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(54) Equipment for distributing a liquid.

(57) The equipment comprises a delivery head having a projecting boss (10). A distribution element (20') is rotated in use by a motor (6) to deliver liquid supplied to the element (20') through an annular outlet (18) provided in the boss (10). The distribution surface (26') of the element (20') is spaced by a small distance (d) from the end of the boss (10).

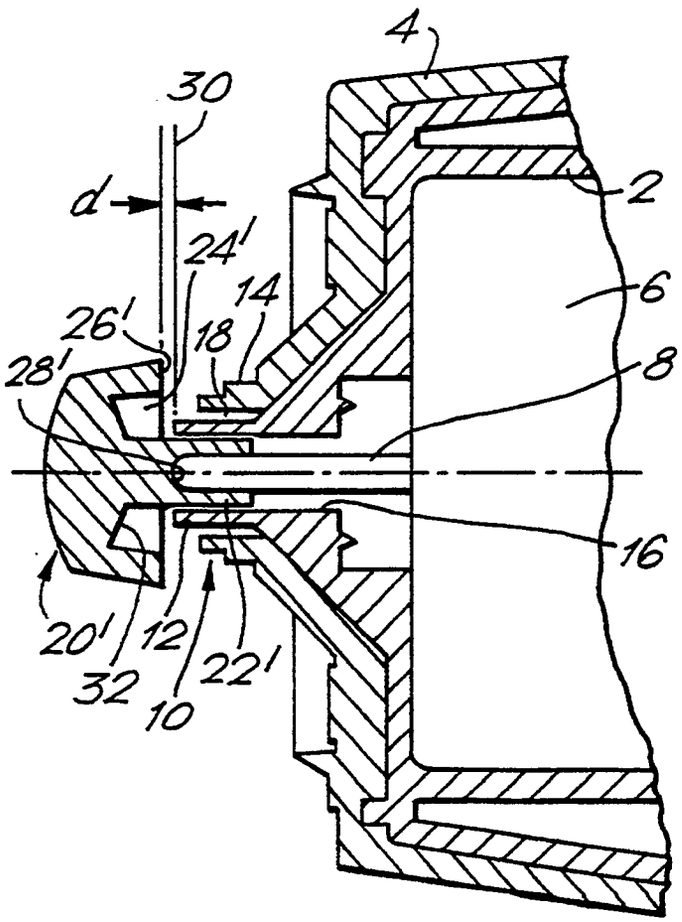

FIG. 2.

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This invention relates to equipment for distributing a liquid, and is particularly, although not exclusively, concerned with equipment for distributing agricultural and horticultural chemicals, such as herbicides.

GB-A-2194467 discloses a delivery head for, for example, a hand-held herbicide applicator. GB-A-2194467 also discloses rotary distribution elements for use with the delivery head.

The delivery head disclosed in GB-A-2194467 comprises a motor housing provided with a projecting boss having a central aperture into which projects a drive spindle of an electric motor accommodated within the housing. The distribution element has a hollow drive shank which extends into the central aperture and fits over the drive spindle, in order that the distribution element may be driven, in operation. An annular recess surrounds the drive shank, this recess receiving the outer extremity of the projecting boss. An outlet for liquid is provided in the motor housing, and this outlet opens into the recess. The distribution element has a distribution surface across which liquid flows, in use, to be discharged from the outer periphery of the distribution element under centrifugal force. The distribution surface is spaced in the direction towards the delivery head from a transverse plane containing the outer extremity of the projecting boss.

This arrangement of delivery head and distribution element works effectively, and, with appropriate herbicide formulations, enables a user to deliver the herbicide in the form of droplets of generally uniform size with a median droplet diameter of approximately 600 microns.

However, it is desirable to reduce this median droplet size in order to reduce the tendency of droplets to roll off leaves on which they fall. Also, a smaller droplet size makes it possible to achieve a more even distribution of herbicide, or other agricultural or horticultural chemical, over the ground to be treated. However, the creation of droplets below a certain size must be avoided, since small droplets can be carried by the wind, which is undesirable for several reasons.

We have found surprisingly that, by adjusting the position of the distribution element with regard to the delivery head, an adjustment in median droplet size can be achieved, resulting in improved droplet formation.

According to the present invention, there is provided equipment for distributing a liquid, comprising a delivery head provided with a projecting boss having a central aperture which receives a drive shank of a motor driven rotary distribution element, the boss also having an outlet disposed adjacent the central aperture for supplying liquid to the distribution element, the distribution element having a distribution surface from which, in use, liquid is discharged, the distribution surface being spaced, in a direction away from the delivery head, from a transverse plane containing the extremity of the boss.

Preferably, the drive shank is hollow, so that the distribution element is a push fit onto a drive spindle of a motor accommodated within the delivery head. Stop means may be provided for limiting the extent to which the distribution element can be pushed onto the drive spindle. The stop means may comprise an end face of the central bore in the hollow drive shank.

The space between the distribution surface and the transverse plane should be less than one millimetre, and is preferably less than 0.5mm. Good results have been achieved using a distribution element having a generally square outer periphery with a dimension across its diagonals of 16mm. The distribution element may have an annular recess disposed between the drive shank and the distribution surface. This annular recess may have a generally frusto conical end surface which is inclined from the rotary axis of the disc in a direction away from the delivery head.

For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a fragmentary sectional view of a delivery head and a rotary distribution element in accordance with the prior art; and

Figure 2 corresponds to Figure 1 but shows a rotary distribution element constructed and disposed in accordance with the present invention.

Referring first to Figure 1, the delivery head comprises inner and outer housing components 2 anddd 4. The inner housing component 2 accommodates an electric motor 6, having a drive spindle 8.

The delivery head has a projecting boss 10 which comprises an inner projection 12 formed on the inner component 2 and an outer projection 14 formed on the outer component 4. The inner projection 12 has a central aperture 16 into which the drive spindle 8 extends. The inner and outer projections 12 and 14 define between them an annular outlet 18 through which, in use, flows herbicide to be delivered. Further details concerning the construction of the delivery head are given in GB-A-2194467 and GB-A-2172524.

A rotary distribution element 20 is fitted to the delivery head. The distribution element 20 has a hollow drive shank 22 which extends into the central aperture 16 and is a press fit over the drive spindle 8.

The distribution element has an annular recess 24 surrounding the drive shank 22, and both the inner and outer projections 12, 14 of the projecting boss 10 extend into the recess 24. The distribution element 20 also has a distribution surface 26 across which liquid flows, in operation, to be discharged in the form of droplets at its outer periphery.

The distribution element shown in Figure 1 is the same as that shown in Figures 4 to 7 of GB-A-

2194467. For use, the distribution element 20 is pushed on to the spindle 8 as far as it will go, the limit of movement being defined either by contact with the extremity of the inner projection 12 with the base of the recess 24, or by contact between the drive spindle 8 and the end face of the hollow interior of the drive shank 22. This limit position is shown in Figure 1, and it will be appreciated that the distribution surface 26 is disposed closer to the main body of the delivery head than the extremity of this projecting boss 10. This has previously been felt to be desirable, in order to achieve a wiping action between the outer projection 14 and the wall of the recess 24 adjacent the distribution surface 26, in order to achieve even distribution of liquid over the distribution surface 26.

It has been found, however, that improved droplet formation characteristics can be achieved with the arrangement shown in Figure 2. In the arrangement shown in Figure 2, the delivery head itself is unchanged, but the distribution element 20′ is modified in some respects, and its relationship with the delivery head is significantly altered. In particular, the hollow interior of the drive shank 22′ is significantly shorter, and terminates at an end wall 28′. The effect of this is that the distribution element 20 cannot be pushed onto the drive spindle 8 as far as the distribution element 20 of Figure 1. Consequently, the distribution surface 26′ is spaced from a plane 30, containing the furthest extremity of the projecting boss 10, by a distance d. In a preferred embodiment, the distance d is 0.3mm.

The configuration of the distribution element 20′ is generally similar to that of the distribution element 20, and in particular it has a generally square outer periphery. However, as shown in Figure 2, the face of the distribution element 20′ away from the delivery head is part-spherical, instead of flat. Also, the recess 24′ terminates at a frusto conical surface 32 which slopes from the rotary axis of the distribution element 20′ away from the transverse plane 30.

An unexpected result of the disposition of the distribution element 20′ as shown in Figure 2 is that the median size of droplets discharged from the distribution element 20′ in operation is slightly smaller than the median size of droplets discharged from the disc 20 disposed as shown in Figure 1, when using the same liquid and the same rotational speed (5 to 200 r.p.m). Thus, the median size of the droplets discharged using the arrangement shown in Figure 2 is approximately 400 microns, compared with a median size of approximately 600 microns discharged using the arrangement of Figure 1. It is not, at present, entirely clear why this difference should occur, but it is believed to derive from the occurrence of a different mechanism by which liquid is transferred from the outlet 18 to the distribution surface 26 or 26′.

Claims

1. Equipment for distributing a liquid, comprising a delivery head provided with a projecting boss (10) having a central aperture (16) which receives a drive shank (22′) of a motor driven rotary distribution element (20), the boss (10) also having an outlet (18) disposed adjacent the central aperture (16) for supplying liquid to the distribution element (20) the distribution element (20) having a distribution surface (26′) from which, in use, a liquid is discharged, characterized in that the distribution surface (26′) is spaced, in a direction away from the delivery head, from a transverse plane (30) containing the extremity of the boss (10).

2. Equipment as claimed in claim 1, characterised in that the drive shank (22) is hollow, the distribution element (20) being a push fit onto a drive spindle (8) of a motor (6) accommodated within the delivery head.

3. Equipment as claimed in claim 2, characterized in that stop means (28′) is provided for limiting the extent to which the distribution element (20) can be pushed on to the drive spindle (8).

4. Equipment as claimed in claim 3, characterized in that the stop means (28′) comprises an end face of the central bore in the hollow drive shank (22′).

5. Equipment as claimed in any one of the preceding claims, characterized in that the space (d) between the distribution surface (26′) and the transverse plane (30) is less than one millimetre, preferably less than 0.5mm.

6. Equipment as claimed in any one of the preceding claims, characterized in that the distribution element has a generally square outer periphery.

7. Equipment as claimed in claim 6, characterized in that the dimension of the square outer periphery across its diagonals is 16mm.

8. Equipment as claimed in any one of the preceding claims, characterized in that the distribution element has an annular recess (24′) disposed between the drive shank (22′) and the distribution surface (26′).

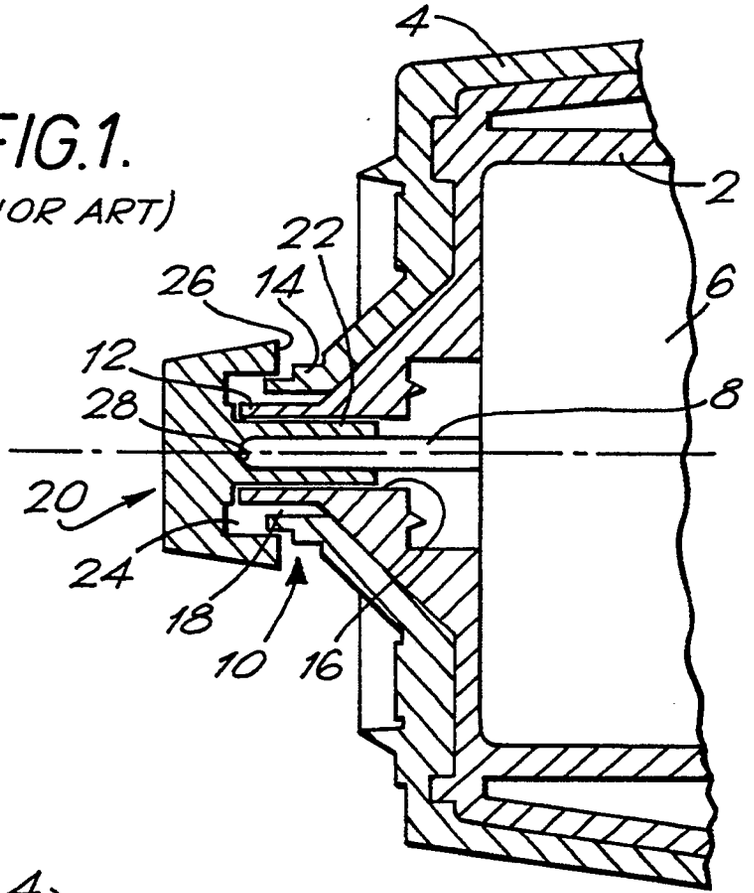
9. Equipment as claimed in claim 8, characterized in that the annular recess (24′) has a generally frusto conical end surface (32) which is inclined from the rotary axis of the disc in a direction away form the delivery head.

10. Equipment as claimed in claim 8 or 9, charac-

terized in that the outer diameter of the recess (24') is slightly larger than the outer diameter at the boss (10).

11. Equipment as claimed in any one of the preceding claims, characterized in that the outlet (18) is annular.

FIG.1.
(PRIOR ART)



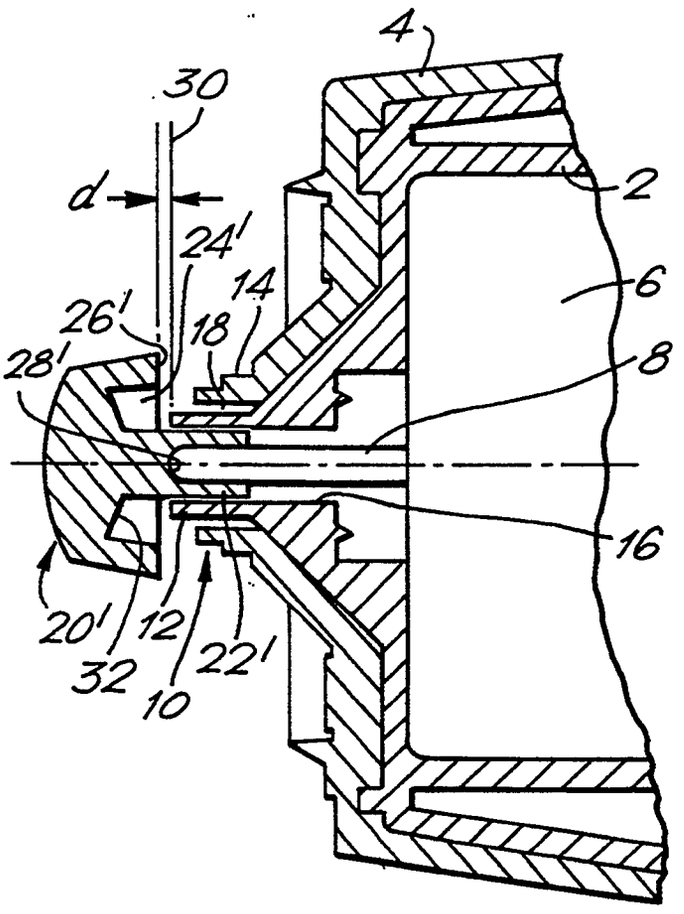


FIG.2.

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EUROPEAN SEARCH REPORT

Application Number

EP. 91 30 2900

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.5)
X	PATENT ABSTRACTS OF JAPAN vol. 8, no. 41 (C-211)(1478) 22 February 1984, & JP-A-58 199068 (MATSUSHITA DENKO K.K.) 19 November 1983, * the whole document *	1, 8-11	B05B3/10
A	EP-A-249470 (NOMIX MANUFACTURING CO. LTD) * column 3, line 57 - column 4, line 18; figures 4-7 *	1, 6-8, 10, 11	
A	FR-A-2526330 (COCOVI GARCIA) * page 5, lines 8 - 10; figure 2 *	2-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04 JUNE 1991	JUGUET J.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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