June 14, 1938. H. A. GREENE 2,120,556

INFLATION FOR MILKING MACHINE CUPS

Filed Aug. 20, 1936

Fig. 1.

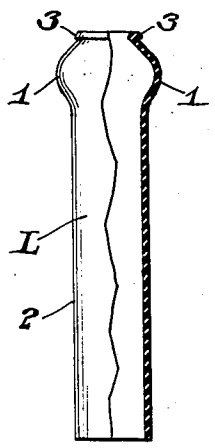


Fig. 2.

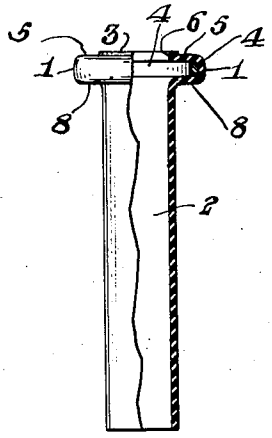


Fig. 3.

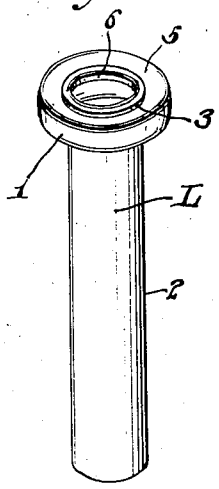


Fig. 4.

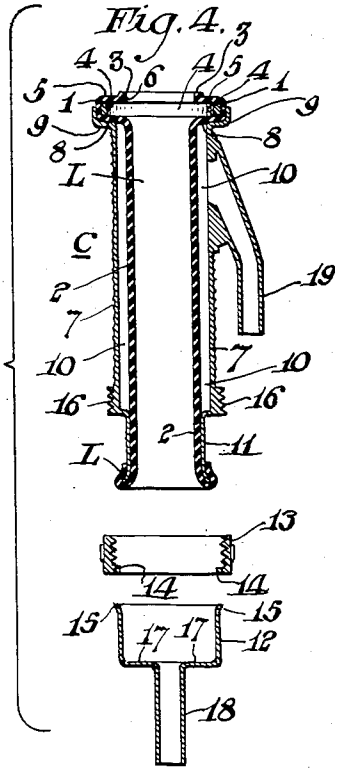
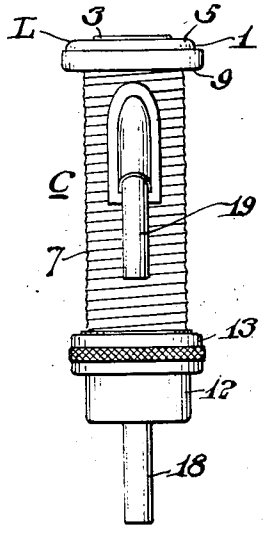


Fig. 5.



Inventor
Herbert A. Greene
By Cornelius D. Eckert
Attorney.

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INFLATION FOR MILKING MACHINE CUPS

Herbert A. Greene, Philadelphia, Pa.

Application August 20, 1936, Serial No. 96,970

4 Claims. (Cl. 31—85)

My invention relates to liners or inflations for cups of milking machines.

Heretofore it has been usual practice to provide as a liner or inflation for a commonly used type of milking cup, a heavy rubber tube of uniform diameter. To adapt a liner of this type for use, it is expanded, adjacent its teat-receiving end, to substantially twice its normal diameter, as by a metal ring, to form a diaphragm or mouthpiece which contacts the udder of the animal and which has a teat-receiving orifice. For sanitary reasons, the ring is removed after each milking period and reinserted before the next. The force required to enlarge the tube diameter is so great, the expansion ring must be inserted by machine. It has been found, in practice, the life of such inflations, or liners, is short; the rubber deteriorates, more or less, due to chemical reaction with the milk, sterilizing, exposure, etc., and, additionally, because of the aforesaid forcible and great expansions; consequently after a short while, sometimes as little as a week, when it is attempted to expand the tube, the rupturing point of the rubber is exceeded and the tube splits, rendering it worthless for further use.

In accordance with my invention, there is provided a liner tube which at a portion or region adjacent its teat-receiving end is materially enlarged, to a diameter which, when unstretched by the expansion ring, is substantially greater than the diameter of the remainder of the tube and yet substantially less than the diameter of the expansion ring. The force necessary to remove and insert the expansion ring from and into the enlargement is low, permitting these operations to be performed manually and greatly increasing the life of the liner. This construction also permits the size of the teat-receiving orifice to be adjusted manually to accommodate a particular animal.

For an understanding of my invention and for illustration of a preferred form thereof, reference is made to the accompanying drawing, in which:

Figure 1 is an elevational view, partly in section, of the improved liner;

Fig. 2 illustrates the liner of Fig. 1 with the expansion ring in place;

Fig. 3 is Fig. 2 in perspective;

Fig. 4, in cross-sectional elevation, shows the components of a milking cup with the liner of Fig. 2 in place;

Fig. 5 shows the assembled cup.

Referring to Fig. 1, the tubular liner or inflation L, of rubber or equivalent, differs from a common type previously used in that the tube is not of uniform diameter but is formed or molded to provide near its upper or teat-receiving end a bulbous section or portion 1 whose maximum diameter is substantially larger than the diameter of the remaining section 2 of the tube. By way of example, the external diameter of section 2 may be about one and one-eighth inches and the external diameter of section 1 about one and one-half inches. The tube L is of substantial thickness, for example about one-eighth of an inch; the thickness may be uniform throughout the length of the tube or may, if desired, be somewhat more or less for section 1. The length of the enlarged section 1, in the preferred form shown and for use in the particular milking cup C of Fig. 4, is about one inch. Preferably, as shown in Fig. 1, section 1 of the inflation is bulbous; the internal diameter of section 1 progressively increases from the diameter of section 2 to a maximum at somewhat less than half the length of section 1 and then progressively decreases until at the teat-receiving end of the tube it is somewhat less than the internal diameter of section 2; for example, about three-quarters of an inch.

Preferably, the upper end of the liner L is formed with an integral reinforcing ring 3 which affords desired strength of the tube at this point and is smoothly rounded or beaded to avoid discomfort to the animal.

To prepare the rubber liner for use, its upper end is stretched to receive the expansion ring 4, usually metal, and preferably approximately semi-circular in cross-section; for the particular milking cup and liner herein specifically described, the external diameter of ring 4 is somewhat less than two inches. Because of provision of the bulged portion 1, the force necessary to stretch the tube is materially less than for a tube which is of uniform diameter throughout and, in fact, is sufficiently low to permit the expansion ring to be inserted and removed manually without use of a machine which previously was necessary for straight-side liners. Since the strain on the wall of the tubing is materially less than in the aforesaid prior construction, the life of the liner is materially increased. In actual practice, the usual life of the improved inflation is at least several times as long as straight-side liners of the same grade of rubber. In most instances, use of my improved liners was discontinued after long periods—not because they split at the ring-receiving end, but for divers other reasons.

When the tube is stretched over the expansion

ring 4, there is in effect provided, as appears in Figs. 2 and 3, a mouthpiece or diaphragm 5 which engages the udder, and an orifice 6 in the diaphragm to receive a teat. When the ring 4 is in place between the diaphragm 5 and face or flange 8 the tension is sufficiently low to permit the size of the orifice 6 of the integral mouthpiece to be adjusted manually to suit it to the individual animal or breed. In practice, it has been found desirable to use orifices 6 varying from about one-half inch for Jersey cows to about seven-eighths of an inch for Holsteins.

To decrease the size of orifice 6, the ring 4 is pushed manually away from the upper end of the inflation and conversely to increase the size of the orifice the expansion ring is moved manually toward the upper end of the inflation. A snug fit between the teat and the liner is necessary, otherwise the vacuum produced in the inflation for milking is broken and the teat cup and its liner fall off.

Because of the provision of the bulge 1 which permits the orifice to be adjusted manually, it is not necessary to provide different liners to accommodate different animals or breeds nor to use different sets of teat cups to obtain the various desired orifice areas.

Preferably the liners L are molded, although they may be made in other ways, for example by forming on a suitably shaped mandrel.

After the liner is expanded and its orifice 6 adjusted, it is positioned in the casing 7 of a milking cup C, Fig. 4. The lower face or flange 8 of the portion 1 of liner L rests upon the upper face of the out-turned portion 9 of the milking cup to seal the upper end of the pressure chamber 10 whose diameter is suitably larger than the diameter of section 2 of the liner. The lower end of the liner L is received by the reduced end 11 of the suction cup which is preferably slightly flared at its lower end as appears in Fig. 4.

The liner L is then stretched lengthwise and its lower end turned upwardly and back over the flared lower end of the suction cup to seal the lower end of pressure chamber 10. This stretching of the liner does not change the size of orifice 6 because the diaphragm 5 is under sufficient tension to prevent creeping of the rubber around the expansion ring. If the diameter of the bulged portion 1, Fig. 1, is made too large, creeping may result when the lower end of the liner is stretched over the end 11 of the milking cup.

After the liner is in place, the discharge member 12 is slipped over the lower end 11 of the cup and locked by the clamping ring 13 having a lip 14 which bears against the under side of the flared end 15 of member 12. Ring 13 is threaded internally to engage the threaded portion 16 of the milking cup C.

When the ring 13 is screwed into position, Fig. 5, that portion of the liner L which is turned over the lower edge of end section 11 of the cup bears against the surface 17 of the discharge member 12 and prevents leakage of milk, confining the discharge to the delivery tube 18 attached to or integral with the discharge member 12.

In use, the teat of the animal passes through the orifice 6 of the diaphragm or mouthpiece 5 and is received by the lower section 2 of the liner or inflation; the space within the inflation is sealed from atmosphere by engagement of diaphragm 5 with the udder of the animal. The liner, intermediate its ends, is flexed, alternately expanded and contracted, by variation of pressure in chamber 10 placed in communication with a suitable pump by a hose connected to pipe 19 suitably attached to or made part of the casing of the milking cup C. Milk-delivering tube 18 of the discharge member 12 is connected to a suitable source of suction.

It is to be understood my invention is not limited to the construction specifically illustrated and described, but is co-extensive in scope with the appended claims.

What I claim is:

1. The combination with an inflation for a teat-cup of a milking machine comprising a tube of yielding material and having a bulbous enlargement adjacent one end thereof, said end portion of the tube itself constituting a mouthpiece having a teat-receiving orifice, of an expansion ring manually inserted into said bulbous enlargement and adjustable therein axially of said tube to adjust the diameter of said orifice of the mouthpiece.

2. A teat-cup assembly comprising a cup member having a peripheral shoulder adjacent one end thereof, a tube of yielding material having a bulbous enlargement adjacent one end thereof, said end portion of the tube constituting a mouthpiece having a teat-receiving orifice, and an expansion ring manually inserted into said bulbous enlargement and adjustable therein axially to adjust the diameter of said orifice, said ring defining a flange of said tube and confining it against said shoulder.

3. A teat-cup inflation unit manually adjustable to effect adjustment of the mouth opening to accommodate different animals comprising an elastic tube having a bulbous enlargement preformed adjacent an end thereof, and a ring in and with respect to which said bulbous enlargement is longitudinally adjustable to stretch said enlargement and to form a diaphragm mouthpiece integral with said tube and having a teat-receiving opening adjustable in diameter in response to manual adjustment of said ring within and longitudinally of said bulbous enlargement.

4. A teat-cup inflation unit manually adjustable to effect adjustment of the mouth opening to accommodate different animals comprising an elastic tube having a bulbous enlargement preformed adjacent an end thereof and terminating in an integral reinforcing mouth-forming bead, and a ring in and with respect to which said bulbous enlargement is longitudinally adjustable to stretch said enlargement and said bead to form a diaphragm mouthpiece, integral with said tube, having a mouth-opening defined by said bead, adjustable in diameter in response to manual adjustment of said ring within and longitudinally of said bulbous enlargement.

HERBERT A. GREENE.