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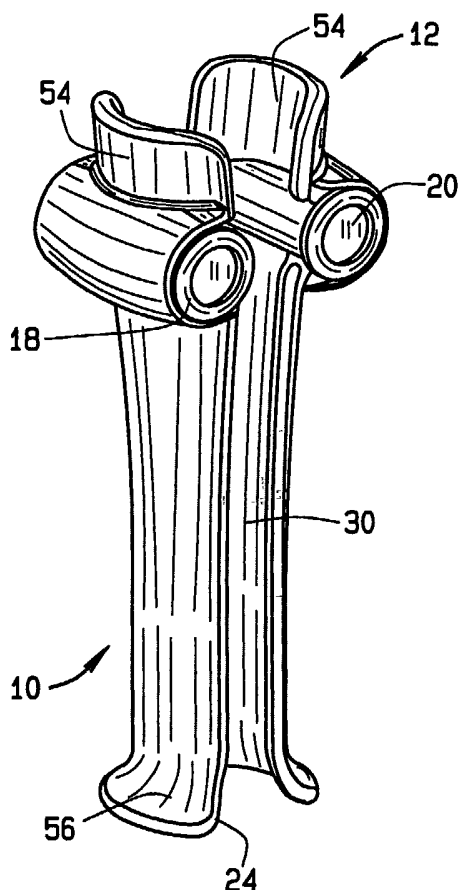
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[Continued on next page]

(54) Title: ROLLER MILKER DEVICE



(57) Abstract: A milking device (10) having a flexible, unitary body (12) for securing and compressing patient tubing (48) is disclosed comprising first and second portions (14, 16) which are tapered from one another and define a conduit (38) that communicates with a channel (30) formed on one side of the device and an opposing slot (40) formed on the other side thereof. First and second portions (14, 16) further define first and second receptacles (26, 28), respectively, each adapted to receive a roller (18, 20) disposed rotatably therein for engaging patient tubing (48). A pair of guides (54) are provided at the entrance of the device (10) in order to facilitate the axial advancement of patient tubing (48) through the conduit (38) of the body (12). Distal and proximal openings (32, 34) are formed at either end of the conduit (38) to receive a portion of patient tubing (48) inserted through the channel (30). The device (10) may then be advanced longitudinally along the tubing (48) as a user presses the two rollers (18, 20) together and engages the tubing (48) while progressively evacuating the contents thereof into an appropriate collection site.

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ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

ROLLER MILKER DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to medical devices, and more particularly to medical devices for milking patient tubing. More specifically, the present invention relates to a milking device for progressively clearing tube contents from patient tubing during a milking procedure.

10

2. Prior Art

 Prior art medical devices that provide a means for clearing or dislodging the contents of patient tubing are well known in the art, such as devices used for stripping or milking. Devices used for stripping or milking procedures may include a pair of rollers that engage patient tubing therebetween in order to allow the user to clamp down on the tubing. The user then advances the device along the patient tubing such that tube contents are progressively cleared from the tubing. Typically, a stripping procedure requires the user to totally occlude the tubing, while the user in a milking procedure clamps down on the tubing, but does not totally occlude it.

 For example, U.S. Patent No. 3,847,370 to Engelsher
25 discloses a tube servicing device comprising a strap-like

frame with a pair of oppositely disposed flexible legs with each leg having an opposing roller capable of pinching, rolling contact with patient tubing. Other references, such as U.S. Patent No. 4,164,223 to Munib, disclose an

5 instrument for use in a stripping procedure comprising a pair of rollers mounted on shafts which are hinged together at one end, while the opposite end of one shaft forms a cylindrical handle and the other shaft an opposed thumb rest for moving the rollers into and out of engagement with the

10 tubing. Similarly, U.S. Patent Nos. 4,287,890; and 4,452,244 to Chin and Fogarty, respectively, disclose scissor-like instruments having opposed rollers mounted on each scissor portion for engaging and stripping patient tubing. Unfortunately, the above devices are provided with

15 unguided rollers which may cause the device to run across the patient tubing thereby scoring and possibly tearing it.

Therefore, further improvements in the prior art are desirable for a device capable of simultaneously milking or stripping patient tubing while axially guiding the patient

20 tubing as the device is advanced along the length thereof in order to progressively expel the contents from the tubing.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, the primary object of the present invention is to provide a device for milking or stripping patient tubing.

5 Another object is to provide a device of the above character that includes at least a pair of opposed rollers capable of engaging patient tubing in continuous, rolling contact during the milking procedure.

 Yet another object of the present invention is to
10 provide a device of the above character having a flexible unitary body adapted to engage and axially guide patient tubing during the milking procedure.

 A further object of the present invention is to provide a device of the above character having a channel adapted to
15 laterally receive a portion of patient tubing therethrough during the milking procedure.

 Yet another further object of the present invention is to provide a device of the above character having a flexible body that permits easy compression of the free ends of the
20 device during the milking procedure.

 These and other objects of the present invention are realized in the preferred embodiment of the present invention, described by way of example and not by way of limitation, which provides for a milking device for

expelling the contents of patient tubing as the device axially guides patient tubing.

In brief summary, the present invention overcomes and substantially alleviates the deficiencies in the prior art by providing a milking device comprising a flexible unitary body defining first and second portions that collectively form a conduit adapted to receive patient tubing. The body further defines proximal and distal portions forming respective openings at opposing ends of the conduit. The first and second portions define a channel along one side and a slot along the other opposite side of the milking device. In the preferred embodiment, the distal end of each respective portion further defines opposing receptacles sized and shaped to receive a roller that is freely rotatable therein with one roller being in direct opposition with the other roller. However, in the alternative, three or more rollers may be utilized without departing from the scope of the present invention with the rollers in general opposition to one another. The body of the milking device is made from a flexible plastic material that permits the user to flex the distal end of first and second portions toward one another in order to compress patient tubing during the milking procedure. Further, the distal portion of the device defines opposing guides adapted to facilitate

the axial guiding of patient tubing into the conduit of the body during the milking procedure.

In operation, the user laterally inserts the patient tubing through the channel and into the conduit such that
5 the tubing is placed between the rollers and extends through the proximal and distal openings of the milking device. The user then grasps the first and second portions between his thumb and forefinger, respectively and flexes the distal end of the first and second portions toward one another such
10 that the rollers properly engage and compress the tubing from the patient. As the milking device is axially advanced along the length of the patient tubing by the user, the guides in conjunction with the conduit of the body, axially guide the patient tubing as the contents therein are
15 progressively dislodged from the tubing as the user maintains the compressive engagement therealong until all of the tubing contents are evacuated into a suitable collection site. Once the procedure is completed, the user removes the patient tubing from the milking device back through the
20 channel.

Additional objects, advantages and novel features of the invention will be set forth in the description which follows, and will become apparent to those skilled in the art upon examination of the following more detailed

description and drawings in which like elements of the invention are similarly numbered throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

5 FIG. 1 is a perspective view of a milking device according to the present invention;

FIG. 2 is a side view of the milking device according to the present invention;

FIG. 3 is an opposite side view of the milking device
10 according to the present invention;

FIG. 4 is a cross-sectional view of the milking device taken along line 4-4 of FIG. 2 according to the present invention;

FIG. 5 is a cross-sectional view of the milking device
15 taken along line 5-5 of FIG. 3 according to the present invention;

FIG. 6 is a top view of the milking device according to the present invention;

FIG. 7 is a bottom view of the milking device according
20 to the present invention;

FIG. 8 is a perspective view of the milking device showing a pair of rollers according to the present invention; and

FIG. 9 is a partial exploded view of the milking device
25 according to the present invention;

FIG. 10 is a cross-sectional view of the milking device engaged to patient tubing illustrating the milking procedure according to the present invention; and

FIG. 11 is a side view of an alternative embodiment of the milking device according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, the preferred embodiment of the milking device of the present invention for engaging and milking patient tubing is illustrated and generally indicated as 10 in FIG. 1. Milking device 10 comprises a flexible, unitary body 12 that includes opposing first and second portions 14 and 16 defining a distal portion 22 and a proximal portion 24. Referring to FIGS. 1, 2 and 5, first and second portions 14 and 16 collectively define a longitudinal channel 30 along an entire side of milking device 10 and a longitudinal slot 40 (FIG. 5) on the other side thereof that extends a distance from the distal portion 22 which both communicate with an interior conduit 38 formed between portions 14 and 16 of body 12. The conduit 38 includes distal and proximal openings 32 and 34 formed at opposite ends of conduit 38 for receiving a portion of patient tubing 48 (FIG. 10) therethrough during the milking procedure as shall be discussed in greater detail below. Referring specifically in FIG. 2, first and second portions

14 and 16 meet along proximal portion 24 by an integral portion 36 such that portions 14 and 16 are bifurcated and gradually taper away from one another as one proceeds from the proximal portion 24 to the distal portion 22 of milking
5 device 10. In this tapered configuration, the inner diameter of the distal opening 32 is greater than the inner diameter of the proximal opening 34. Further, the tapered configuration permits first and second portions 14 and 16 to be flexed toward one another when the user engages the
10 rollers 18 and 20 with patient tubing 48 during the milking procedure.

As shown specifically in FIGS. 1, 2, 4, 8 and 9, first and second portions 14 and 16 define opposing receptacles 26 and 28, respectively. Receptacles 26 and 28 each include a
15 curved segment 46 which is sized and shaped to securely engage a pair of rollers 18 and 20, respectively. Referring specifically to FIG. 9, rollers 18 and 20 each comprise a shaft 37 that forms opposing flanges 42 at each end thereof which are adapted to rotatably engage shoulders 50 formed at
20 opposite ends of receptacles 26 and 28 when rollers 18 and 20 are secured therein. Once properly secured, rollers 18 and 20 freely rotate within the curved segments 46 of receptacles 26 and 28. Preferably, first and second receptacles are configured for snap fit engagement with
25 rollers 18, 20.

Referring to FIGS. 5 and 6, distal portion 22 is formed adjacent distal opening 32 and defines a pair of guides 54 that facilitate the advancement of patient tubing 48 through conduit 38 of milking device 10. Guides 54 have a generally cup-shaped configuration adapted to facilitate advancement of patient tubing 48 through distal opening 32 during the milking procedure.

Referring to FIGS. 1, 3, and 7, proximal portion 24 defines an outwardly extending flange 56 which provides a gripping surface for the user. Flange 56 is configured such that the user may comfortably grasp and handle milking device 10 while permitting the distal portion 22 of first and second portions 14, 16 to be easily brought toward one another during the milking procedure and compress patient tubing 48.

Referring to FIG. 10, the operation of milking device 10 shall be discussed. In operation, the far end of patient tubing 48 is laterally inserted through channel 30 of milking device 10 such that the patient tubing 48 enters conduit 38 and is then inserted through both distal and proximal openings 32 and 34. In this arrangement, patient tubing 48 is in co-axial alignment with the conduit 38. The user then presses the distal portion 22 of first and second portions 14 and 16 together along arrows A with his thumb and forefinger in order to engage and compress patient

tubing 48 between rollers 18 and 20 such that tubing 48 becomes partially occluded. Preferably, the user partially occludes patient tubing 48 by permitting rollers 18 and 20 to compress tubing 48 and expel tubing contents when milking device 10 is advanced in the direction of arrow B. While maintaining this engagement that compresses patient tubing 48, the user axially advances body 12 along the tubing 48 away from the patient until the contents thereof are expelled along the direction of arrow C into a suitable collection device, such as a chest drainage apparatus. However, the present invention also contemplates that milking device 10 can be used to totally occlude the patient tubing when device 10 is used in a stripping procedure. During the milking or stripping procedure, the conduit 38 in conjunction with guides 54 facilitate the axial advancement of patient tubing 48 through milking device 10 by maintaining the tubing 48 in proper alignment between rollers 18 and 20 so that tubing 48 does not disengage therefrom. This guiding feature of milking device 10 prevents the device 10 from running across patient tubing 48 which can score and tear it.

In one embodiment of the present invention, body 12 may have marking indicia, such as suitable language or directional arrow, that provides the user with the proper direction for advancing milking device 10 along patient

tubing 48 during the milking operation, such direction being away from the patient and toward the collection device (not shown) .

Preferably, milking device 10 is made from a suitable
5 flexible plastic material that permits the user to easily flex the distal portion 22 inwardly when engaging patient tubing 48.

The present invention contemplates that the inner
diameters of distal and proximal openings 32, 34 and conduit
10 38 are such that patient tubing 48 readily advances therethrough during the milking operation.

An alternative embodiment of the present invention is illustrated and generally indicated as 110 in FIG. 11. Milking device 110 comprises a similarly flexible body 112
15 that includes first and second portions 114 and 116, defining a distal portion 122 and a proximal portion 124. Further, first and second portions 114 and 116 collectively define a channel 130 on one side of milking device 110 and a slot 140 on the other side thereof which communicate with a
20 conduit 138 formed between portions 114 and 116. The conduit 138 includes distal and proximal openings 132 and 134 formed at opposite ends thereof. The alternate embodiment differs from the preferred embodiment in that it includes a roller assembly 13 having receptacles 126, 128
25 and 129 which are arranged in general opposition to at least

one other receptacle. Receptacles 126, 128 and 129 are adapted to rotatably secure rollers 118, 119 and 120, respectively. However, the present invention contemplates that at least two or more rollers be arranged to provide the
5 means for compressing patient tubing 48.

It should be understood from the foregoing that, while particular embodiments of the invention have been illustrated and described, various modifications can be made thereto without departing from the spirit and scope of the
10 invention. Therefore, it is not intended that the invention be limited by the specification; instead, the scope of the present invention is intended to be limited only by the appended claims.

CLAIMS

What is claimed is:

1. A medical device (10) for expelling the contents of tubing comprising:

first and second portions (14, 16), each of said first and second portions (14, 16) including at least one

5 receptacle (26, 28), a conduit (38) defined between said first and second portions (14, 16) in communication with a distal opening (32) and a proximal opening (34) formed at opposite ends thereof;

a roller (18, 20) disposed within each of said
10 receptacles (26, 28), each of said rollers (18, 20) being freely rotatably within a respective receptacle (26, 28) and positioned in general opposition to one another,

wherein said first and second portions (14, 16) are flexible toward one another in order to engage the tubing
15 (48) between said rollers (18, 20) when operating the medical device (10) such that said conduit (38) facilitates the axial advancement of tubing (48) therethrough.

2. The medical device (10) according to claim 1, wherein each of said rollers (18, 20) comprises a shaft (37) defining flanges (42) along opposite ends thereof.

3. The medical device (10) according to claim 2, wherein each of said receptacles (26, 28) forms opposing shoulders (50) adapted to rotatably receive a respective roller (18, 20).

4. The medical device (10) according to claim 3, wherein said flanges (42) of said rollers (18, 20) are adapted to rotatably engage said shoulders (50) of said receptacle (26, 28).

5. The medical device (10) according to claim 1, wherein said first and second portions (14, 16) are tapered away from one another.

6. The medical device (10) according to claim 1, wherein a flange (56) is formed adjacent said proximal opening (24), said flange (56) adapted to provide a gripping surface.

7. The medical device (10) according to claim 1, wherein a pair of guides (54) are formed adjacent said distal opening (32), said guides (54) facilitating the axial advancement of the tubing (48) into said conduit (38).

8. The medical device (10) according to claim 1, wherein each receptacle (26, 28) forms a curved segment (46), said

curved segment (46) being adapted to rotatably receive a respective roller (18, 20) therein.

9. The medical device (10) according to claim 1, wherein said first and second portions (14, 16) define a slot (40) on one side and a channel (30) at the other side thereof, said slot (40) and said channel (30) permitting the first
5 and second portions (14, 16) to be flexed toward one another.

10. The medical device (10) according to claim 9, wherein the tubing (48) is insertable into said conduit (38) through said channel (30) of the medical device (10).

11. The medical device (10) according to claim 1, wherein a channel (30) is formed between said first and second portions (14, 16) on one side of the medical device (10).

12. The medical device (10) according to claim 1, wherein a slot (40) is formed between first and second portions (14, 16) on the other side of the medical device (10).

13. A device (10) for expelling contents from flexible tubing (48) comprising:

a unitary body (12) having at least a pair of receptacles (26, 28), said body (12) being formed of a flexible material and further including a proximal portion (24) and a distal portion (22), said body (12) defining a longitudinal channel (30) extending along an entire length of said body (12) from said distal portion (22) to said proximal portion (24), said channel (30) communicating with an interior conduit (38) defined by said body (12), wherein said body (12) is adapted to receive a length of flexible tubing (48) within said interior conduit (38) in coaxial relationship thereto by laterally passing said tubing (48) through said channel (30) and along said length of said body (12), said distal portion (22) being bifurcated into opposing first and second portions (14, 16), said receptacles (26, 28) each having a roller (18, 20) disposed therein, said first and second portions (14, 16) being adapted to be manipulated such that said rollers (18, 20) are drawn towards each other in approaching engagement.

14. The device (10) according to claim 13 wherein said conduit (38) facilitates axial advancement of said tubing (48) through the device (10).

15. The device (10) according to claim 14 wherein first and second portions (14, 16) are tapered, said distal portion

(22) of said body (12) having a greater inner diameter than said proximal portion (24) thereof.

16. The device (10) according to claim 13 wherein each of said receptacles (26, 28) defines a shoulder (50) at opposing ends thereof with each roller (18, 20) forming a flange (42) at opposing ends thereof, said flanges (42)
5 being rotatably secured against each shoulder (50) such that each of said rollers (18, 20) freely rotates within each of said receptacles (26, 28).

17. The device (10) according to claim 13 wherein said body (12) is marked with indicia for instructing a user on a proper direction of advancement of said body (12) during operation of the device (10).

18. The device (10) according to claim 13 wherein said distal portion (22) defines opposing guides (54), said guides (54) providing a means for facilitating advancement of tubing (48) through said conduit (38).

19. A device (110) for milking contents from flexible tubing (48), said device (110) comprising:

a flexible body (112), said body (112) defining a proximal portion (124) and a distal portion (122) and

further defining a longitudinal channel (130) extending along an entire length of said body (112) from said distal portion (122) to said proximal portion (124), said channel (130) communicating with an interior conduit (138) defined by said body (112), whereby said body (112) being adapted to receive a length of flexible tubing (48) within said interior conduit (138) in coaxial relationship by laterally passing the tubing (48) through said channel (130) along said length of said body (112), said body (112) further including a roller assembly (13) comprising of at least a plurality of receptacles (126, 128, 129), each of said at least a plurality of receptacles (126, 128, 129) having a roller (118, 119, 120) rotatably engaged therein and in general opposition with at least one other receptacle (126, 128, 129), said roller assembly (13) being adapted to be manipulated such that at least one receptacle (126, 128, 129) is drawn toward another receptacle (126, 128, 129) in approaching engagement.

20. The device (110) according to claim 19 wherein an outwardly extending peripheral flange is formed at said proximal portion (124) of said body (112).

21. The device (110) according to claim 20 wherein a shape of said hollow body (112) is tapered, said distal portion

(122) having a greater diameter than said proximal portion (124).

22. The device (110) according to claim 19 wherein said body (112) is marked with indicia for instructing a user on a proper direction of advancement of said body (112) during operation of the device (110).

23. The device (10) according to claim 1, wherein the first and second portions (14, 16) are made from a plastic material.

24. The device (10) according to claim 22, wherein said plastic material comprises an additive for reducing the drag between the device (10) and said tubing (48).

25. The device (10) according to claim 23 wherein said additive modifies and enhances the surface lubricity of said plastic material.

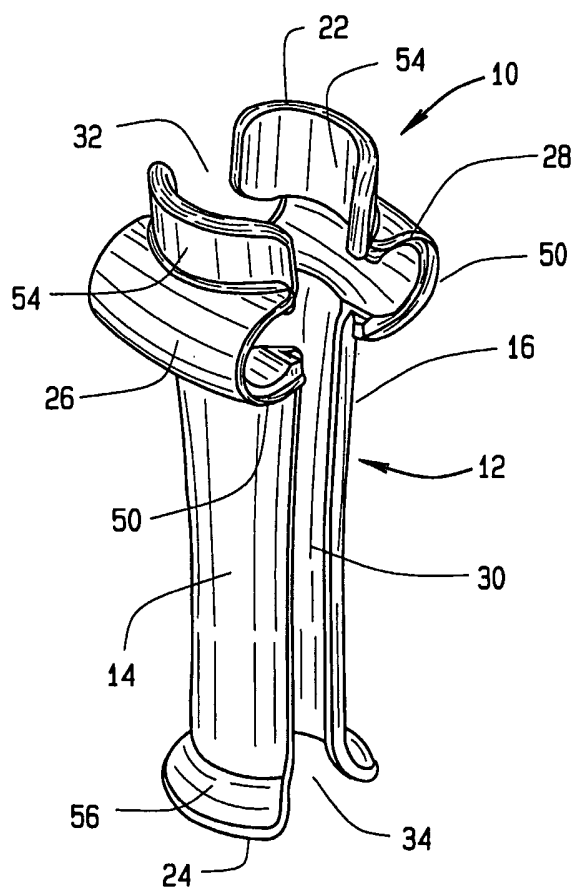


FIG. 1

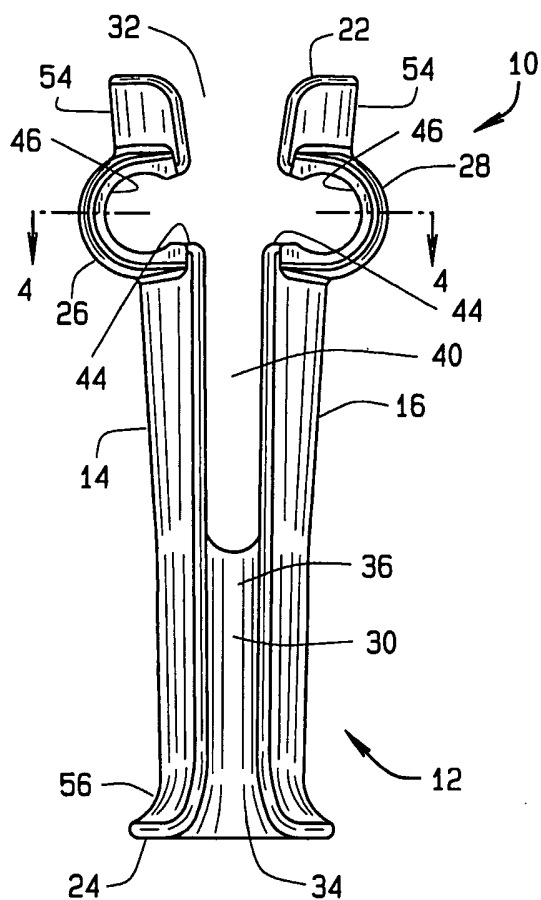


FIG. 2

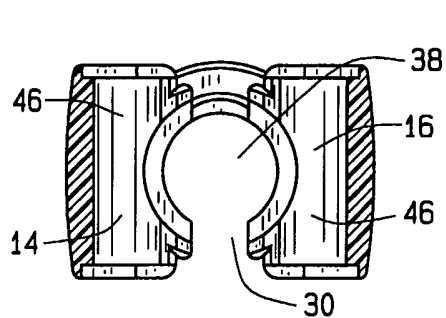


FIG. 4

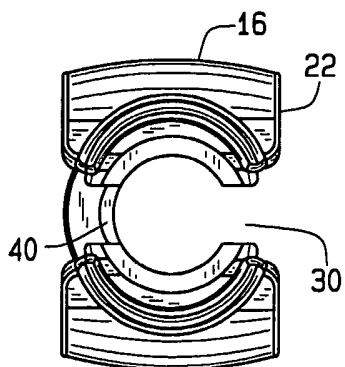


FIG. 6

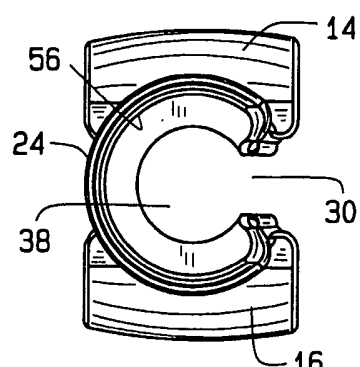


FIG. 7

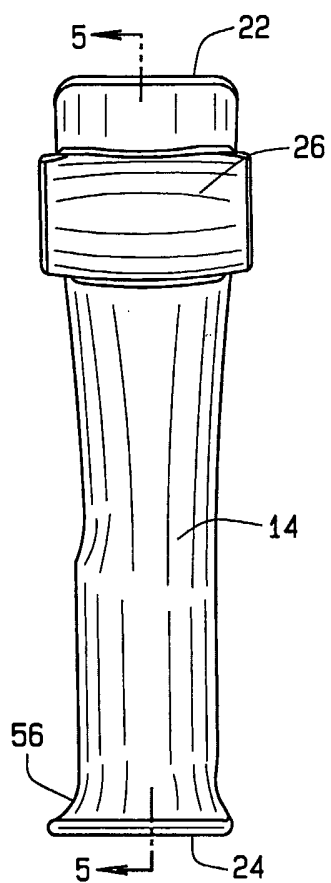


FIG. 3

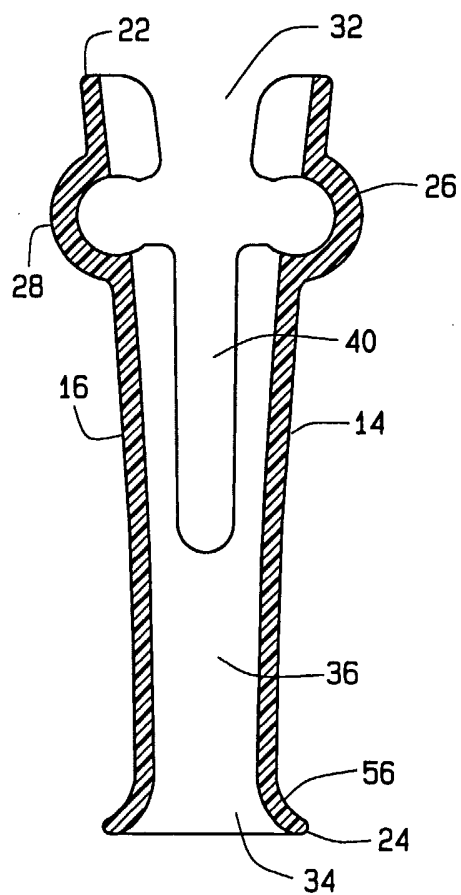


FIG. 5

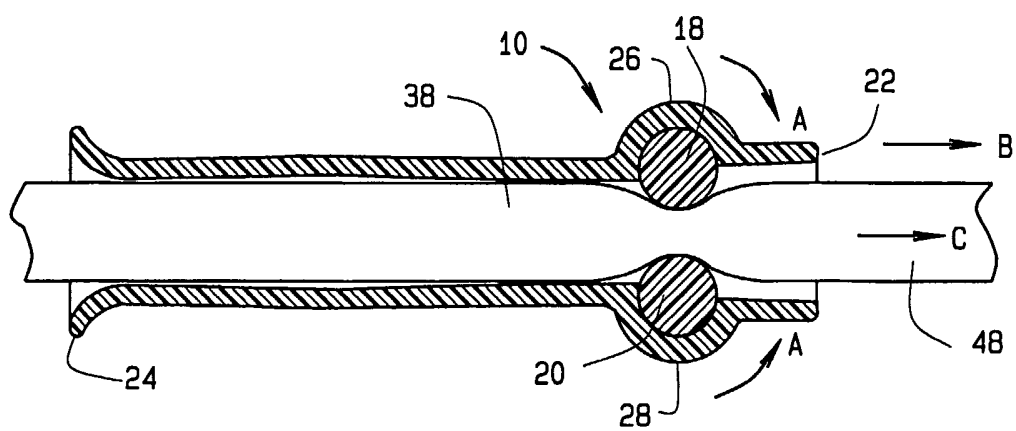
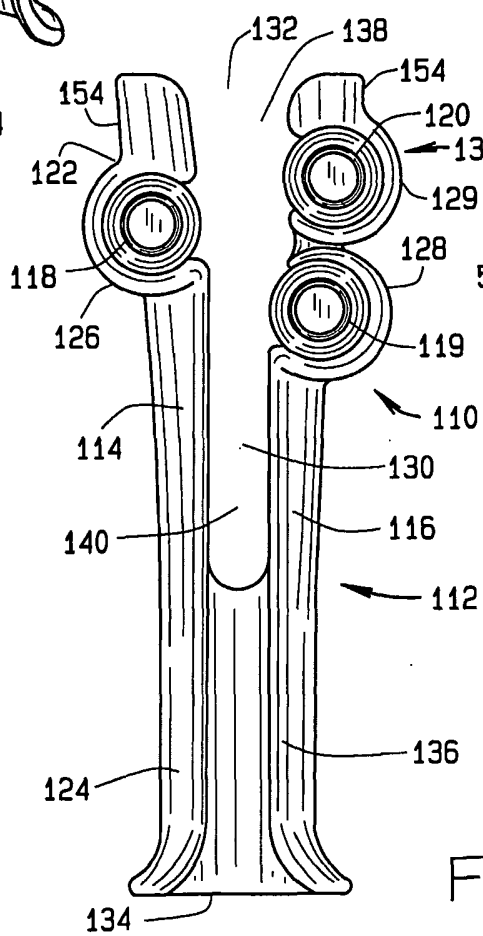
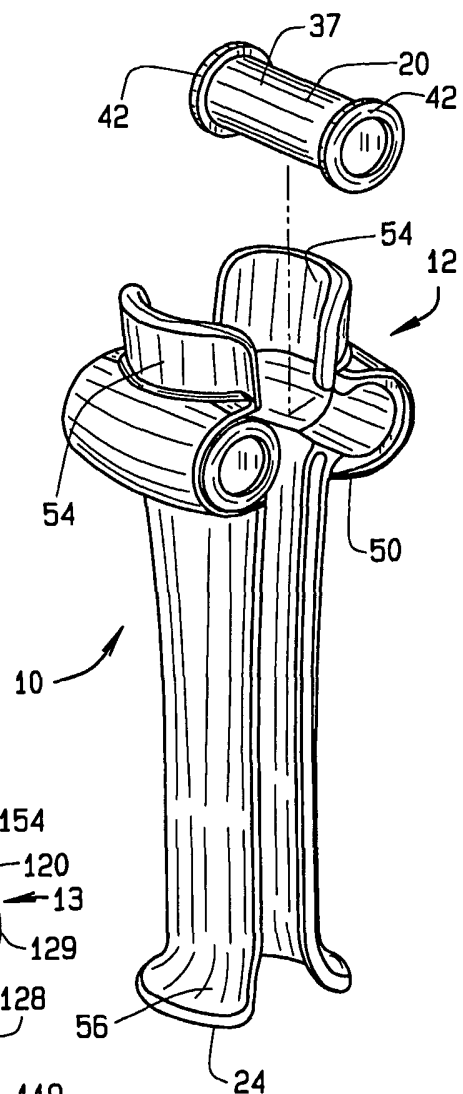
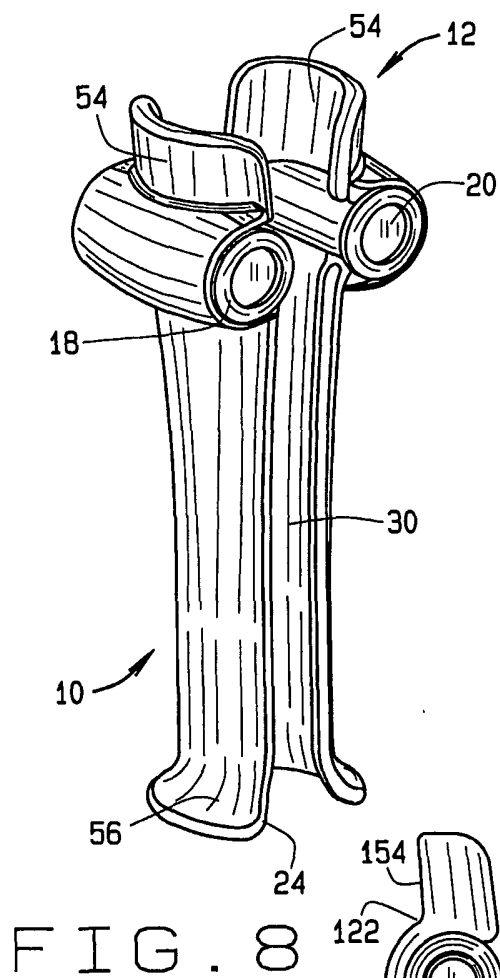


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/39806

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61B 17/28

US CL : 606/209

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 606/209; 222/102

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NoneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST - Milking, stripper**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,164,223 A (Munib) 14 August 1979, see figs. 1-3.	1-25
A	US 5,881,916 A (Madjarac) 16 March 1999, see figs. 1-3.	1-25



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:		"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search

03 February 2003 (03.02.2003)

Date of mailing of the international search report

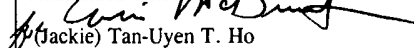
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