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M. FRANCOIS

2,879,803

FLEXIBLE PIPES

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Fig. 1

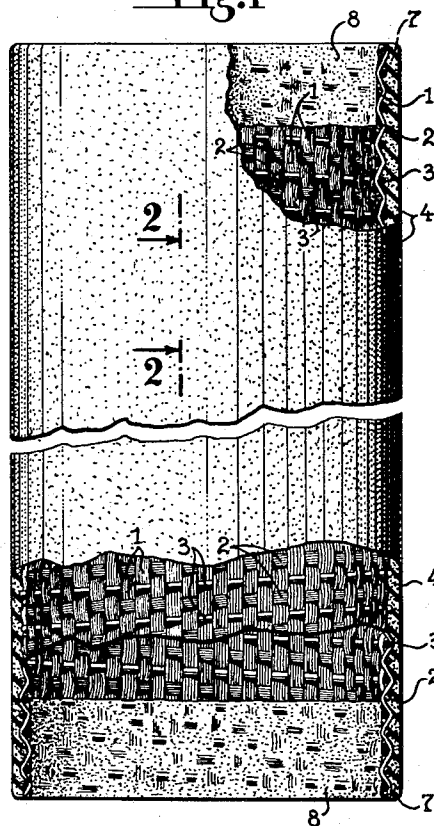
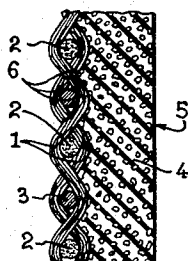


Fig. 2



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FLEXIBLE PIPES

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3 Claims. (Cl. 138—56)

The object of the present invention is to provide a flexible fluid-tight pipe which is insulated against heat and sounds. This pipe comprises a circularly woven textile structure, a metallic reinforcement incorporated in the form of a helical weft in said structure, and an outer coating of cellular foam having closed cells and comprising natural or synthetic rubber or one of the derivatives of the latter or synthetic resins, said coating having a smooth and continuous outer surface and adhering to said structure through the medium of burst open cells which are caught on said structure and not through a simple continuous surface layer of closed cells.

The bursting of the cells in contact with said structure occurs automatically when applying the coating, so long as the surface tension of the coating liquid used (such as an aqueous dispersion of latex, a solution of rubber in a solvent, or a plastisol) is such having regard to the textile structure used, that this liquid wets said textile. Experience has shown that the opening of the cells occurs whenever the coating liquid penetrates the fibre and enters between the latter, which is obtained as soon as the textile structure is wetted.

The coating may be applied in particular by dipping the textile structure, with its reinforcement already incorporated, in a coating bath or by spraying or slubbing.

The pipe embodying the invention has, relative to known pipes, the advantage of providing both an excellent fluid-tightness and substantially no transmission of noises; the fluid-tightness is due to the smooth and continuous outer surface of the coating resulting from the closed cells, and the non-transmission of noises to the very special type of connection obtained between the textile structure and the coating owing to the bursting of the closed cells which are in contact with the textile structure, which bursting is favoured by the wettability and the roughness of the textile structure.

As an example of one of the uses of such a pipe, there may be mentioned air-conditioning pipes for motor vehicles and living quarters. As concerns this use of the pipe, the latter has an additional advantage in that it has an improved thermal efficiency owing to its heat insulating qualities and the pipe may be used indifferently at very high or very low temperature (ranging from -40° C. to $+150^{\circ}$ C.).

Further features and advantages of the invention will be apparent from the ensuing description with reference to the accompanying drawing to which the invention is in no way limited.

In the drawing:

Fig. 1 is an elevational view, with parts cut away, of a pipe embodying the invention, and

Fig. 2 is a partial longitudinal sectional view taken along line 2—2 of Fig. 1, on an enlarged scale.

In the embodiment shown in Figs. 1 and 2, the pipe comprises a circularly woven textile structure, that is, a

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structure composed of longitudinal strands or warp threads 1 and helical strands or weft threads 2. The elements 1 and 2 may advantageously be of, for example, cotton, hemp, jute or even glass.

Incorporated in this textile structure in the course of the weaving and in the form of an additional helical weft, for example alternating with the weft 2, is a metallic reinforcement consisting of an iron, steel, brass, bronze, or aluminium wire 3 or a wire of other metal or alloy which is both strong and non-corrosive owing to its very nature, for example rustless, or owing to a suitable treatment of its surface, such as electro-plating, tinning or nickel-plating.

The unit (1, 2, 3) thus obtained and which, despite the reinforcement 3, remains flexible and deformable while retaining a substantially constant cross-section, is covered externally with a coating 4.

As mentioned hereinbefore, this coating is formed of a thick layer of cellular foam composed of natural or synthetic rubber, polyvinyl chloride or other synthetic resin.

After evaporation of the solvent or other liquid, this coating 4 (applied by one of the methods mentioned hereinbefore or in any other manner) is composed within its thickness of closed cells, which results in a fluid-tight coating and an outer surface 5 which is smooth and continuous. But the cells 6 (Fig. 2) in contact with the rough woven structure 1, 2 are open cells which strongly adhere thereto, owing to the fact that they mechanically cling to this rough material.

Preferably, the coating 4 is extended at 7 around the end faces of the pipe, at least when the latter is manufactured in sections of finished length, and also extended at 8 inwardly a short distance along the inner surface of the structure 1, 2.

For a pipe having an outside diameter of about 75 to 80 mm., the radial thickness of the coating 4 is advantageously about 3 mm.

Although a specific embodiment of the invention has been described, many modifications and changes may be made therein without departing from the scope of the invention as defined in the appended claims.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. A flexible fluid-tight pipe which is insulated against heat and sound, consisting of a tubular circularly rough woven textile structure composed of longitudinal warp threads and helical weft threads, a metallic reinforcement incorporated in the form of a helical weft in said structure, and an outer impervious coating of cellular foam having closed cells, said coating having a smooth and continuous outer surface and adhering to said structure through the medium of burst open cells mechanically clinging to said rough structure otherwise than through a simple continuous surface layer of closed cells.

2. A pipe as claimed in claim 1, wherein the cellular foam consists of a material selected from the group consisting of natural rubber and synthetic resins.

3. A pipe as claimed in claim 1, wherein the reinforcement forms a weft which alternates with the woven textile weft.

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