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(54) **Teat cup inflations and assemblies**

(57) A teat cup inflations 1 has location means 6 arranged to locate with locating means 7 of a teat cup shell 8 such that on an assembly of the inflation 1 with a teat cup shell 8 there can be no (or minimal) twisting of the inflation 1 relative to the teat cup shell 8. An assembly of a teat cup inflation with a teat cup shell is also described.

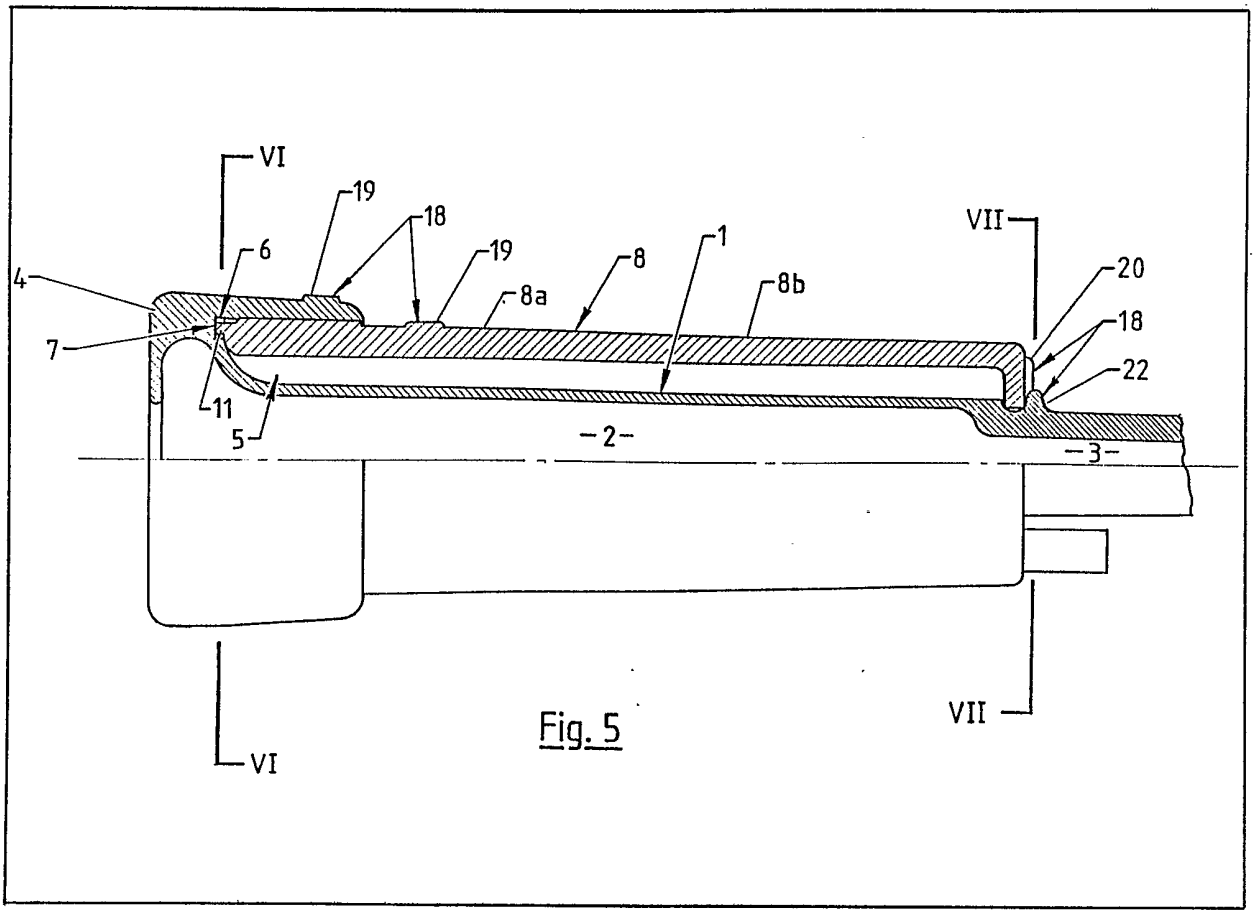

Fig. 5

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

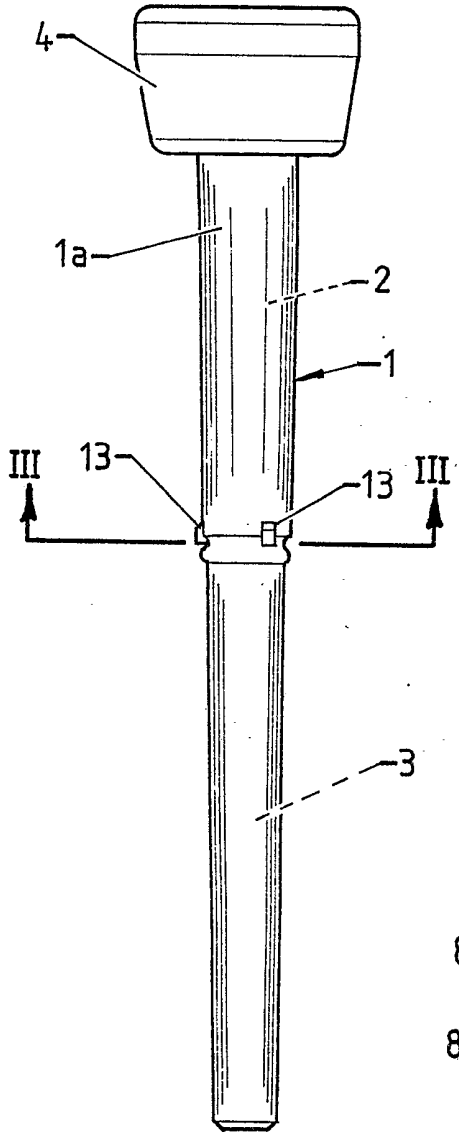

Fig. 1

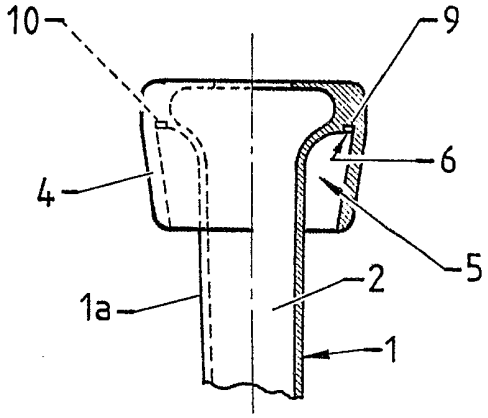

Fig. 2

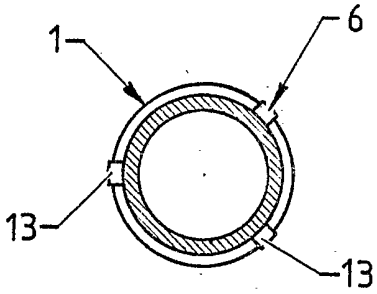

Fig. 3

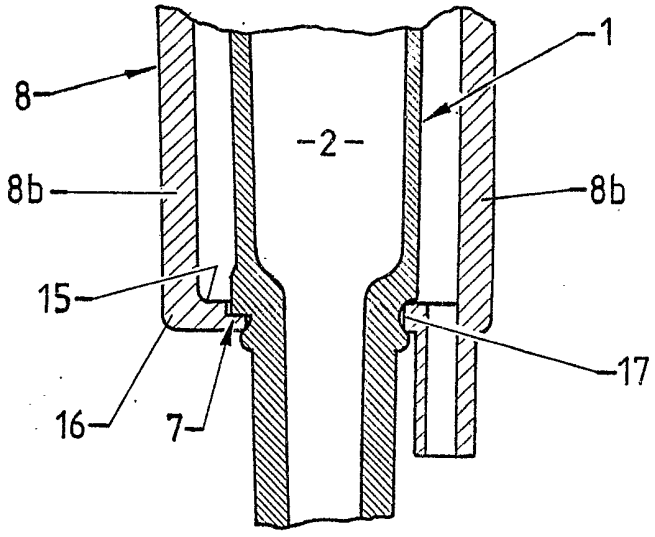

Fig. 4

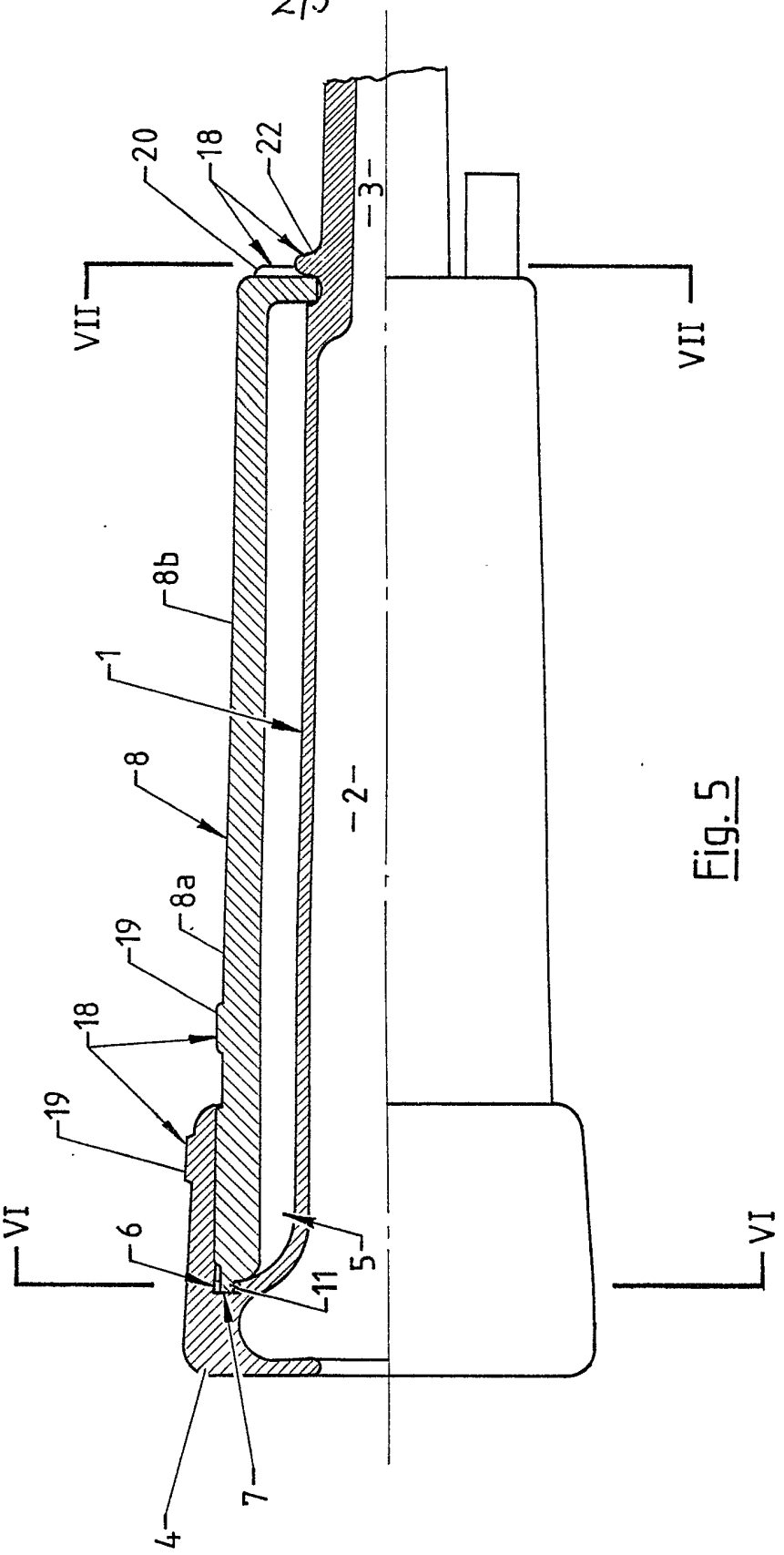

Fig. 5

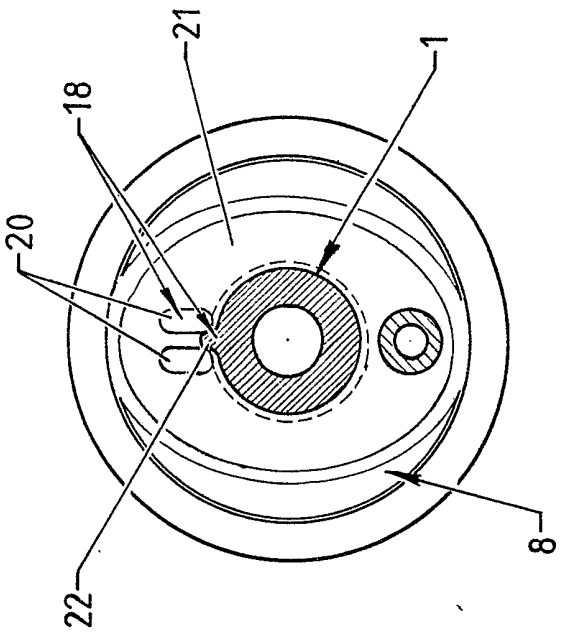

Fig.7

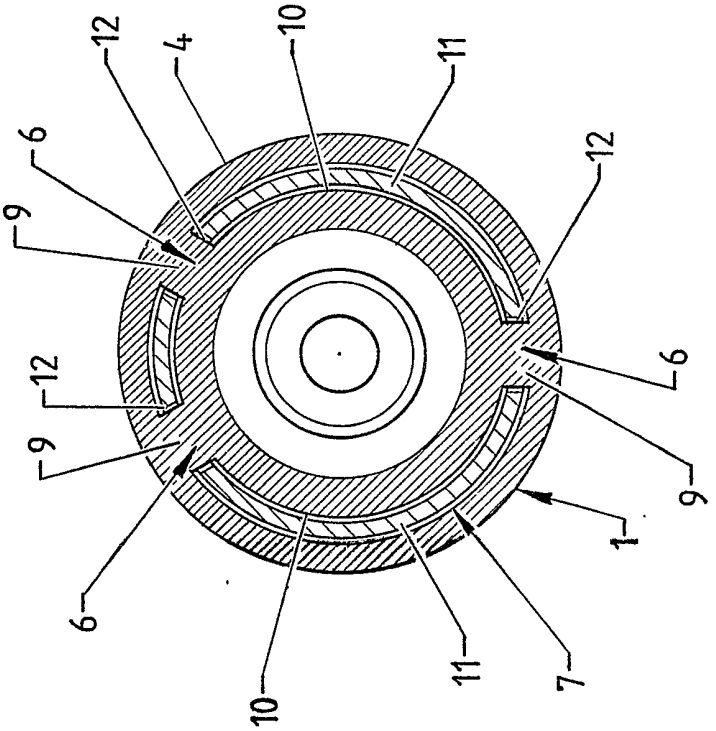

Fig.6

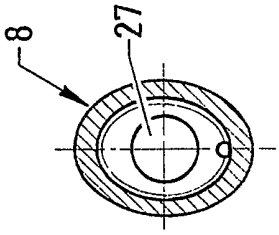

Fig.11

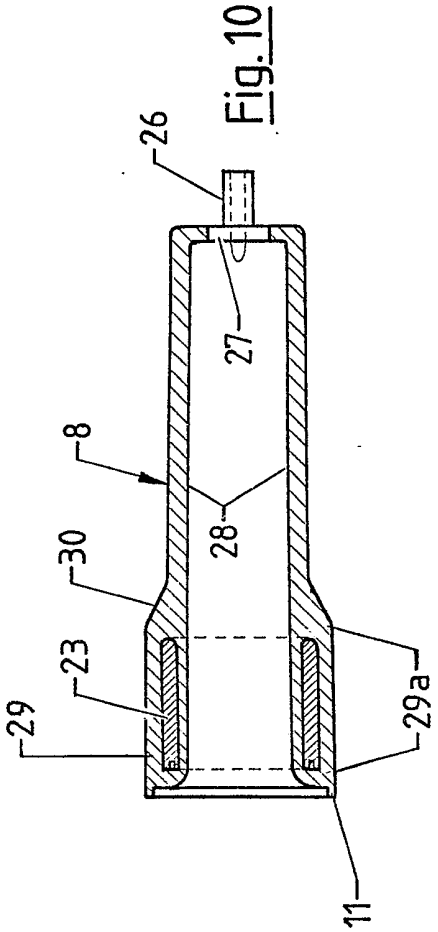

Fig.10

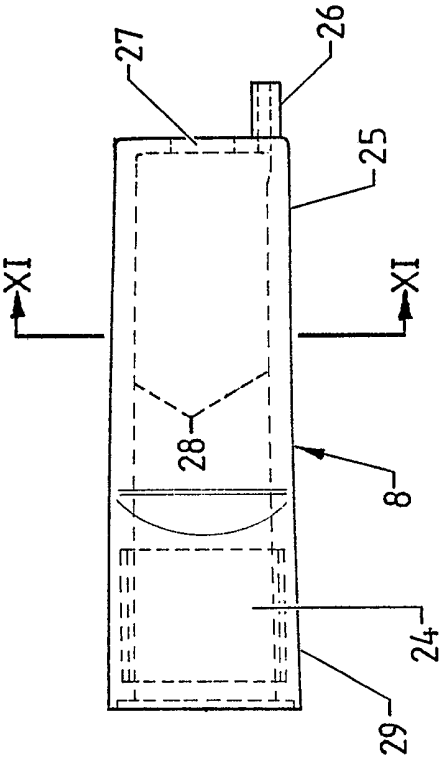

Fig.9

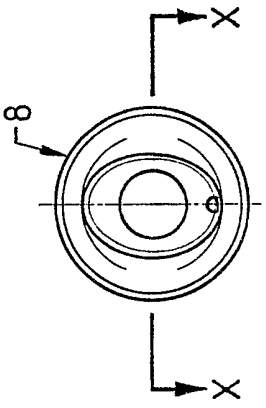

Fig.8

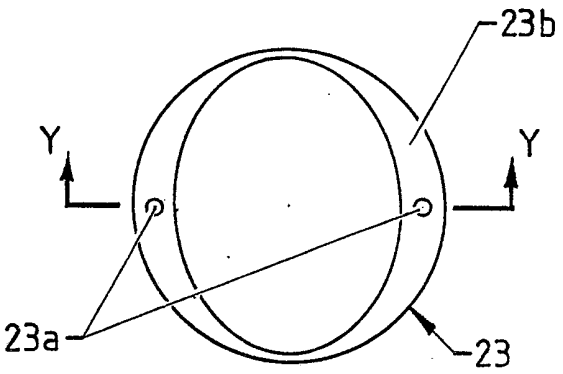

Fig. 12

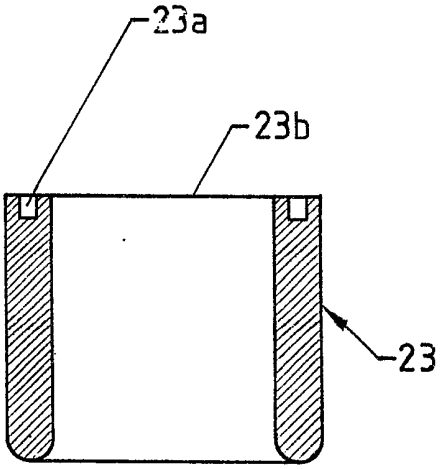

Fig. 13

SPECIFICATION

Improvements in or relating to teat cup inflations and assemblies

This invention relates to teat cup inflations and assemblies of teat cup inflations with teat cup shells.

A common problem with milking apparatus is that one of more "quarters" of a cluster is not milking satisfactorily. This is often attributable to situations where one or both ends of the inflation twist radially with respect to the other end and as a result the test cup inflation does not expand and contract as is desirable for efficient milking because the inflation is stressed in an undesirable manner. A problem of this type is difficult to identify particularly by an operator unfamiliar with the mechanics of a milking machine who may not realise that "twisting" in an individual test cup assembly or assemblies has taken place.

Accordingly, it is an object of the present invention to provide a teat cup inflation which is arranged to be assembled with a teat cup shell in a manner such as to eliminate or minimise twisting of the inflation relative to a teat cup shell to which it is assembled.

In conventional milking apparatus a teat cup shell (usually in stainless steel) is used to encase individual inflations. In the majority of milking installations a vacuum source or sources is/are applied to individual clusters and accordingly as the teat cups are applied and removed it is desirable that excess air be prevented from entering the vacuum system and for this to be achieved milk lines to unused teat cups must be individually isolated. In order to isolate the unused teat cups milk inlet nipples of the cluster claws to which the milk lines are connected are inclined outwardly and upwardly and when the teat cups are not in use these are allowed to fall such that the line to the milk inlet nipple will seat against the end of the nipple. A perfect seal however is not always obtained because of the relative inflexibility of the milk lines and because the centre of mass in a conventional teat cup assembly is often too close to the point where the milk line engages with the nipple of the cluster claw.

It is accordingly a further object of the present invention to provide a weighted teat cup shell for an assembly with an inflation as aforesaid which will go someway to eliminating the aforesaid problem.

Further objects and advantages of the present invention will become apparent from the ensuing description which is given by way of example.

According to a first aspect of the present invention there is provided a teat cup inflation comprising an elongate substantially cylindrical body defining a teat chamber in the upper regions thereof and a milk chamber in the lower regions thereof, said upper region of the body including a downwardly depending flange arranged to form an upper teat cup shell engaging portion between the flange and the body of the upper regions of the inflation, wherein at least said upper teat cup shell engaging portion includes location means for complementary engagement with locating means in an upper portion of a test cup shell, such that on an assembly of a teat cup shell with the inflation there can be no radial twisting, or a minimal amount of radial twisting of the inflation relative to the teat cup shell.

According to a still further aspect of the present invention there is provided an assembly of a teat cup inflation as aforesaid with a teat cup shell wherein the teat cup shell comprises a body having an upper portion with an open end arranged to engage with the teat cup engaging portion of the teat cup inflation and a lower portion including an aperture through which the lower region of the body of the teat cup inflation may pass.

Aspects of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1; is a side view of a teat cup inflation in accordance with one possible embodiment of the present invention, and

Figure 2: is a partial cross-section of the upper region of the teat cup inflation of Figure 1, and

Figure 3: is a cross-section at III:III of Figure 1, and

Figure 4: is a diagrammatic cross-section of the lower region of a teat cup inflation of Figures 1 to 3 showing its engagement with a teat cup shell in an assembly of the teat cup inflation with a teat cup shell, and

Figure 5: is a diagrammatic partial long-section of an assembly of a teat cup inflation in accordance with another possible embodiment of the present invention shown in an assembly with a teat cup shell, and

Figure 6: is a diagrammatic cross-section taken at VI:VI of Figure 5, and

Figure 7: is a cross-section taken at VII:VII of Figure 6, and

Figure 8: is a top view of a teat cup shell with which an inflation in accordance with the present invention may be assembled, and

Figure 9: is a side view of the teat cup shell of Figure 8, and

Figure 10: is a long-section taken at X:X of Figure 8, and

Figure 11: is a cross-section taken at XIII:XIII of Figure 9, and

Figure 12: is a top view of a weight for a teat cup shell in accordance with Figures 10 to 13, and

Figure 13: is a cross-section of the weight of Figure 14 taken at Y:Y of Figure 12.

With reference firstly to Figures 1—7 of the drawings a teat cup inflation in accordance with one possible embodiment of the present invention can comprise an elongate substantially cylindrical body generally indicated by arrow 1 defining a teat chamber 2 in the upper regions thereof and a milk chamber 3 in the lower regions thereof, an upper portion 1a of the body 1 including a downwardly depending flange 4 arranged to form an upper teat cup shell engaging portion generally indicated by arrow 5 between the flange and the body 1 of the

upper portion 1a of the inflation, wherein at least the said upper teat cup shell engaging portion 5 includes location means generally indicated by arrow 6 for complementary engagement with locating means generally indicated by arrow 7 in an upper portion of a teat cup shell generally indicated by arrow 8 such that on assembly of the teat cup shell 8 with the inflation 1 there can be no radial twisting, or, a minimal amount of radial twisting, of the inflation 1 relative to the teat cup shell 8.

In the embodiment illustrated by Figures 1, 2, 3 and 4 of the drawings, the inflation 1 is provided with location means 6 where the inflation 1 engages with upper portion 8a of the teat cup shell and location means 6 where the inflation 1 engages with the lower portions 8b of the teat cup shell.

In the embodiment illustrated by Figures 5, 6 and 7, the inflation is provided with location means 6 only in the upper regions thereof where the inflation 1 engages with the upper portions 8a of the teat cup shell 8.

The location means 6 at the upper regions of the teat cup inflation can comprise three radially equally spaced notches 9 in a groove 10 within the upper teat cup engaging portion 5. The notches 9 may be spaced at 120 degree intervals. The groove 10 is arranged to receive a flange 11 of the teat cup shell 8 which is provided with complementary cut-outs 12 therein. Thus when the inflation 1 is assembled with the teat cup shell 8, in the manner illustrated there can be no radial twisting of the inflation 1 relative to the teat cup shell 8.

As aforesaid in the embodiment illustrated by Figures 1 to 4 of the drawings, the inflation 1 is also provided with location means 6 where the inflation engages with lower portions 8b of the teat cup shell. Such location means 5 can comprise three tabs 13 formed on the outer surface of the body 1 of the inflation arranged to engage with locating means 7 of the teat cup shell 8.

The tabs 13 are equally spaced at 120 degrees and are adapted to engage with cut-outs in the inner surface 15 of an inwardly directed flange 16 adjacent an aperture 17 in the teat cup shell 8 to which the inflation is assembled. Thus, on an assembly of the teat cup shell with the inflation 1 there can be no radial twisting of the inflation 1 relative to the teat cup shell 8 where the lower region of the inflation passes through the teat cup shell.

To assist with the assembly of the inflation 1 relative to the teat cup shell 8 the inflation and teat cup shell can be provided with indexing means, an example of which is illustrated by Figures 5 and 6 of the drawings. Indexing means, generally indicated by arrow 18 can be positioned at upper and lower regions of the assembly. At the upper region of an assembly indexing means 18 can comprise raised parts 19 on the outer surfaces of the inflation 1 and the teat cup shell 8, which indicate proper alignment of the inflation 1 with the teat cup shell 8. The lower region of an assembly may include spaced notches 10 on the lower outer surface 21 of the flange 11 of the teat cup shell and a notch 22 on the outer surface of the inflation 1 which also indicate proper alignment of the inflation 1 relative to the teat cup shell 8.

Figures 8—13 of the accompanying drawings illustrate a teat cup shell with which an inflation in accordance with the present invention may be assembled. The assembly of an inflation 1 and teat cup shell 8 may be joined to a cluster claw (not shown) provided with nipples to which lower ends of the inflation 1 can be engaged such that the interiors of the cluster claw are in communication with the milk chamber 3 of the inflation 1.

Before and after individual cows have been milked and the teat cup assemblies are removed they are allowed to hang vertically downwardly from the cluster claw.

In this situation the interiors of the inflation or at least the lower portions thereof provide a seal with bevelled ends of the nipples of a cluster claw. To ensure an adequate seal is made in this situation the test cup assembly should be such as to ensure that the inflation shuts off bevelled ends of milk nipples of a milking claw.

The teat cup shell illustrated by Figures 8 to 13 includes an internally moulded weight which ensures that the mass of an assembly is at the free end of the assembly.

The teat cup shell 8 is formed in a mouldable material such as plastics and has an intergrally moulded and inset weight generally indicated by arrow 23 of a non-homogeneous material in the wall thereof. The teat cup shell illustrated comprises a tubular body having an open end 24 and a lower end 25 mounting a pulsator line nipple 26 and providing an aperture 27 through which the lower end of a teat cup inflation may pass.

Preferably the teat cup shell 8 is provided with a bore 28 in which the width in a first plane is substantially greater than the width in another plane at right angles to the first plane and in the example given these requirements are met with an oval bore which may be converging from top to bottom although it is to be appreciated that the bore 28 of the teat cup shell may be of an alternative configuration. in the example illustrated the outer surface 29 of the teat cup body is circular and includes a flange 11 to facilitate its engagement with a teat cup inflation.

As aforesaid the upper body portion of the teat cup body is provided with internally moulded and inset weight generally indicated by arrow 23. The inset weight 23 which may be a lead weight is formed in a continuous ring which is in the embodiment illustrated completely surrounded by mouldable material and is shaped in cross-section to correspond with the cross-section of the upper body portion of the teat cup.

When the teat cup shell is provided with an oval bore the outer perimeter of the lower end of the body 25 can also be oval shaped (see Figure

11) a transition region 30 is provided between the circular and oval perimeters just below the weighted end of the teat cup body 8. The shape of the outside of the teat cup body as illustrated is most convenient as the oval shaped lower end of the body corresponds with the shape defined by a persons hand between the thumb and the fingers when the hand closes.

The size of the weight 23 can be altered to suit various types of milking plant and to achieve the results required and accordingly the weight may be provided in other forms for example by providing a plurality of vertically disposed pellets or the like (not shown) of a suitable high density steel or metal. It is also envisaged that the weight may be a fluid. For most effect the weight 23 can extend throughout an upper portion 29a at the teat cup shell.

With reference to Figures 12 and 13 of the drawings illustrating the inset weight 23 the inset weight is provided with a cross-section which is complementary to the cross-section of the upper portion 29a of the body of the teat cup shell 8 and is provided with a plurality of shallow holes 23a in the upper surface 23b.

The teat cup body is formed in a die (not shown) whilst the inset weight is supported co-axially in the die when finger members (not shown) associated with the die engage with the holes 23a securing the weight 23 in position as the mouldable material is injected into the die and surrounds the weight. To complete the manufacturing process the finger members are disengaged from the holes 23a and the void areas created by the removal thereof are filled with an appropriate material.

An alternative means for supporting the weight 23 in a die during moulding may include the provision of a plastics cradle (not shown) which positions and spaces the weight from the internal core of a die for forming the teat cup shell. The cradle which may be in a compatible material may comprise a pair of ring members spaced by supports and the weight can be fitted over the cradle during the moulding process.

Although the teat cup inflation 1 is described herein in an assembly with a teat cup shell as illustrated by Figures 8 to 13 of the drawings, it is to be appreciated that an inflation in accordance with the present invention may be assembled with other teat cup shells such as the conventional metal shell with appropriate modifications.

Aspects of the present invention have been described by way of example only and it is to be appreciated that modifications and additions thereto may be made without departing from the scope of the invention as defined in the appended claims.

CLAIMS

1. A teat cup inflation comprising an elongate substantially cylindrical body defining a teat chamber in the upper regions thereof and a milk chamber in the lower regions thereof, said upper region of the body including a downwardly depending flange arranged to form an upper teat cup shell engaging portion between the flange and the body of the upper regions of the inflation, wherein at least said upper teat cup shell engaging portion includes location means for complementary engagement with locating means in an upper portion of a teat cup shell, such that on an assembly of a teat cup shell with the inflation there can be no radial twisting, or a minimal amount of radial twisting of the inflation relative to the teat cup shell.

2. A teat cup inflation as claimed in claim 1 wherein the lower region of the body of the inflation includes location means for complementary engagement with locating means in the lower portion of a teat cup shell such that, on an assembly of a teat cup shell with the inflation there can be no radial twisting of the inflation relative to the teat cup shell.

3. A teat cup inflation as claimed in claim 1 or claim 2 wherein the location means in the upper regions comprise a plurality of notches in a groove in the upper teat cup engaging portion.

4. A teat cup inflation as claimed in any one of claims 1 to 3 wherein the lower region of the body of the teat cup inflation is provided with location means comprising a plurality of notches on the outer surface thereof arranged to be engageable between complementary grooves in the body of a teat cup shell with which the inflation may be assembled.

5. An assembly of a teat cup inflation as claimed in any one of claims 1 to 4 with a teat cup shell wherein the teat cup shell comprises a body having an upper portion with an open end arranged to engage with the teat cup engaging portion of the teat cup inflation and a lower portion including an aperture through which the lower region of the body of the teat cup inflation may pass.

6. An assembly of a teat cup inflation with a teat cup shell as claimed in claim 5, wherein the body of the teat cup shell is formed in a mouldable material and includes at least one internally moulded and inset weight of a non-homogeneous material in the wall thereof.

7. An assembly of a teat cup inflation with a teat cup shell as claimed in claim 6 wherein the said at least one internally moulded and inset weight is positioned in the upper regions of the teat cup shell.

8. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 5 to 7 wherein the teat cup shell has an internal bore in which the width in a first plane is greater than the width in a second plane at right angles to the first plane.

9. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 5 to 8 wherein the teat cup shell has an oval bore.

10. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 5 to 8 wherein said at least one internally moulded and inset weight has a cross-sectional configuration which is complementary with the cross-sectional

configuration of the upper portion of the teat cup shell.

11. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 5 to 10 wherein the internal bore of the teat cup shell is converging from top to bottom.

12. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 5 to 11 wherein the upper portion of the teat cup body is provided with a substantially circular outer surface whereas the lower portion of the teat cup body is provided with a substantially oval or rectangular outer surface.

13. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 1 to 12 wherein the lower portion of the teat cup shell includes an internally projecting skirt defining a centrally positioned aperture through which the lower part of a teat cup inflation may pass.

14. An assembly of a teat cup inflation with a teat cup shell as claimed in any one of claims 1 to 13 wherein said internally projecting skirt mounts a nozzle to which a pulsating pressure line in a milking plant can be attached.

15. A teat cup inflation substantially as herein described with reference to the accompanying drawings.

16. An assembly of a teat cup inflation with a teat cup shell substantially as herein described with reference to the accompanying drawings.

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