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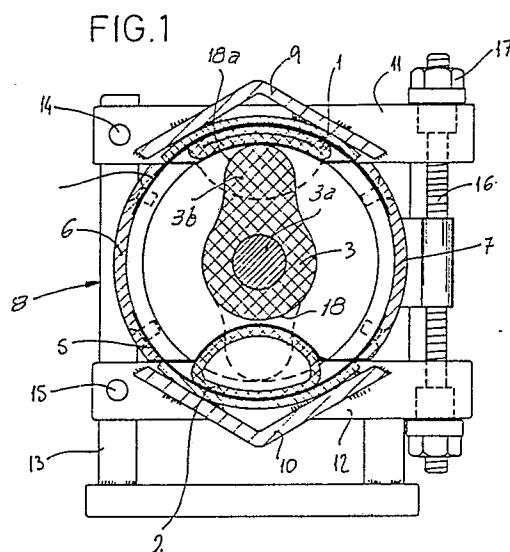
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54 **Peristaltic pump.**

57 A peristaltic pump of the kind comprising flexible tubular conduits (1,2), and means for creating a movable crushing on a point of the length of the conduit thus impelling a fluid present within a said tubular conduit in the direction of motion of the said crushing.

The fluid impelling means comprise a revolving body (3) and a helical extending rib (3b), the tubular conduit or conduits (1,2) being placed about the revolving body (3) such that the outer border of the rib (3b) crushes the tubular conduit or conduits at a point or points which move along the said conduits.

Applicable to moving of aggressive or motion sensitive liquids.



## Description

### PERISTALTIC PUMP

The present invention relates to a peristaltic pump of the type comprising at least a flexible tubular conduit, means for crushing a point of the length of the conduit thus creating a fluid tight restriction between upstream and downstream portions of the conduit, and means for moving the said restriction along the conduit, thus impelling a fluid present within at least a said tubular conduit to move along this latter in the direction of motion of the said restriction. Both crushing and moving means, taken as an ensemble, will be termed hereafter "the impeller means".

In such pumps the flexible tubular conduit is isolated from the driving means, and this is specially suitable for moving on the one hand aggressive liquids which could damage the pump mechanisms, and on the other hand liquids which want not to be altered, such as liquids to be used for consumption (for example wines and the like).

### BACKGROUND OF THE INVENTION

Peristaltic pumps according to the above definition are well known. Thus, for example, the Spanish patent 518 515 in the name of the same applicant, describes a peristaltic pump wherein the crusher and impeller means are constituted of electromagnets acting upon compression plates in contact with the flexible tubular conduit, thus avoiding the expensive mechanisms used hitherto for driving this kind of pumps.

However, this pump had the drawback that the compression plates were applied suddenly onto the flexible tubular conduit, thus causing an hydraulic ram effect in the hydraulic ducting in which the pump is installed.

The Spanish patent 526 982 is an addition to the above patent and has the aim of solving the above drawback in that the compression plates are driven by a camshaft, each of whose cams is arranged at a given angular position about their rotation axis.

This solution improved the previous embodiment, though it failed to avoid the jump taking place between either cam, thus the movement was not sufficiently smooth to be thoroughly satisfactory.

### DESCRIPTION OF THE INVENTION

The peristaltic pump making the subject of the invention responds to the above definition and is characterized in that the fluid impelling means comprise a revolving body connected to rotation means, and a helical extending rib, the flexible tubular conduit or conduits being placed about the revolving body such that the outer border of the rib crushes the tubular conduit or conduits at a point or points which move along the said conduits, thus impelling the fluid therethrough, when the body with the helicoidal rib is rotated about the axis of the

former.

The helicoid made-up by the revolving body and the helicoidal rib acts upon the flexible tubular conduit or conduits in a continuous fashion, without the discontinuities and jumps of the known peristaltic pumps. Thus, the peristaltic pump of the invention succeeds in solving the above drawbacks and provides a continuous and smooth working.

To advantage the borders of the helicoidal rib or helicoid are rounded in order that the contact between the helicoid and the tubular conduit or conduits becomes as smooth as possible.

To advantage, the pump comprises a fabric web arranged between the helicoid and she at least one flexible tubular conduit to ease the helicoid displacement over the at least one tubular conduit. It is thus avoided that the tubular conduit or conduits become trapped by the helicoid and subjected to an excessive wear.

Preferably, the movement of the helicoid is performed in a dry condition, though it is also possible to perform it within a lubricating means in order to cut down friction between the helicoid and the fabric web or webs.

According to a preferred embodiment, the pump according to the invention comprises a pair of flexible tubular conduits located at diametral opposite positions as regards the helicoid. The use of two tubular conduits affords an increase of the pump flow capabilities as regards the flow of a pump using only one tubular conduit.

Owing to these working features, the pump of the invention is specially suitable for moving chemicals, champagne, sparkling wines and the like, which become altered when they are shocked suddenly.

### BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the above exposition, some drawings are enclosed wherein a diagrammatic practical embodiment case is represented only by way of example. In the said drawings:

Figure 1 is a cross section elevation view of the peristaltic pump of the invention wherein the helicoid stands at a position for which the upper flexible tubular conduit is compressed while the lower conduit is in slack condition;

Figure 2 is the same view as in the previous Figure, though the helicoid stands in another position, compressing the lower flexible tubular conduit and leaving in slack condition the upper conduit, and

Figure 3 is a plan view of the central portion of the peristaltic pump.

### DESCRIPTION OF A PREFERRED EMBODIMENT

The peristaltic pump shown in the Figures comprises a pair of flexible tubular conduits 1,2 to be

described further later, and a so called helicoid 3 formed of an elongated body secured to a shaft 3a for connection to a conventional means for rotating it. This body is formed with a helical rib 3b, the outer border 18 of which crushes flat the tubular conduits with their mutually faced inner surfaces in contact along a transverse line at one point of their length, thus forming an interruption or restriction of the inner volume of the conduits which moves, when the helicoid is made to revolve, along the length of the same, thus impelling the fluid contained in a circuit of which the said conduits form part, in the direction of motion of the restriction along both tubular conduits.

It also comprises fabric webs 4,5 arranged between the helicoid 3 and the flexible tubular conduits 1,2. The fabric webs 4,5 are secured to side plates 6,7 which are integral with the pump frame 8. It will be understood that although this fastening system has been shown, it could be of whatever type.

In Figures 1 and 2 the flexible tubular conduits 1,2 are secured to the frame 8 by means of respective angled profiles 9,10 which are integral with arms 11,12 in turn articulated at points 14,15 on the upright 13. The said arms are secured by means of bolts 16 and nuts 17. Also in this case, it will be understood that the securing device of the tubular conduits could be of whatever other type performing a function analogous to the described one.

The working of the peristaltic pump issues from the above exposition.

As shown in Figure 3, the outer rounded border of the rib 3b of the helicoid 3 shows, in profile, protruding zones 18a and recessed zones 18 which move along the pump when the helicoid is rotated by a conventional driving means, such as an electric motor.

Figures 1 and 2 show two different positions of the pump parts. In Figure 1, a protruding zone 18a is acting upon the upper flexible tubular conduit 1a recessed zone 18 being located at the lower part, thus leaving the tubular conduit 2 free. In Figure 2 the protruding zone 18a is acting upon the tubular conduit 2 thus leaving the tubular conduit 1 free.

At every zone of actuation of the helicoid 3 on the flexible tubular conduits 1,2 these latter become crushed flat such that their diametrically opposite inner surfaces come in mutual contact thus forming a wall or restriction individuating within each conduit two volumes respectively upstream and downstream as regards the restriction.

When the helicoid 3 revolves driven by a motor, the external border of the helicoid rib 3b moves the restriction along the flexible tubular conduits 1,2 thus impelling the fluid contained within them, and an associated hydraulic circuit, along the said conduits in the same direct ion as the restriction.

As it will be understood from the figures, the helicoid 3 acts upon the flexible tubular conduits 1,2 in a continuous manner, with no discontinuities or jumps as in the known peristaltic pumps. It will also be observed in the Figures that the outer borders of the rib 3b are rounded in order that the contact between the helicoid 3 and the tubular conduits 1,2 is as smooth as possible.

The fabric webs 4,5 are located between the helicoid 3 and the flexible tubular conduits 1,2 to facilitate the displacement of the helicoid 3 over the said tubular conduits, thus avoiding that these latter could become trapped by the helicoid and subjected to an excessive wear.

As indicated above, the movement of the helicoid is performed preferably in a dry condition, though it could also be performed in a lubricant medium in order to cut down friction between the helicoid 3 and the fabric webs 4,5.

## Claims

1. A peristaltic pump of the kind comprising at least a flexible tubular conduit (1,2), means for crushing a point of the length of the conduit thus creating a fluid tight restriction between upstream and downstream portions of the conduit, and means for moving the said restriction along the conduit, characterized in that the fluid impelling means comprise a revolving body (3) connected to rotation means, and a helical extending rib (3b), the tubular conduit or conduits (1,2) being placed about the revolving body (3) such that the outer border of the rib (3b) crushes the tubular conduit or conduits at a point or points which move along the said conduits, thus impelling the fluid therethrough, when the body (3) with the helicoidal rib (3b) is rotated about the axis of the former.

2. A peristaltic pump as in claim 1, characterized in that it comprises a fabric web (4,5) arranged between the helicoid (3) and tee at least one tubular conduit (1,2) to easy the helicoid displacement over the at least one tubular conduit.

3. A peristaltic pump as in the preceding claims, characterized in that it comprises a pair of tubular conduits (1,2) located at diametral opposite positions as regards the helicoid (3).

FIG.1

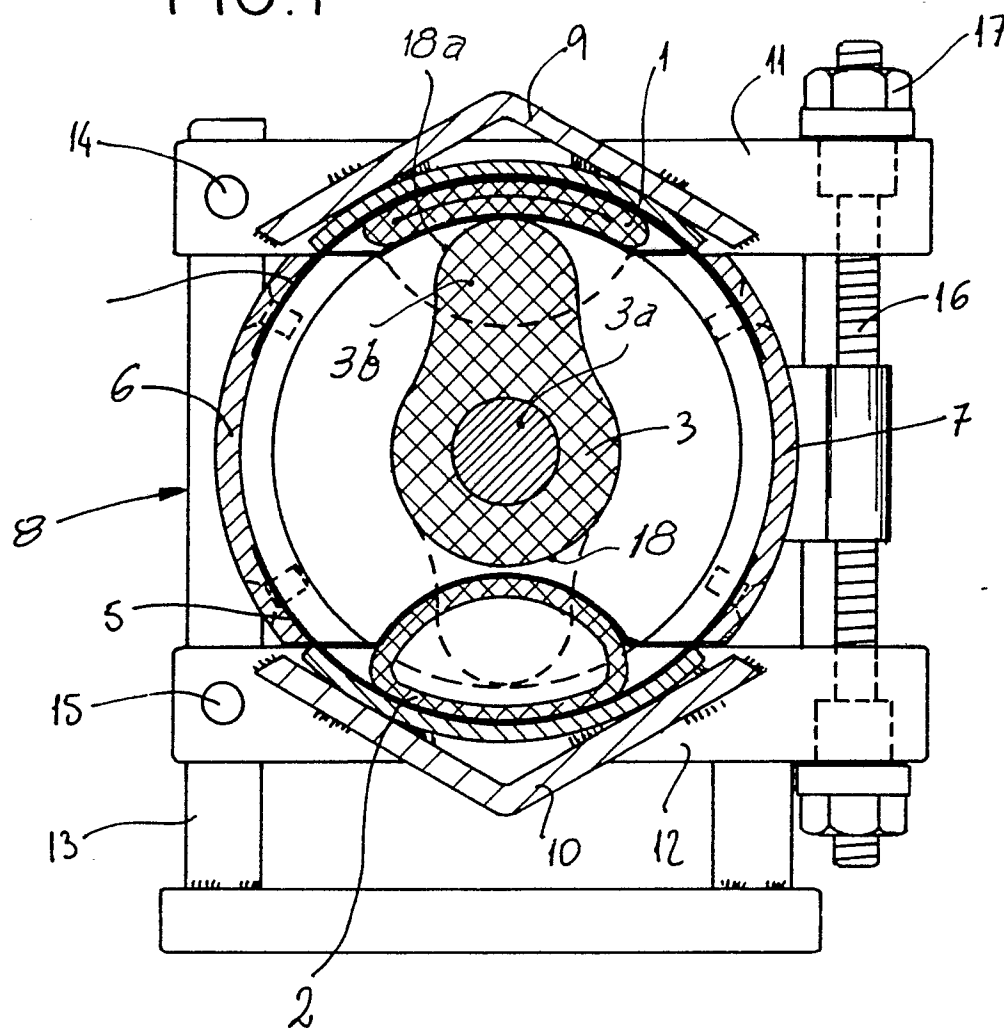


FIG. 2

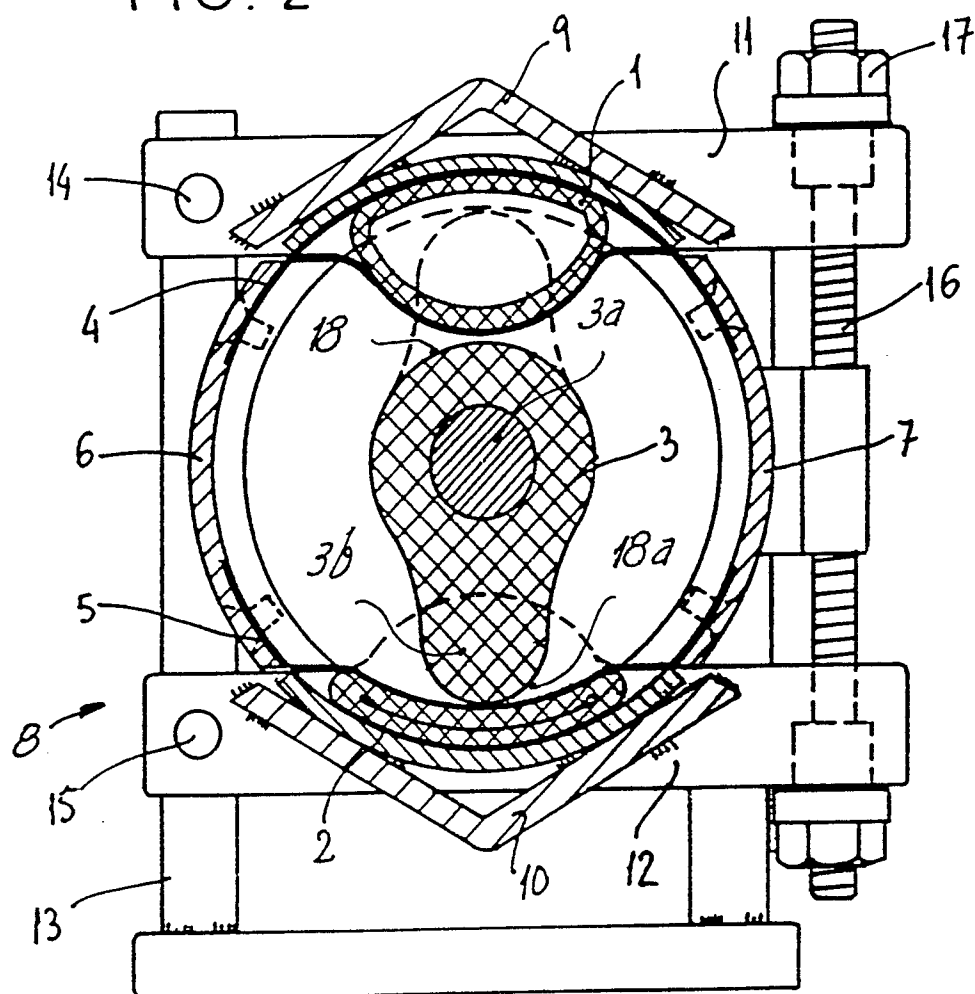
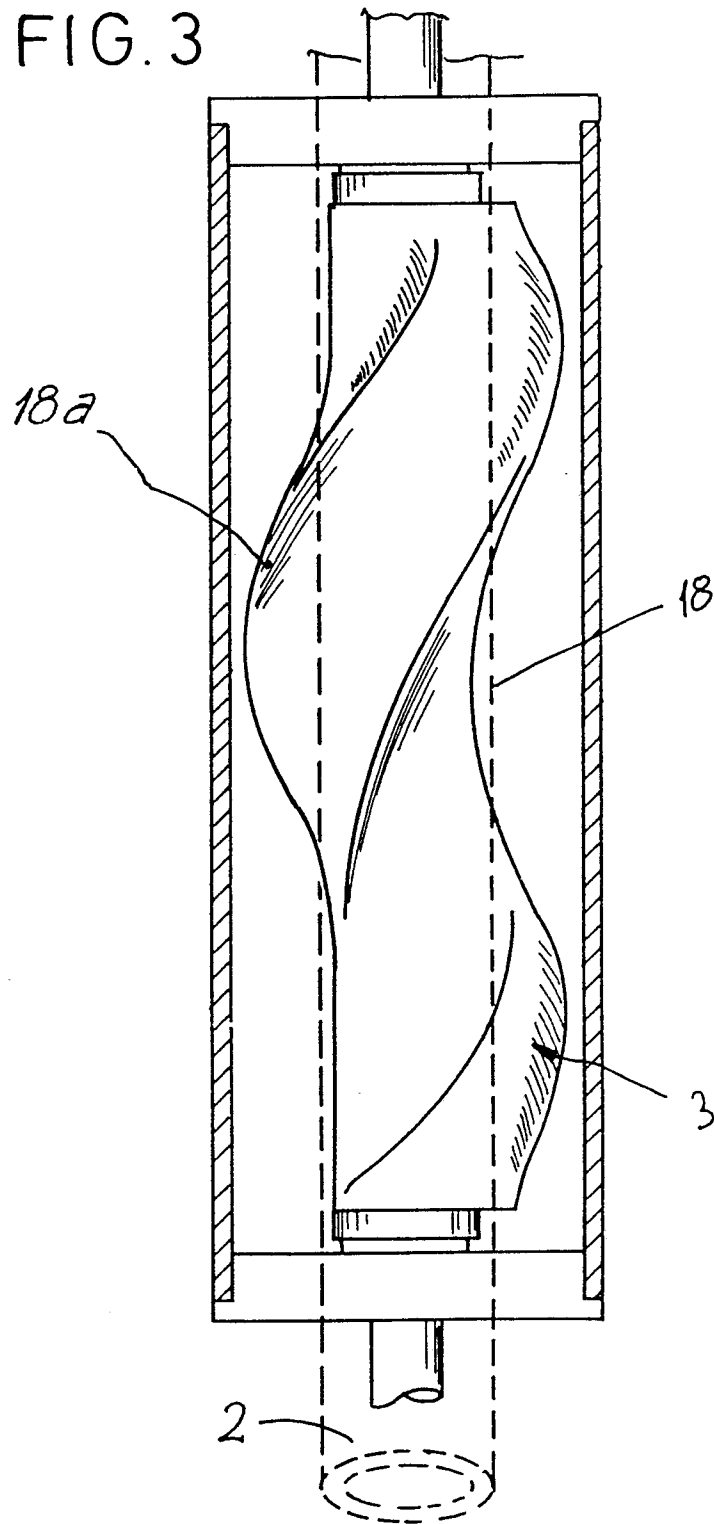


FIG. 3





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	EP-A-0 200 448 (RUSSELL) * Page 4, line 8 - page 6, line 3; figures 1,2 * ---	1,2	F 04 B 43/12
X	US-A-2 629 333 (OLDEN) * Whole document * -----	1-3	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 04 B
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	04-09-1989	VON ARX H.P.	
<b>CATEGORY OF CITED DOCUMENTS</b>			
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	