PATENT SPECIFICATION (11) 1 572 218

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(21) Application No. 27998/77 (22) Filed 4 July 1977
(31) Convention Application No. 7607647 (32) Filed 5 July 1976 in
(33) Sweden (SE)
(44) Complete Specification published 30 July 1980
(51) INT. CL.³ B05B 3/02 // B01F 9/10
(52) Index at acceptance
B2F 10H3A3A2B 10H3A3A2Y 10H3A3A3 10H3A3B
B1C 19C2B 5

(19)

(54) APPARATUS FOR DISPENSING MATERIAL

(71) We, AKTIEBOLAGET SKF, a Swedish Body Corporate, of S-415 50 Goteborg, Sweden, do hereby declare the invention,

for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns apparatus for dispensing material.

The invention provides apparatus for dispensing material, the apparatus comprising a nozzle and means for supplying material into the nozzle, which nozzle comprises a rotatable vessel with a central axis, the vessel having a circumferential wall, a plurality of axially extending partition walls in the vessel integral with the circumferential wall and extending radially inwardly from the circumferential wall, a plurality of outlet apertures in the circumferential wall and arranged circumferentially of the vessel, one between the walls of each pair of adjacent partition walls, and an inlet aperture at one axial end of the vessel for the supply of material into the vessel, the supply means having an opening at the said one axial end which opening is offset from the central axis and lies between the axis and circumferential wall, so that, in use of the apparatus and with the nozzle rotating about the central axis, material supplied to the vessel leaves the opening, moves with an axial component through the inlet aperture into the vessel, falls between the radially extending partition walls and is then guided between the partition walls to move with a radial component to and through the outlet apertures.

The partition walls of each pair of adjacent walls may subtend the same angle as any other pair of adjacent walls.

The axial end of the vessel opposite to the said one end may taper towards the axis away from the vessel, the outlet apertures being disposed adjacent to the taper.

The vessel may have means other than the said walls to promote mixing of material in the vessel.

Between the walls of each pair of adjacent partition walls there may be at least one axially extending further wall which extends radially but stops short of the circumferential wall of the vessel.

The vessel may be sub-divided into a plurality of chambers by the partition walls.

Two or more said vessels may be provided, one coaxially arranged inside the other, the outlet apertures of the inner vessel communicating with the outer vessel.

A said nozzle may be mounted to be driven in rotation about its central axis and an annular disc may be provided and arranged coaxial with the nozzle and to be driven in rotation, the disc may have means for securing moulds to it so that when the disc and nozzle are driven in rotation together and moulds are secured to the disc, there is one mould adjacent to each outlet aperture of the nozzle.

The apparatus may include a said nozzle mounted on a platform, and the platform may include means for securing moulds one adjacent to each outlet of the nozzle.

Embodiments of the invention will now be described by way of example, reference being made to the accompanying drawings of which:—

Figure 1 is an axial section of a nozzle;

Figure 2 is a plan view of the nozzle of Figure 1;

Figure 3 is an axial section of another nozzle;

Figure 4 is a plan view of the nozzle of Figure 3;

Figure 5 is an axial section of a further nozzle;

Figure 6 is a plan view of the nozzle of Figure 5;

Figure 7 is an axial section of yet another nozzle; and

Figure 8 is a plan view of the nozzle of Figure 7.

Referring to Figures 1 and 2, the nozzle comprises a vessel 1 having a central axis and an axially extending central shaft 2. The vessel is arranged with the axis vertical and at the top axial end is an inlet aperture 3. Two stationary supply tubes 4 are arranged side by side but eccentric to the vessel 1 for supplying material 6 to the vessel 1. Four outlets 5 are arranged circumferentially around the vessel 1. The vessel 1 is subdivided into four identical chambers 10 by walls 11 which extend axially and radially, each adjacent pair of walls 11 subtending the same angle as any other adjacent pair.

The vessel 1 is mounted on a shaft 8 to be driven in rotation about its central axis. Arranged coaxially with the nozzle is an annular disc on which are secured four moulds 9, each with an opening 7, so that when the nozzle and disc are driven in rotation together, each mould 9 is adjacent to one outlet 5. The material 6 is thus thrown from the vessel through openings 7. An advantage of this is that the same nozzle can be used to serve several sets of moulds on different discs.

With a constant flow rate of material down the tubes 4 and with the nozzle rotating at a constant velocity, each chamber 10 will be supplied with an equal volume of material because each adjacent pair of walls 11 subtend the same angle. Thus equal volumes of material will be dispensed to the moulds 9, and the volume will be independent of the size of the chambers 10, the size of the tubes 4 and the size of the outlets 5. If the material is a plastic material which is curing or setting even while in the nozzle, then each outlet will become blocked or obstructed, and so maintaining a constant flow rate through the outlets 5 becomes difficult. If the outlets 5 are of different sizes, this will not affect the volume of material dispensed, only the flow rate from the chambers. The disc with the moulds must be kept rotating until the plastics material has cured sufficiently so that it does not run out.

Each of the four moulds 9 depicted is a stator for an electric motor, and the stator is to be filled with a plastics material. One of the tubes 4 can dispense an epoxy resin and the other a hardener for the resin. The liquids flowing from the tubes 4 are mixed together when they impinge against the walls 11 and by the turbulence around each outlet 5. Further means can be provided in each chamber for promoting mixing of material in that chamber, such means may include baffles, perforated walls or partitions for example. The mixing will be best if the tubes 4 are arranged side by side with the flow of material from them impinging against the walls 11 at the same time. The tubes may even be arranged coaxial. However the tubes need not necessarily be arranged side by side. There may be an advantage in having more than one tube dispensing a particular material, particularly if that material is to be mixed with another and is difficult to mix.

Although four chambers 10 are shown to be of equal size because adjacent pairs of walls 11 subtend the same angle, different size chambers can be had by increasing the number of walls and therefore of chambers; or the same number of chambers can be kept, but each of a different size, with adjacent pairs of walls 11 subtending different angles. The angle subtended by an adjacent pair of walls determines how much material is dispensed to it by tubes 4.

The embodiment shown in Figures 3 and 4 has a vessel which is square in cross-section with outlets which are holes drilled in the wall. Each chamber has means comprising a free axially and radially extending wall or partition 12 and baffles 13 to cause turbulence of the material in each chamber and thereby promote mixing.

Figures 5 and 6 show an embodiment in which two nozzles are arranged coaxially one inside the other. The inner vessel has four equal size chambers with an outlet 14 for each chamber communicating with a chamber 16 of the outer vessel. Above and eccentric to the inner vessel are two supply tubes arranged side by side, and above the outer vessel is a third supply tube 15. The outlet of each chamber 16 of the outer vessel in angularly displaced from the communicating outlet of the inner vessel so that material does not immediately leave chamber 16. Such an embodiment is suitable for mixing and dispensing, for example, a plastics material, a hardener for the plastics material and an accelerator for the hardener. The plastics material and hardener are mixed in the inner vessel and transferred to the outer vessel. The accelerator is then supplied by tube 15 to chamber 16 and mixed with plastics material and hardener. The accelerator thus only comes into contact with the hardener at the last possible moment so preventing a too rapid reaction.

The nozzle shown in Figures 7 and 8 comprises a vessel of which the lower end 17 tapers towards the axis away from the vessel, outlets 18 being disposed adjacent to the taper and comprising axially extending slots in the wall of the vessel. The vessel has a plurality of axially extending partitions 12 which extend radially but stop short of the circumferential wall of the vessel. All of the partitions 12 must be of the same height or axial extent for good

mixing. Walls 11 extend from the circumferential wall of the vessel but do not meet all the way along the axis and extend axially upwards past at least the bottom of the outlets 18. An advantage of this embodiment is that the nozzle can be made at low cost by injection moulding in a two piece mould.

Instead of moulds being secured to an annular disc coaxial with the separately mounted nozzle, the nozzle and moulds can all be mounted on a single platform.

WHAT WE CLAIM IS:—

1. Apparatus for dispensing material, the apparatus comprising a nozzle and means for supplying material into the nozzle, which nozzle comprises a rotatable vessel with a central axis, the vessel having a circumferential wall, a plurality of axially extending partition walls in the vessel integral with the circumferential wall and extending radially inwardly from the circumferential wall, a plurality of outlet apertures in the circumferential wall and arranged circumferentially of the vessel, one between the walls of each pair of adjacent partition walls, and an inlet aperture at one axial end of the vessel for the supply of material into the vessel, the supply means having an opening at the said one axial end which opening is offset from the central axis and lies between the axis and circumferential wall, so that, in use of the apparatus and with the nozzle rotating about the central axis, material supplied to the vessel leaves the opening, moves with an axial component through the inlet aperture into the vessel, falls between the radially extending partition walls and is then guided between the partition walls to move with a radial component to and through the outlet apertures.

2. Apparatus as claimed in claim 1, wherein the partition walls of each pair of adjacent walls subtend the same angle as any other pair of adjacent walls.

3. Apparatus as claimed in claim 1 or 2, wherein the axial end of the vessel opposite to the said one end tapers towards the axis away from the vessel, the outlet apertures being disposed adjacent to the taper.

4. Apparatus as claimed in any preceding claim, wherein the vessel has means other than the said walls to promote mixing of material in the vessel.

5. Apparatus as claimed in claim 4, wherein between the walls of each pair of adjacent partition walls there is at least one axially extending further wall which extends radially but stops short of the circumferential wall of the vessel.

6. Apparatus as claimed in any preceding claim wherein the vessel is subdivided into a plurality of chambers by the partition walls.

7. Apparatus as claimed in any preceding claim, wherein two or more said vessels are provided, one coaxially arranged inside the other, the outlet apertures of the inner vessel communicating with the outer vessel.

8. Apparatus as claimed in any preceding claim wherein a said nozzle is mounted to be driven in rotation about its central axis and an annular disc is provided and arranged coaxial with the nozzle and to be driven in rotation, the disc having means for securing moulds to it so that when the disc and nozzle are driven in rotation together and moulds are secured to the disc, there is one mould adjacent to each outlet aperture of the nozzle.

9. Apparatus as claimed in any one of claims 1 to 7, including a said nozzle mounted on a platform, the platform including means for securing moulds one adjacent to each outlet of the nozzle.

10. Apparatus substantially as herein described with reference to and as shown in Figures 1 and 2 or with reference to and as shown in Figures 3 and 4 or with reference to and as shown in Figures 5 and 6 or with reference to and as shown in Figures 7 and 8 of the acompanying drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1980.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1572218 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

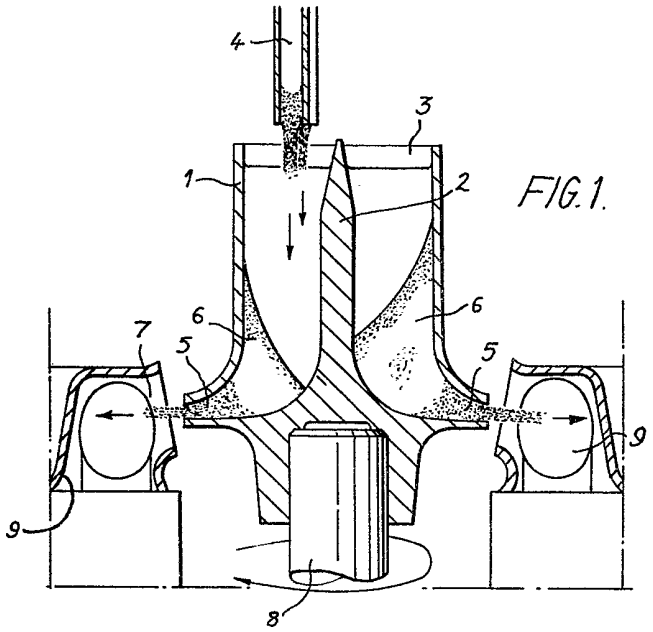


FIG. 1.

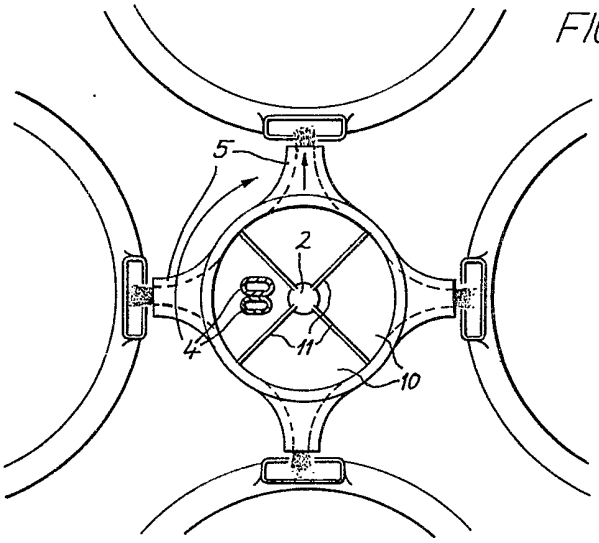
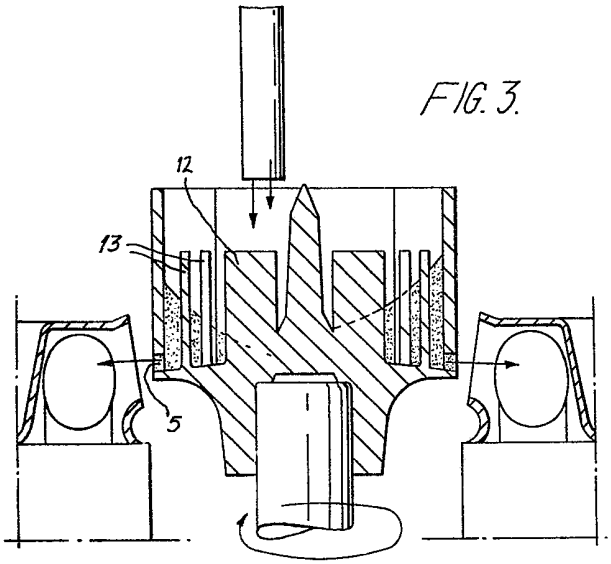


FIG. 2.

FIG. 3.



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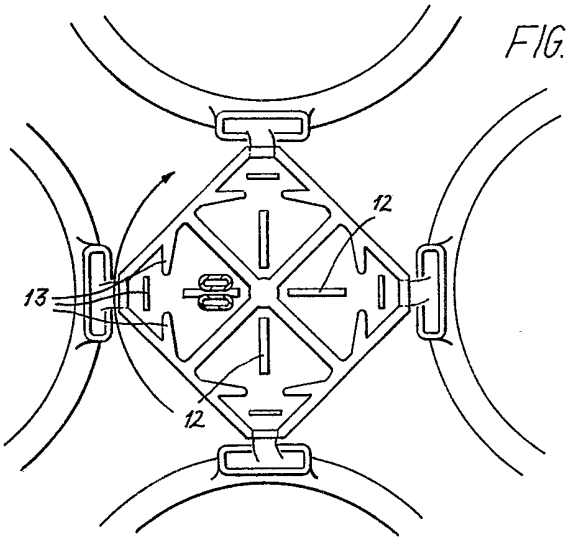

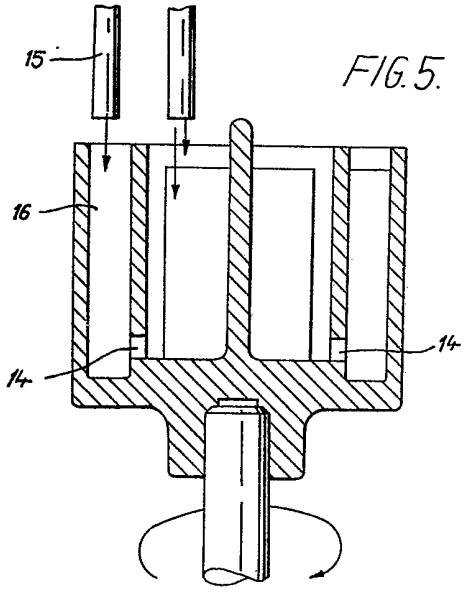

FIG. 5.

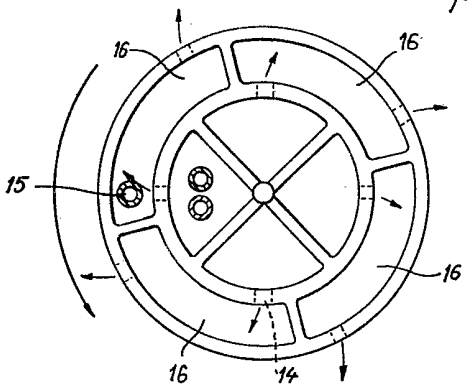

FIG. 6.

FIG. 7.

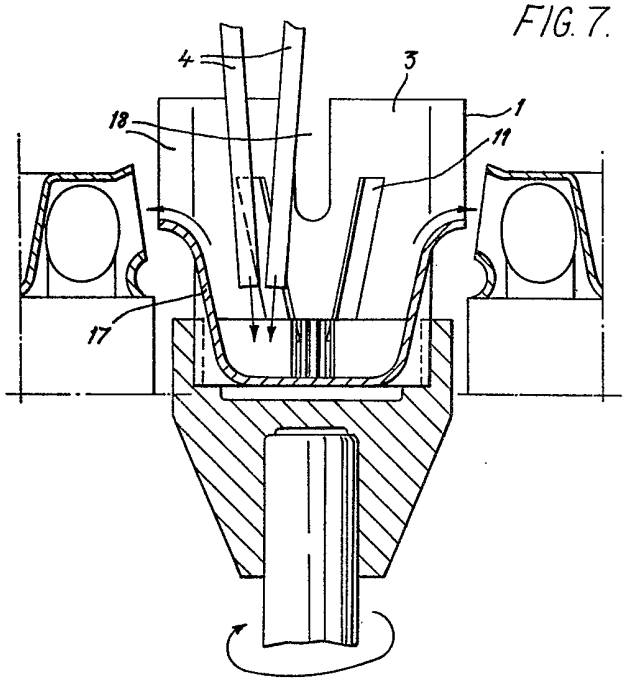

FIG. 8.