit part (15) is vented at a cross-section less than the first cross-section of the body member. The venting (31) comprises a branch (32), which is directed forwardly and downwardly of the nozzle, and a gate valve 40 capable of adjustably varying the effective orifice of the venting. The venting is arranged substantially parallel to a cut-off (30) of an end portion of the nozzle.

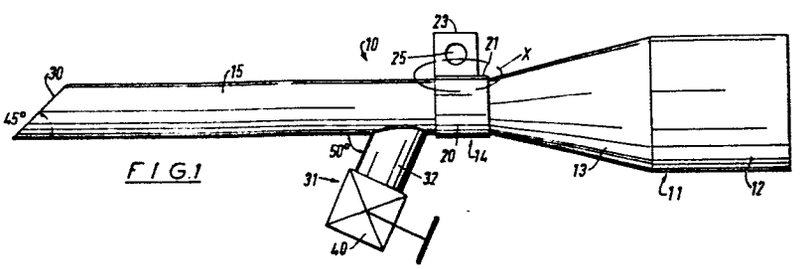

FIG.1

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Title: Nozzles

TITLE MODIFIED
see front page

DESCRIPTION

The invention relates to nozzles and has particular application to pumping apparatus for mineral fibre at least when used as insulation, such a nozzle comprising a body member that substantially reduces in cross-section between an input part of a first constant cross-section and an exit part of a second constant cross-section.

We have experienced difficulties in achieving entirely satisfactory filling of cavity walls with mineral fibre as insulation. We prefer to use mineral fibre, such as available commercially as Rockwool, because of its high insulation value coupled with excellent physical and chemical stability. Our preferred pumping apparatus, see our copending British patent applications Nos. 81/08008 and 81/08009, is highly effective in producing a smooth and regular stream of gas, usually air, with a substantially even entrainment of mineral fibres. The latter is important in that it is desirable for resulting insulation (in loft spaces, cavity walls, or elsewhere

to be insulated) to be in a fluffed and relatively uncompacted condition, both to achieve best insulation values and to avoid problems that can arise, particularly for cavity walls, by reason of compaction leading to transmission of damp through the compacted insulation.

Output is usually taken from our preferred pumping apparatus through a flexible tube or pipe and we have found it to be advantageous for such a tube or pipe to be terminated by a nozzle that substantially reduces in cross-section from said tube or pipe to final exit from the nozzle. Such provision aids maintenance of an air stream with well and evenly distributed entrained mineral fibre. However, it will be evident that the stream must speed up through the nozzle, which leads to a tendency for unwanted compaction of the delivered insulation material, especially when a cavity to be filled substantially entirely nears its full state. For cavity walls, that can even lead to localised damp transmission between its skins at least in regions adjacent to delivery positions.

We have now found, and thus propose as an aspect of this invention, that these problems are capable of solution by venting a delivery nozzle, preferably of the aforementioned reducing cross-sectio.. motive, and

preferably vented at a cross-section less than its input, further preferably at its exit cross-section.

Venting from a side of the nozzle has been found to be particularly effective when done at an acute angle of the nozzle axis and directed forwardly thereof, preferably downwardly, and preferably at an angle substantially equal to that of a cut-off of the end of the nozzle further preferably substantially parallel thereto. By "substantially parallel" we intend to include both close correspondence of angles and also tolerable variations, for example the nozzle end at about 45° and the vent angle at about 50° for a range of about 45° to 50° for both.

It is also advantageous for the venting to be via a variable orifice, such as a suitable valve, preferably a gate valve. Then, operators can set the vent orifice to suit particular conditions on site and/or as desirable to suit different lengths of nozzle ends depending, for cavity wall filling, on the thickness of the wall skin to be penetrated, usually via a suitable sealed coupling or other sealing arrangement.

In preferred embodiments hereof, there is a cross-section reduction, preferably as a smooth taper, of

50% or more, typically about 80%, say from nominal 50 mm diameter to 22 mm diameter. At least then, it is approproate to vent via an acutely inclined branch of equal cross-section to the nozzle end and carrying a gate valve of the same nominal size rating. Such branch need not exceed in length the inlet diameter or equivalent for the nozzle.

We find that, even with a forwardly directed vent, normal operation of pumping apparatus does not cause significant loss of insulation material through the vent. Some dust may be expelled via the vent, but significant quantities of mineral fibre appear only when the cavity is full, thus acting as an indicator so that pumping can be stopped before undesirable compaction can occur.

Particular preferred nozzles hereof have removable, tubular, substantially constant section, end parts and clamping means associated with the reduced end of the remainder of the nozzle for securement purposes and ready replacement with different length end parts to suit particular site conditions.

In view of the above-mentioned preference for substantial parallelism of the nozzle end and the vent, we find it advantageous to fabricate end parts

complete with fixed branches for gate valves that will also normally be attached permanently thereto.

One specific embodiment of this invention will now be described, by way of example with reference to the accompanying diagrammatic drawing, in which:

Figure 1 is a side view of a nozzle;

Figure 2 is an end view of the same nozzle; and

Figure 3 shows a detail section at X of Figure 1.

In the drawings, a nozzle 10 comprises a main part 11 having an entry section 12 of substantially constant cross-section, actually 50 mm circular, for securement thereto of flexible tube or pipe (not shown), say by clamp means such as Jubilee clips. Beyond the section 12 the nozzle part 11 tapers 13 at a constant rate to a coupling 14 for a nozzle end part 15 also of substantially constant cross-section, actually 22 mm circular, matching the end of the tapered section 13 of the main part 11.

The coupling 14 comprises a sleeve 20 welded to the end of section 12 at its inner end 21 which has a continuous periphery, and a split outer end 22 carrying confronting plate-like upstands 23, 24 having registering apertures (25 shown) by which they are interconnected via bolt-and-nut 27, 28 in order to

clamp into a nozzle end part 15 that will butt neatly up to the reduced end of the section 12. Nozzle end parts 15 are, by these means, readily fitted, removed, and replaced.

The nozzle end parts 15 terminates in a sloped cut-off 30, preferably at an angle of about 45° to 50°, actually 45° as shown.

Forwardly of its connection via the coupling 14, the nozzle end part has a vent arrangement 31 as a short branch 32 at a forward acute angle to the axis of the coupling. That angle is also between about 45° and 50°, actually shown as 50°, and the branch does not need to be long, in fact is shown as just less in length than the diameter of the nozzle inlet. The angling of the vent branch 32 and the nozzle end 30 are thus substantially parallel, i.e. within the tolerances represented by the preferred ranges of those angles.

On the end of the branch 32 is a venting valve 40, shown diagrammatically but actually a gate valve capable of adjustably varying the effective orifice of the vent.

CLAIMS

1. A delivery nozzle for application to pumping apparatus for mineral fibre at least when used as insulation comprising a body member (10) that substantially reduces in cross-section between an input part (12) of a first constant cross-section and an exit part (15) of a second constant cross-section, characterised in that the exit part (15) has vent means (31) arranged at a cross-section less than the first cross-section of the body member.

2. A delivery nozzle as claimed in claim 1, wherein the vent means (31) is arranged at the exit part cross-section.

3. A delivery nozzle as claimed in claim 1 or 2, wherein the vent means (31) is arranged from a side of the nozzle at an acute angle to the nozzle axis, the vent means (31) being directed forwardly of the nozzle.

4. A delivery nozzle as claimed in claim 3, wherein the vent means (31) is directed downwardly, as well as forwardly, of the nozzle.

5. A delivery nozzle as claimed in any one of the

preceding claims, wherein the vent means (31) is arranged at an angle substantially equal to that of a cut-off (30) of an end portion of the nozzle.

6. A delivery nozzle as claimed in claim 5, wherein the vent means (31) is arranged substantially parallel to the cut-off (30).

7. A delivery nozzle as claimed in any one of the preceding claims, wherein the vent means (31) comprises a gate valve (40) capable of adjustably varying the effective orifice of the vent means (31), the gate valve being attached permanently to the vent means.

8. A delivery nozzle as claimed in claim 1, wherein the cross-section reduction is of 50% or more in a smooth taper.

9. A delivery nozzle as claimed in claim 1, 7 or 8, wherein the vent means (31) further comprises an acutely inclined branch (32) of equal cross-section to the exit part (15), the branch having a length not exceeding the diameter of a circular section nozzle input part.

10. A delivery nozzle as claimed in any one of the preceding claims, wherein the nozzle comprises a removably, tubular, substantially constant cross-section, end part and clamping means associated with the

reduced end of the remainder of the nozzle for securement purposes and ready replacement with a different length end part to suit particular site conditions.

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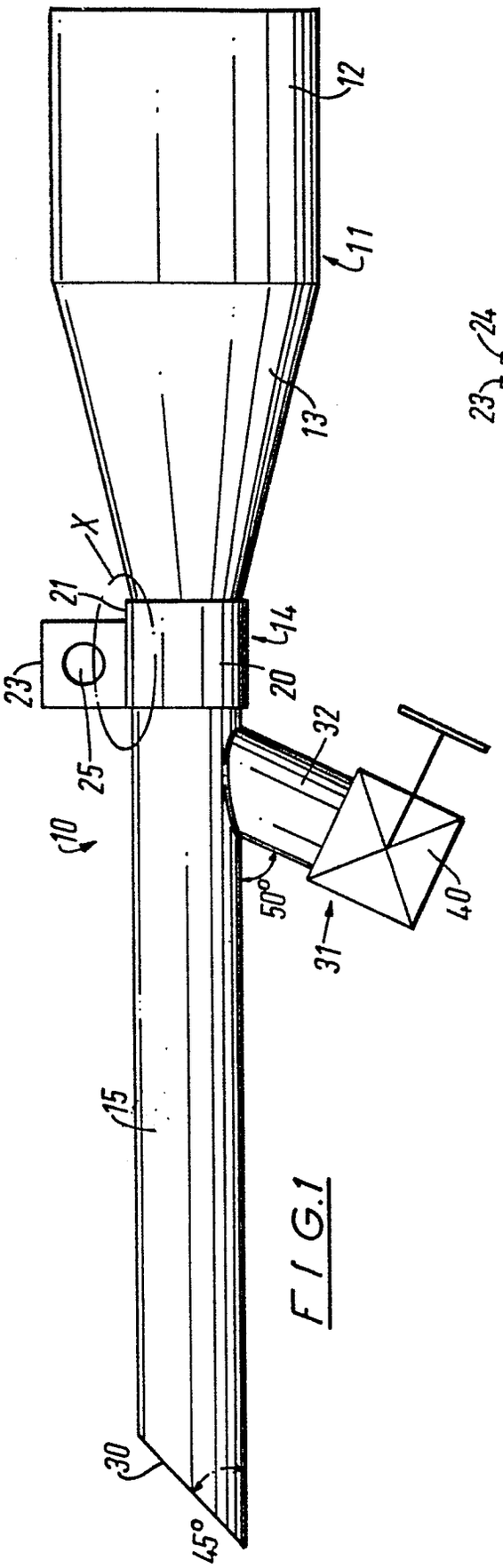

FIG.1

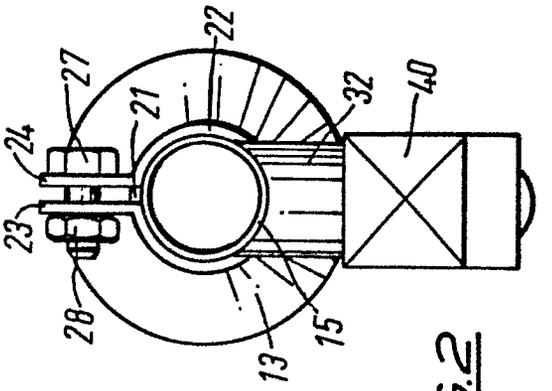

FIG.2

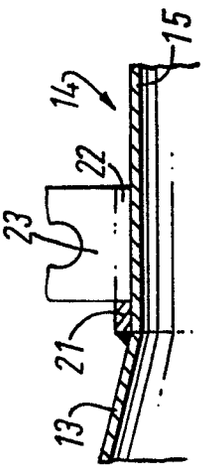

FIG.3