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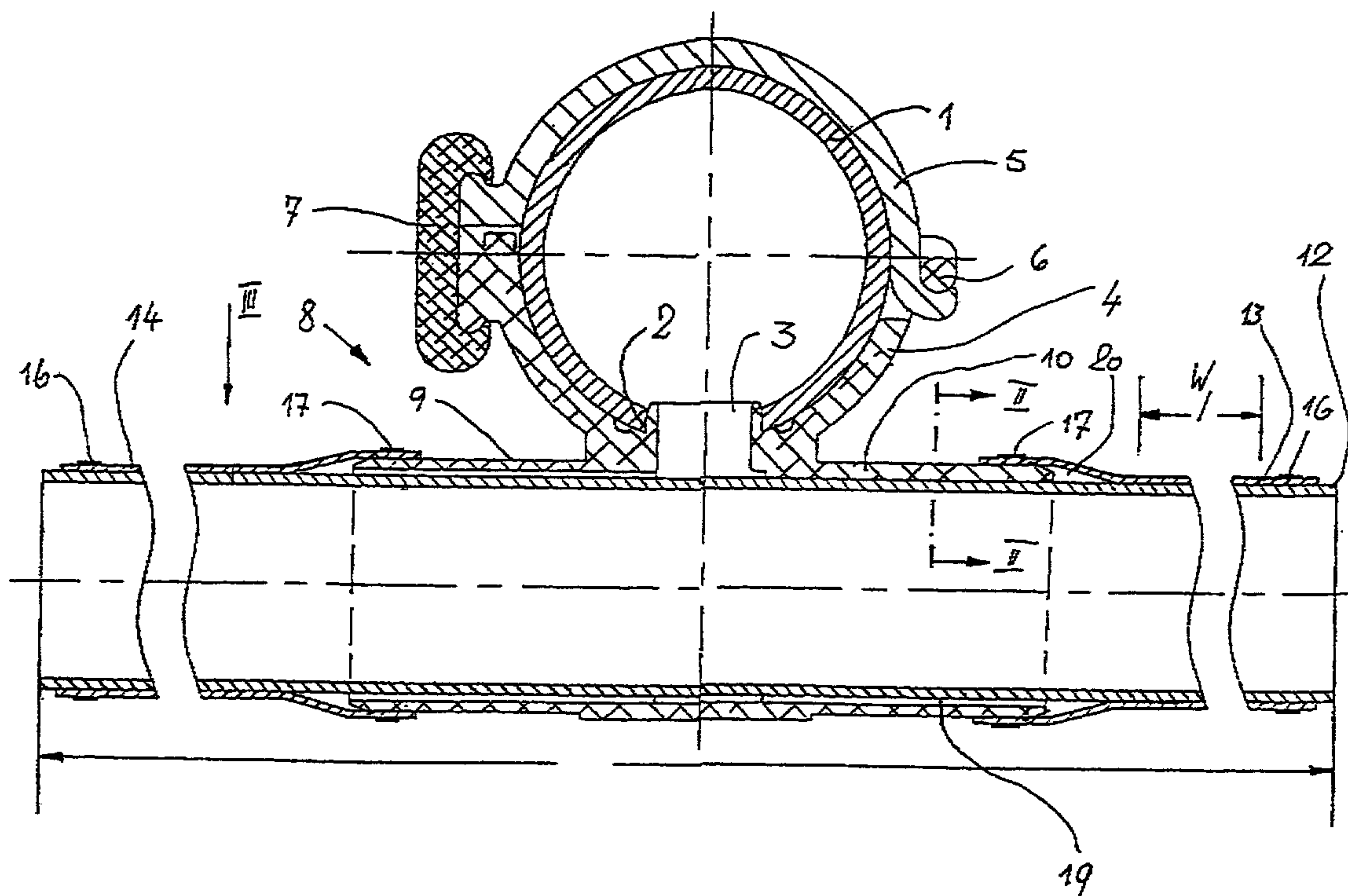
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(54) Title: APPARATUS FOR AERATING WATER



(57) **Abrégé/Abstract:**

An apparatus for aerating water with fine bubbles is provided. A support tube is inserted into a holder, with respective portions of the support tube extending beyond the holder. A respective sleeve of elastomeric material is disposed over each of the extending portions of the support tube, wherein one end of each of the sleeves is secured to the holder via a first clamping means, and an opposite end of each of the sleeves is secured to the support tube via a second clamping means. At least one of the sleeves is provided with fine slits for receiving compressed air that is conveyed from the holder to the slits between the support tube and the sleeves.

TITLE OF THE INVENTION:

APPARATUS FOR AERATING WATER

ABSTRACT OF THE DISCLOSURE:

An apparatus for aerating water with fine bubbles is provided.

- 5 A support tube is inserted into a holder, with respective portions of the support tube extending beyond the holder. A respective sleeve of elastomeric material is disposed over each of the extending portions of the support tube, wherein one end of each of the sleeves is secured to the holder via a first clamping means, and an opposite
- 10 end of each of the sleeves is secured to the support tube via a second clamping means. At least one of the sleeves is provided with fine slits for receiving compressed air that is conveyed from the holder to the slits between the support tube and the sleeves.

APPARATUS FOR AERATING WATER

Background of the Invention

The present invention relates to an apparatus for aerating water with fine bubbles, and includes a support tube upon which is disposed a sleeve that surrounds the support tube, is provided with fine slits, and is made of rubber, other elastomeric material, or the like; the ends of the sleeves are fixed on the support tube by clamping means that encircle the sleeve, with the support tube in turn being secured to a holder means from which compressed air is conducted between the sleeve and the support tube.

Such holder means are in a known manner mounted on a distributor pipe with which are associated a plurality of holder means and support tubes having slitted sleeves. In this connection, the support tubes extend at an angle, and preferably at right angles, to the distributor pipe in order in this manner to be able to accommodate a large number of support tubes having the slitted sleeves in a small space.

It is furthermore known to operate the support tubes in a flooded manner in order to preclude unnecessary buoyancy forces. However, all of the support tubes are fixedly connected with the holder means which in turn are rigidly connected with the distributor

pipe. In general, screw fastenings are used for this purpose.

A drawback of the heretofore known rigid arrangements is that it is often desired to provide a distributor pipe with branches, i.e., support tubes with sleeves of different lengths, for example in the situation where this is expedient due to limited space. This is applicable not only for a aligned support tubes that are disposed opposite one another in pairs on a distributor pipe, but also for support tubes that are sequentially arranged in the longitudinal direction of the distributor pipe.

It is therefore an object of the present invention to simplify the connection of the support tube with its holder means in such a way that conventional tubes, generally made of hard polymeric material, can be used for the support tubes, with such tubes being readily usable with the same or different lengths.

Brief Description of the Drawing

This object, and other objects and advantages of the present invention, will appear more clearly from the following specification in conjunction with the accompanying schematic drawing, in which:

Fig. 1 is in the lower portion a longitudinal cross-sectional view through one exemplary embodiment of the inventive aerating apparatus, and in the upper portion a cross-sectional view

through the pertaining distributor pipe;

Fig. 2 is a partial cross-sectional view through the apparatus of Fig.
1 taken along the line II-II thereof;

Fig. 3 is a plan view upon the working region of the apparatus of
Fig. 1 taken in the direction of the arrow III thereof.

Summary of the Invention

The aerating apparatus of the present invention is characterized primarily in that the support tube is inserted into a tubular holder means, and in that the free end of the sleeve is secured onto the support tube via clamping means while the inner end of the sleeve is secured on the holder means via clamping means.

Under these conditions, support tubes having any desired length or shortness can be used, with which are then associated the elastomeric sleeves that are cut to an appropriate length. The fact that one end of the sleeves (at the free end of the apparatus) are secured to the support tube, whereas the inner end is secured to the holder means, leads to a desired stabilization of the support tube in that the support tube cannot carry out undesired longitudinal displacements. Under these conditions it is even possible to provide on only one side of the distributor pipe a sleeve having slits

that are suitable for the discharge of air bubbles.

To ensure that the floatingly mounted support tube cannot carry out any undesired lateral movements, while at the same time ensuring that the compressed air can pass from the distributor pipe, via the holder means, between the support tube and the sleeve, that surface of the holder means that faces the support tube is provided with projections or channels.

An aerating apparatus provided with the inventive configuration makes it possible to have relatively long support tubes, whereby support tubes having a length of 4-8 m are possible. With such long support tubes, clamp-like ground anchors can be used in order to preclude oscillations and to counteract deformations.

The connection between the distributor pipe and the holder means can be of any desired type. However, clamps that can be separated are particularly expedient to ensure detachability.

Further specific features of the present invention will be described in detail subsequently.

Description of Preferred Embodiments

Referring now to the drawing in detail, a distributor pipe 1, which is made, for example, of hard polymeric material, is provided for supplying compressed air and for this purpose is provided on an

underside thereof with an opening 2 into which a connector 3 sealingly projects. The connector 3 is part of a lower part 4 of a split clamp 5 that has a joint location 6 and securing means 7 for holding the two parts of the clamp together.

5 The lower part 4 merges unitarily or monolithically with a holder means 8 that toward both sides in turn merges with an approximately tubular section 9, 10 that each project to the side beyond the clamp 5 and extend at right angles to the distributor pipe 1.

10 The inner surfaces of the sections 9, 10 are provided with projections in the form of axially extending ribs 11. The open cross-sectional area in the sections 9,10 defined by the projections corresponds to the outer diameter of a support tube 12, which is made of a hard polymeric material.

15 The support tube 12 can be inserted to any desired extent and thus be disposed symmetrically or also asymmetrically relative to the holder means 8. The support tube 12 is surrounded at both ends by a thin, membrane-like sleeve 13, 14 which, as shown in Fig. 3, in a working region W is provided with a large number of fine slits 20 15 in order to enable fine bubbles to escape.

To stabilize the floatingly mounted support tube 12, the free

ends of the two sleeves 13, 14 are connected to the free ends of the support tube 12 by clamping means 16, such as clips, clamping rings, brackets or the like. In contrast, the inner ends of the sleeves 13, 14 are similarly fixedly connected by clamping means 17 to the ends of the sections 9, 10. Thus, the continuous support tube 12 is adequately secured against axial displacement

The compressed air passes out of the distributor pipe 1, via the connector 3 and the channels 19 disposed between the ribs 11 into the space 20, and from there out between the sleeve 13, 14 and the support tube 12. In this way, the air can enter the water via the slits 15.

If with respect to the distributor pipe 1 aeration is to take place merely at one side, a very short sleeve 13 or 14 is used that is still secured via clamping means 16, 17, but is not provided with any slits.

The specification incorporates by reference the disclosure of Germany priority document 199 12 560.0 of 19 March 1999.

The present invention is, of course, in no way restricted to the specific disclosure of the specification and drawing, but also encompasses any modifications within the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN
EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE
DEFINED AS FOLLOWS:

1. An apparatus for aerating water with fine bubbles,
5 comprising:

a holder means;

a support tube that is inserted into said holder means and
has respective portions that extend beyond said holder means; and

a respective sleeve of elastomeric material disposed on each
10 of said extending portions of said support tube, wherein one end of
each of said sleeves is secured to said holder means via a first
clamping means, wherein an opposite end of each of said sleeves,
is secured to said support tube via a second clamping means, and
wherein at least one of said sleeves, is provided with fine slits for
15 receiving compressed air that is conveyed from said holder means
to said slits between said support tube and said sleeves.

2. An apparatus according to claim 1, wherein one of said
sleeves is relatively short and is not provided with any slits.

3. An apparatus according to claim 1, wherein said holder
20 means has a tubular configuration and is provided with inwardly
extending projections that are spaced apart such as to form air
supply channels that essentially open out into a space formed
between said sleeves and said support tube where said portions of

said support tube extend beyond said holder means.

4. An apparatus according to claim 3, wherein said inner projections of said holder means are in the form of ribs.

5. An apparatus according to claim 1, wherein said extending portions of said support tube are provided with clamp-like ground anchoring means.

6. An apparatus according to claim 1, wherein said support tube is inserted through said holder means as a one-piece tube.

Fig. 1

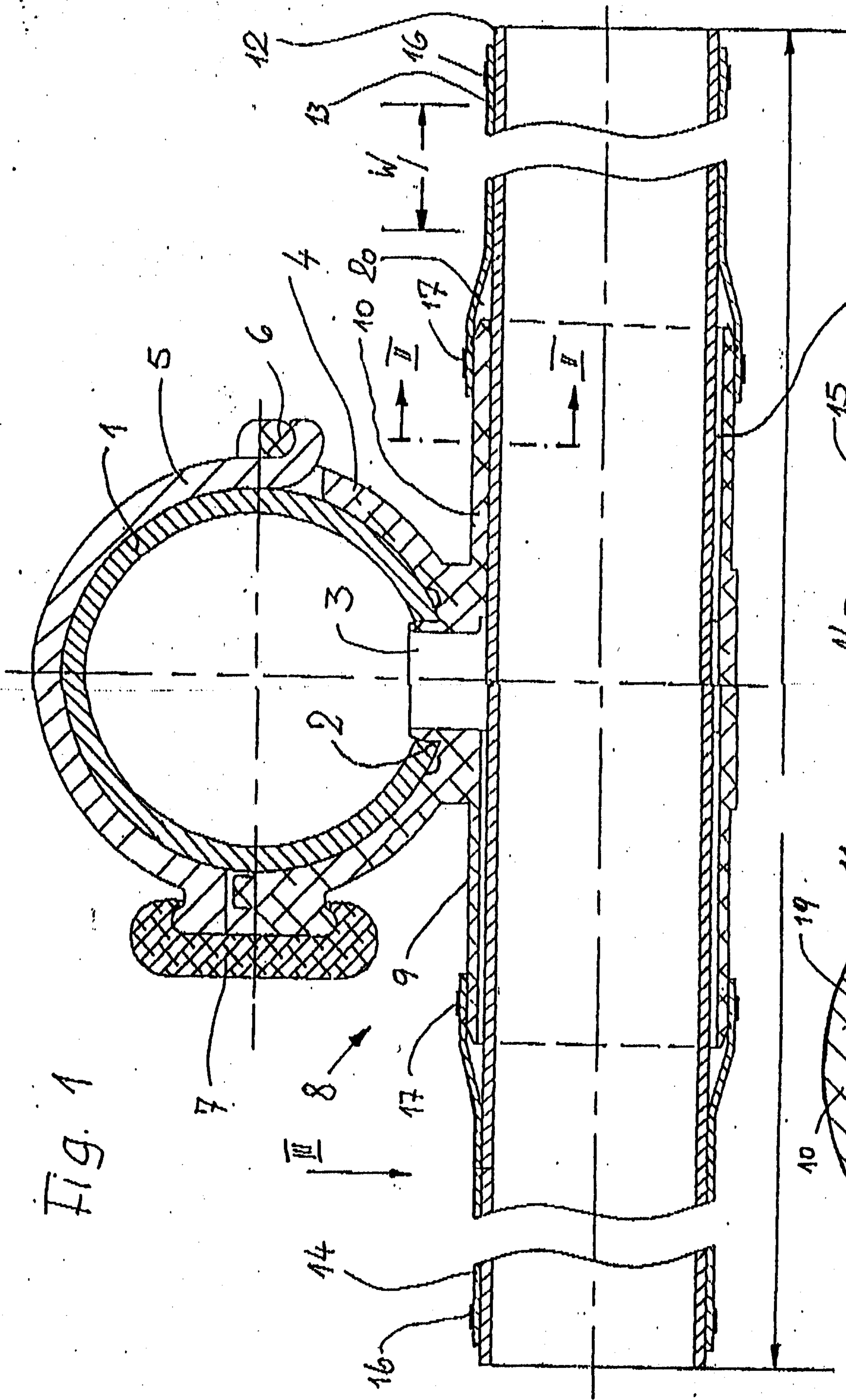


Fig. 2

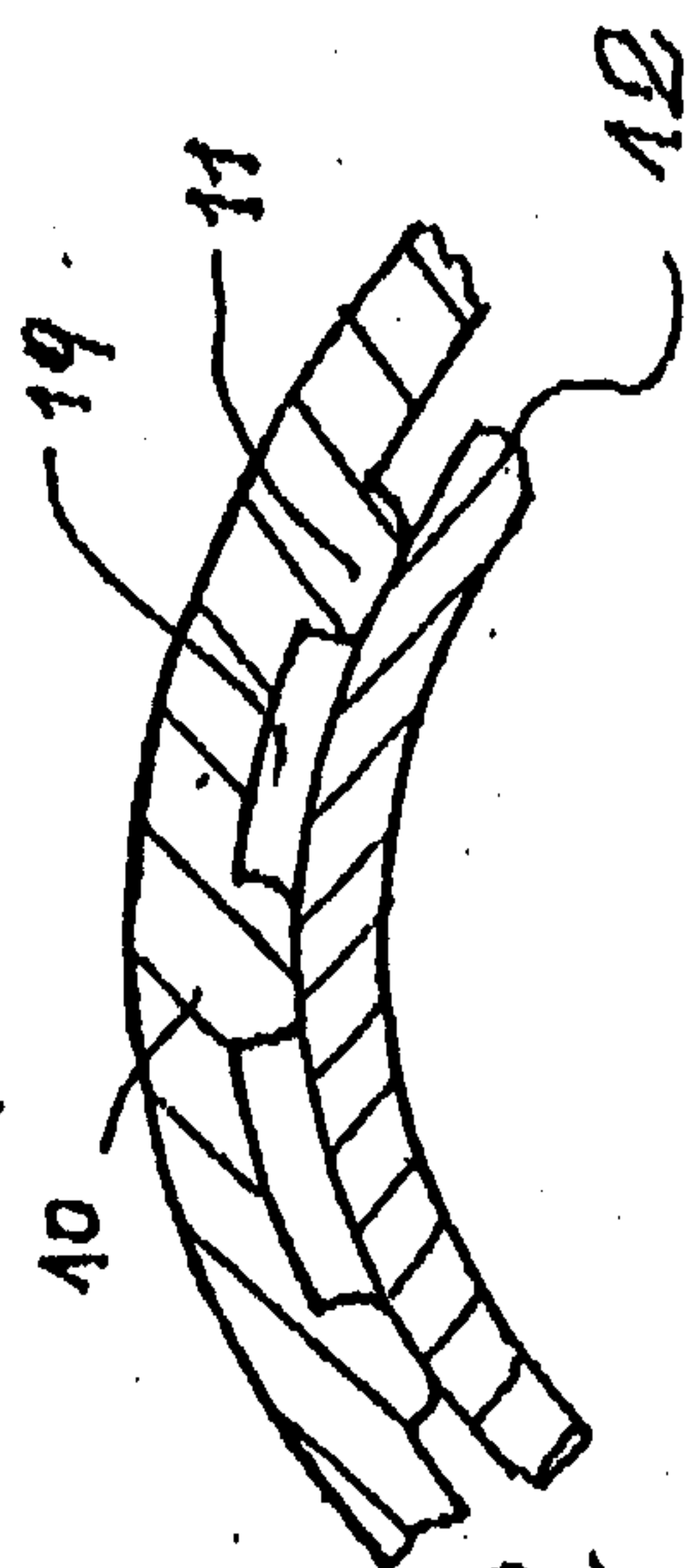


Fig. 3

