(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 663 466 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **95300241.7**

(51) Int. Cl.[6] : **D06F 57/04**

(22) Date of filing : **16.01.95**

(30) Priority : **17.01.94 GB 9400629**

(43) Date of publication of application :
19.07.95 Bulletin 95/29

(84) Designated Contracting States :
BE DE FR GB NL

(71) Applicant : **Abru Aluminium Limited**
Pennygillam Industrial Estate
Launceston Cornwall PL15 7ED (GB)

(72) Inventor : **Oliver, David P.**
Orchard Leigh,
Fairmead Road
Saltash, Cornwall PL12 4GJ (GB)
Inventor : **Redsell, Mark**
Saxons,
Higher Tremar Combe
Liskeard, Cornwall, PL14 5HS (GB)
Inventor : **Bassett, Stephen J.**
Koromiko,
North Petherwin
Launceston, Cornwall, PL15 8LR (GB)

(74) Representative : **Bryer, Kenneth Robert**
K.R. Bryer & Co.
Lewins House
Lewins Mead
Bristol BS1 2NN (GB)

(54) A rotary drier or airer.

(57) A rotary drier or airer, for example for laundry, of the type comprising a column (11) on which are carried upper and lower mountings (17, 25) for a plurality of articulated arms (22) which support a line or a plurality of lines, at least one of the said upper and lower mountings (17, 25) having or including two relatively rotatable components (31, 41) defining respective races (37, 44) between which are interposed a plurality of rolling elements (38) by which free rotation of the said arms (22) about the column (11) is facilitated.

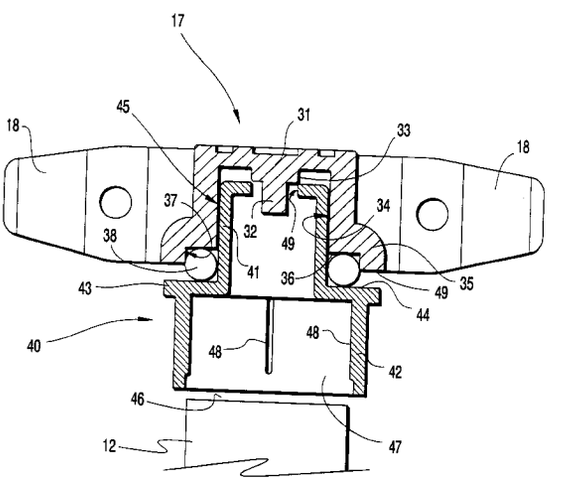

FIG 2

EP 0 663 466 A1

The present invention relates generally to a rotary drier or airer, for example for laundry.

The term rotary drier or airer as used herein will be understood to relate to the apparatus frequently utilised in place of a traditional washing line and comprising a central column on which is mounted an array of generally radially extending arms pivotally connected by articulation links so as to be collapsible to a folded position lying alongside the column, and erected to a working position at an angle approaching 900 to the column, in a manner similar to that of an umbrella framework. Known such rotary driers comprise three or four main arms each pivotally connected at one end to a sleeve slidable along the column, and at an intermediate point to a respective link the other end of which is connected to a mount at or adjacent the top of the column. Means are provided by which the sleeve can be fixed in its upper position, and one known arrangement comprises a bayonet-type coupling involving a radially projecting pin engagable in an L-shape slot in the interior surface of the sleeve such that by lifting the sleeve to engage the slot over the pin and then rotating the sleeve through an angle about the axis of the column the sleeve can be located against axial movement.

A line or a plurality of lines are strung between adjacent arms to provide a network of line sections on which clothing items can be suspended in the usual way.

The effectiveness of such rotary driers is enhanced by mounting the assembly of arms to the column in such a way that the whole assembly can rotate about the column so that the direction from which the wind impinges upon any one clothing item suspended from a line section varies as the assembly turns, thereby maximising the drying effect. However, although known rotary driers have been so constructed that the framework is turnable by means of a plain bearing contact between adjacent faces of cooperating components, such bearings are known to become less free with age as the cooperating surfaces become roughened by age, abrasion and the degrading effects of atmospheric agents. For this reason, known rotary driers which, even when freshly made, have offered only a relatively poor ability to rotate about the column, that is requiring a relatively large force to turn them, become less and less rotatable until they are effectively static frameworks.

The present invention seeks to provide an improved rotary drier or airer in which free rotation of the arm assembly is ensured over an extended life span.

According to one aspect of the present invention, therefore, a rotary drier or airer, for example for laundry, of the type comprising a column on which are carried upper and lower mountings for a plurality of articulated arms which support a line or a plurality of line sections, in which at least one of the said upper and lower mountings comprises or includes two relatively rotatable components defining respective races and between which are interposed a plurality of rolling elements by which free rotation of the said arms about the column is facilitated.

The rolling elements may be of any suitable form, namely balls, parallel or tapered rollers or the like.

In one embodiment of the invention both the upper and the lower mountings are provided with means for receiving and guiding a plurality of rolling elements to form, in effect, respective rolling element bearings by which the assembly of said arms is freely rotatably mounted with respect to the said column. It is, however, sufficient that one of the upper or lower mountings is thus provided in order to secure the benefit of an improvement over known structures comprising only two plain bearings.

It is a particular feature of the present invention that the cooperating components which provide races for receiving and guiding rolling elements may also be interconnected in such a way as to form plain bearings so that, for example, a given component may be used in a range of products having either rolling element bearings in both upper and lower mountings, rolling element bearings in only one of the upper or lower mountings and a plain bearing in the other, or plain bearings in both upper and lower mountings. For this purpose the or each said mounting may comprise or include two relatively rotatable elements having surfaces cooperating to define a plain bearing about the same axis of rotation as that of the array of rolling elements (if fitted) such that the drier or airer may be assembled with or without the rolling elements to form a structure with one or more rolling element bearings and/or one or more plain bearings.

At least one of the said mountings may be provided with cooperating surfaces defining both radial and axial bearings. It is preferred that this be the upper mounting although it is by no means essential for this to be so.

It is, however, preferred that the said at least one mounting is the upper mounting. The said upper mounting may comprise a cap fixable to the upper end of the column and a rotatable connector, the cap and connector having cooperating external and internal cylindrical surfaces defining a radial bearing. These surfaces may be so dimensioned that they are, in effect, held spaced from one another by the rolling elements of a rolling element bearing if such is interfitted between the cooperating surfaces of the components forming the axial or thrust bearing. The lower mounting is preferably carried on a sleeve adjustable in position up and down the column, and in the preferred embodiment of the invention such adjustment is infinitely variable by utilising a manually operable clamp. This avoids the difficulty, encountered when utilising the bayonet-type structure of the prior art, that relaxation of the line due to stretching cannot be overcome by repositioning the sleeve since the radial

pin in the prior art structure is fixed in location. By contrast, any stretching in the line, can up to a certain maximum, be compensated by adjusting the position of the slidable sleeve when a structure is erected.

The upper bearing is preferably constituted by a cap to which the rotatable connector member is attached in such a way that it is rotatable with respect thereto but locked axially. Axial fixing of the rotatable connector member with respect to the cap is conveniently achieved by means of an axial spigot projecting from the rotatable cap and passing through an opening in the connector (or, vice versa, an axial spigot on the connector passing through an opening in the cap). Retention of the spigot may be achieved utilising a spring clip, a screw fixing or any other known means by which a projecting component may be retained within an opening.

One embodiment of the present invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a general side view of a rotary drier incorporating the bearing structure of the present invention;

Figure 2 is an enlarged sectional view of an upper bearing component forming part of the present invention; and

Figure 3 is a side view of a sleeve forming a part of a lower bearing.

Referring now to the drawings, the rotary drier shown comprises a central column generally indicated 11 comprising two telescopic components, namely an upper component 12 which fits telescopically into a lower component 13 which can be removably fitted into a socket 14 (shown in broken outline) in the ground. To the upper end of the lower column part 13 is fitted a collar 15 which extends beyond the upper end of the column part 13 and has an axially split portion which can be clamped to the upper column portion 12 by a screw clamp operated by a hand wheel 16. Adjustment of the height of the column 11 can thus be readily achieved, and the column can be collapsed to a relatively short length for storage.

Mounted on the upper end of the upper column part 12 is an upper mound 17 having lugs 18 for receiving pivot pins 19. Typically there may be three or four pairs of lugs 18 at 120° or 90° from one another respectively. Between adjacent pairs of lugs 18 fits an upper end of a stay 20 the lower end of which is pivoted at 21 to an intermediate point of a main support arm 22. Again, depending on the design of the drier there may be three or four main support arms 22.

The radially inner ends of the main support arms are pivotally mounted to respective pairs of lugs 23 by pivot pins 24, the lugs 23 projecting from a lower mount 25 on the upper part 12 of the column 11. The lower mount 25 has a sleeve 26 with an axial slot which an be clamped, like the collar 15, by operation of a hand wheel 27 which tightens or slackens the split portion 26a of the sleeve 26.

With the hand wheel 27 turned to slacken the split portion 26a the sleeve 26 can be raised to an upper extended position in which the arms 22 are in their working position closest to a horizontal orientation (but inclined upwardly away from the column 11). The sleeve 25 may also be lowered (again by releasing the hand wheel 27) to a lowermost or collapsed position in which the arms 22 lie parallel to the column 11.

Figure 2 illustrates the structure of the upper mount 17. In this embodiment the mount 17 is one having four sets of lugs 18 at 90° to one another. The lugs 18 project from a generally cylindrical mount body 30 having a closed transverse end wall 31 having a central axial projection 32 with a shouldered boss or route portion 33.

The cylindrical body 30 has a cylindrical inner surface 34 and at its lower most end a skirt flange portion 35 defining a shoulder having a radial annular surface 36 and an internal cylindrical surface 37. The two annular surfaces 36, 37 form a circular race for a set of rolling elements, in this embodiment spheres 38.

The mount 17 is fitted onto an end cap generally indicated 40 which comprises two coaxial cylindrical body portions 41, 42 the former of which has a smaller diameter than the latter, and which are joined end to end by a radial wall 43 defining an upper radial annular surface 44 which meets at right angles with the cylindrical surface 45 of the narrow diameter portion 41.

The wider diameter cylindrical body portion 42 projects as a skirt from the opposite face of the radial flange 43 from the other body portion 41, and has an open free end 46 the diameter of the inner surface of which is chosen to be a sliding fit over the upper end of the upper column 12.

The inner cylindrical surface 47 of the cylindrical body portion 42 has four axially extending inner ribs 48 which define a cylindrical surface the diameter of which is less than that of the upper column portion 12 so that when the cap 40 is fitted over the upper end of the column the ribs 48 are crushed or deformed by the force fit thereby tightly connecting the cap 40 to the upper end of the column 12 and securing it in place against removal.

The presence of the balls 38 ensures that the mount 17 can rotate freely with respect to the cap. However, the form of the depending skirt portion 35 is such that its end face 49 can cooperate with the radial face 44 of the intermediate flange 43 of the cap 40 to form a plane bearing if the two components are fitted together without balls. In either event the outer cylindrical surface 45 of the cap and the inner cylindrical surface 34 of the mount act as a cylindrical or radial bearing and this is assisted by the cooperative inter engagement of the shouldered portion 33 of the spigot 32 in the opening 49. A spring clip or other re-

tainer may be fitted onto the spigot 32 to prevent separation of the two components once fitted together, and thereafter the cap 40 may be force fitted onto the end of the column 12.

Referring now to Figure 3 the sleeve 26 shown has a main body portion 50, an upper cylindrical body portion 51 separated from the main body portion 50 by a radial flange 52 having an upper annular radial face 53 and two resilient diametrically opposite tongues 54 having radially outwardly extending projections 55. The lower mount 25 is of similar shape to the upper mount 30 except that the end wall 31 is omitted so that the mount can be fitted over the cylindrical end portion 51 such that the projections 55 engage over the upper edge. The sleeve 26, carrying the mount 25, can then be fitted over the column 12 and the inter engagement of the internal cylindrical surface of the sleeve 50 on the column 12 prevents radial inward movement of the tongues 54 thereby locking the mount 25 in position.

The upper face 53 of the flange 52 acts as a radial bearing surface which can be engaged either by the lower annular face 49 of the mount to form a plane bearing, or may engage spheres, as for the upper bearing, to form a rolling element bearing in which the cylindrical surface of the upper sleeve portion 51 and the annular surface 53 of the flange 52 define a race for rolling element bearings.

Claims

1. A rotary drier or airer (11) for example for laundry, of the type comprising a column (12, 13) on which are carried upper and lower mountings (17, 25) for a plurality of articulated arms (22) which support a line or plurality of lines, characterised in that at least one of the said upper and lower mountings (17, 25) comprises or includes two relatively rotatable components (31, 41) defining respective races (37, 44) and between which are interposed a plurality of rolling elements (38) by which free rotation of the said arms (22) about the column is facilitated.

2. A rotary drier or airer (11) according to Claim 1, characterised in that both the upper and lower mountings (17, 25) are provided with means (36, 37, 44, 45) for receiving and guiding a plurality of rolling elements (38) whereby effectively to form respective rolling element bearings by which the assembly of said arms (22) is freely rotatably mounted with respect to the said column (12, 13).

3. A rotary drier or airer (11) according to Claim 1, characterised in that the or each said mounting (17, 25) comprises or includes two relatively rotatable elements (31, 42) having surfaces (34, 45; 44, 49)cooperating to define a plain bearing about the same axis of rotation as the array of rolling elements (38) would have if fitted, such that the drier or airer (11) may be assembled with or without the rolling elements (38) to form a structure with one or more rolling element bearings and/or one or more plain bearings.

4. A rotary drier or airer (11) according to Claim 3, characterised in that at least one of the said mountings (17, 25) is provided with cooperating surfaces (34, 45; 44, 49) defining both radial and axial bearings.

5. A rotary drier or airer (11) according to Claim 4, characterised in that the said at least one mounting (17) is the upper mounting (17).

6. A rotary drier or airer (11) according to Claim 5, characterised in that the said upper mounting (17) comprises a cap (40) fixable to the upper end of the column (12) and a rotatable connector (31), the cap (42) and connector (31) having cooperating external (45) and internal (34) cylindrical surfaces defining a radial bearing.

7. A rotary drier or airer (11) according to Claim 6, characterised in that the cap (40) has an axial opening (49) and the connector (31) has a cooperating axial spigot (32) by means of which the two components of the upper bearing (17) are retained together against axial separation.

8. A rotary drier or airer (11) according to Claim 6 or Claim 7, characterised in that the cap (40) has a radial flange (43) defining both the race and plain bearing surface (44).

9. A rotary drier or airer (11) according to any of Claims 6 to 8, characterised in that the cap (40) is a force fit over the end of the column (12).

10. A rotary drier or airer (11) according to any of Claims 6 to 9, characterised in that the cap (40) has a cylindrical skirt (42) with axially extending internal ribs (48) which are deformed, upset or destroyed upon force fitting of the cap (40) onto the end of the column (12).

11. A rotary drier or airer according to any preceeding Claim, characterised in that the rolling elements (38) are stainless steel balls in a plastics cage and fitted in place in the races without additional lubricant.

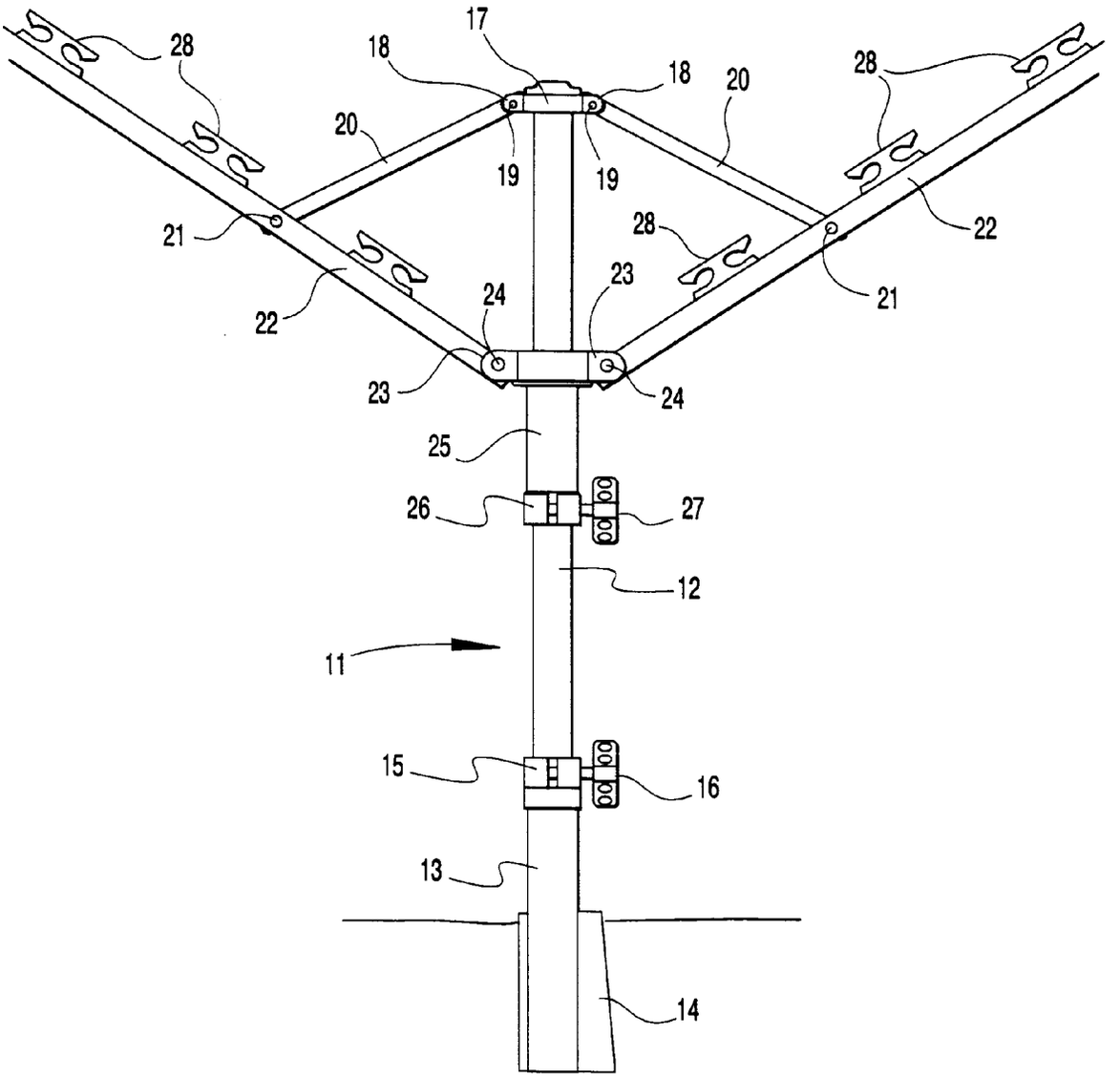
17
18
18
20
20
28
28
19
19
21
22
28
21
22
24
23
23
24
25
26
27
12
11
15
16
13
14

FIG 1

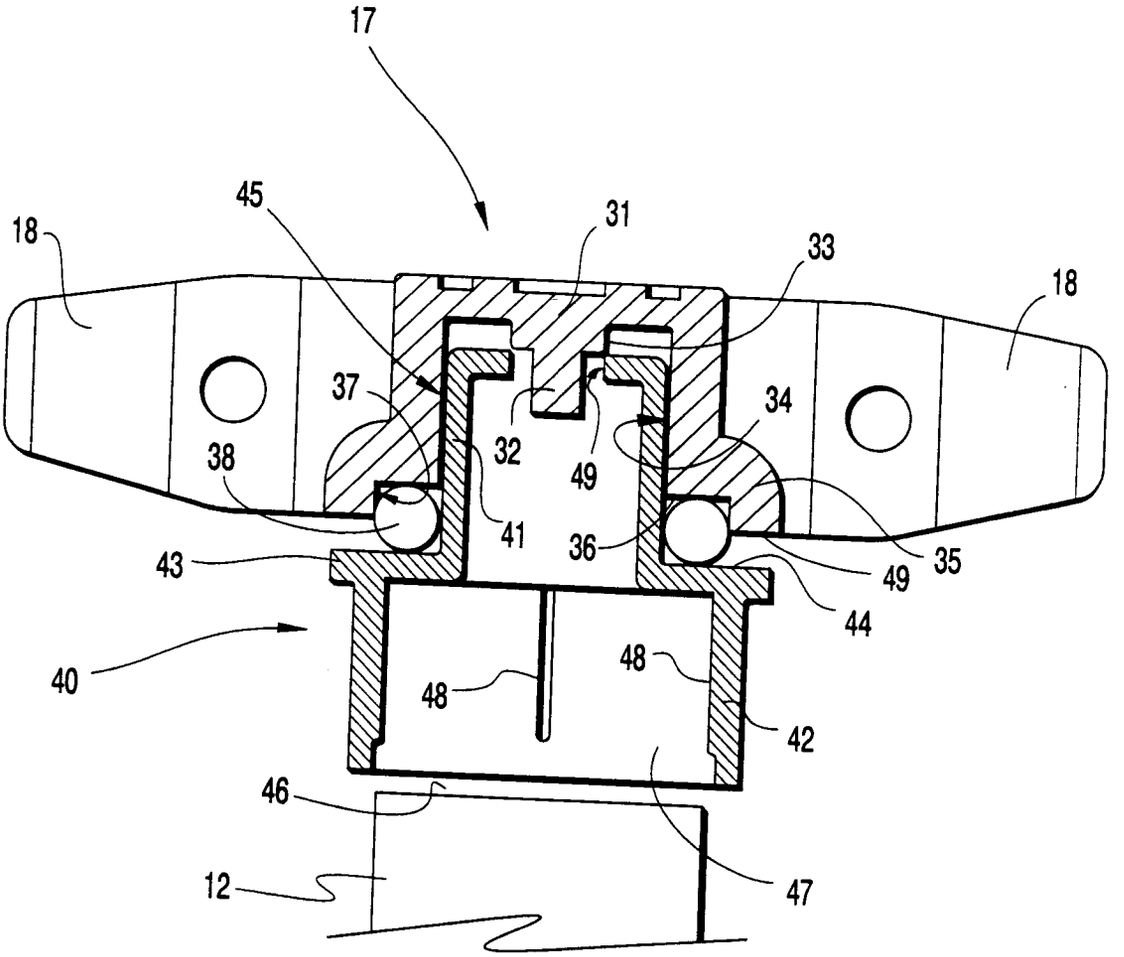

FIG 2

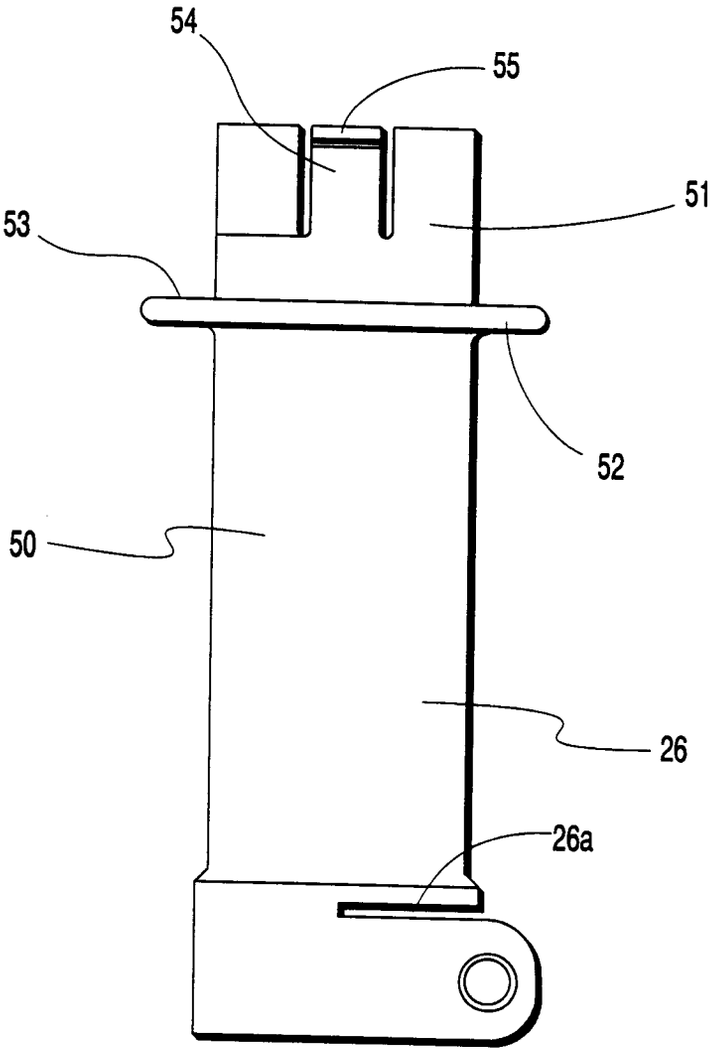

FIG 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 0241

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.6)
X A	GB-A-1 286 344 (CENTURY HARDWARE LIMITED) * the whole document * ---	1 6-9,11	D06F57/04
X A	GB-A-185 637 (F. GRANVILLE HARVEY & C. O'CONNOR) * the whole document * -----	1,3,4 11	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 April 1995	Courrier, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)