

- [54] **MOUNTING SUPPORT FOR CLIMBING ELEMENTS**
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- [58] Field of Search **85/82, 83, 73, 74;**
287/126, 20.3, 85 R, 20.92 B, 127 R

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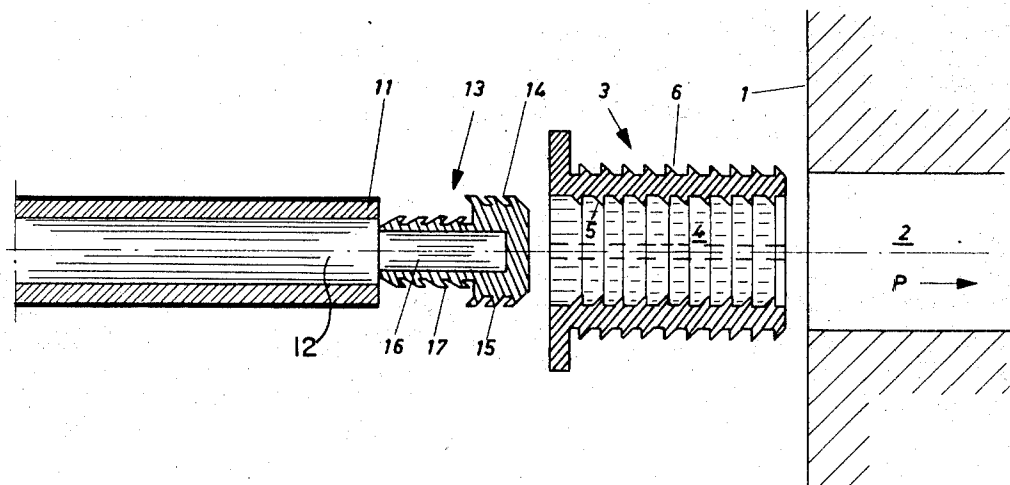
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[57] **ABSTRACT**

A mounting support for climbing elements for force fitting into a correspondingly shaped but smaller bore in a wall comprises a hard, strong, yielding plastic sleeve having cylindrical or square inner and outer longitudinal surfaces with serrations in the form of ring-shaped fins which are interrupted to form fish scale sectors with gaps between them. The serrations on the inner surface have oblique slopes running in the direction of insertion of the sleeve into the bore in the wall, while the serrations on the outer surface have oblique slopes running in the other direction. The shanks of the climbing elements are inserted into the sleeves.

5 Claims, 5 Drawing Figures



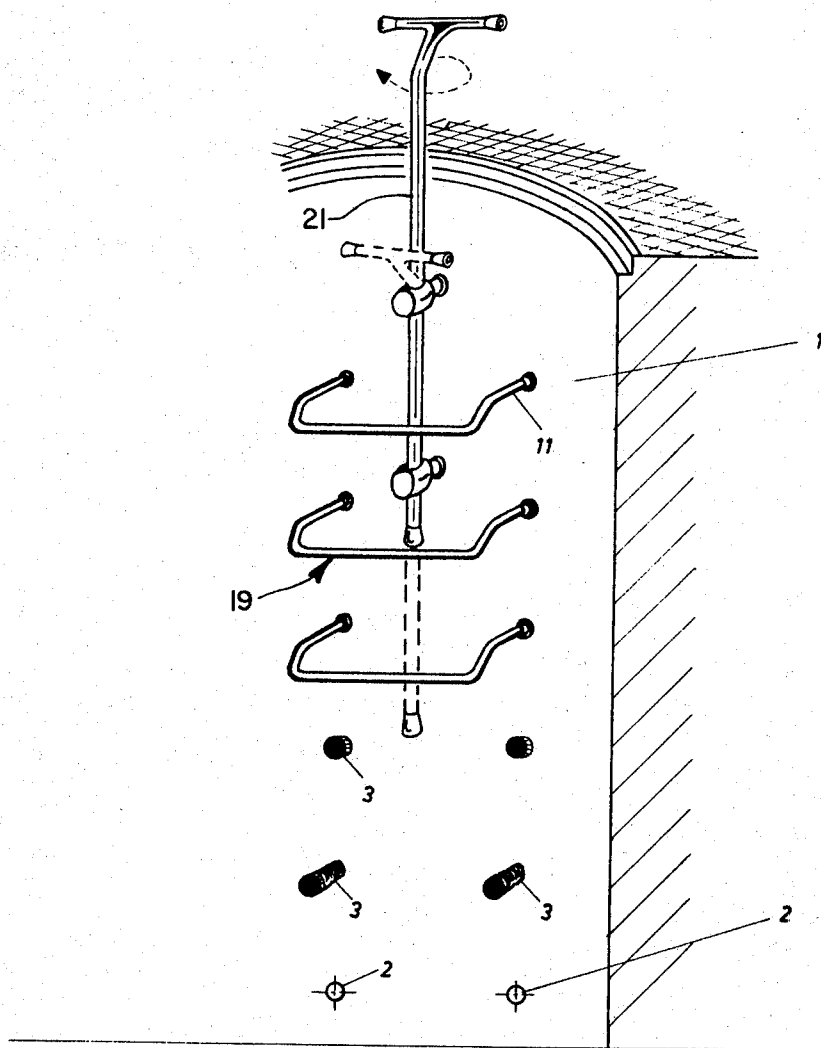
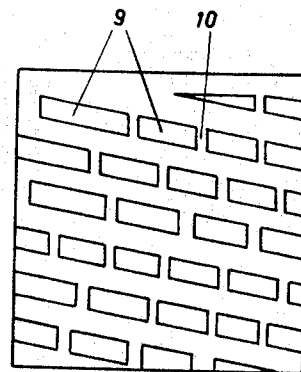
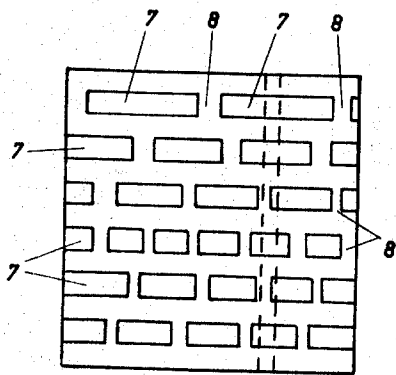
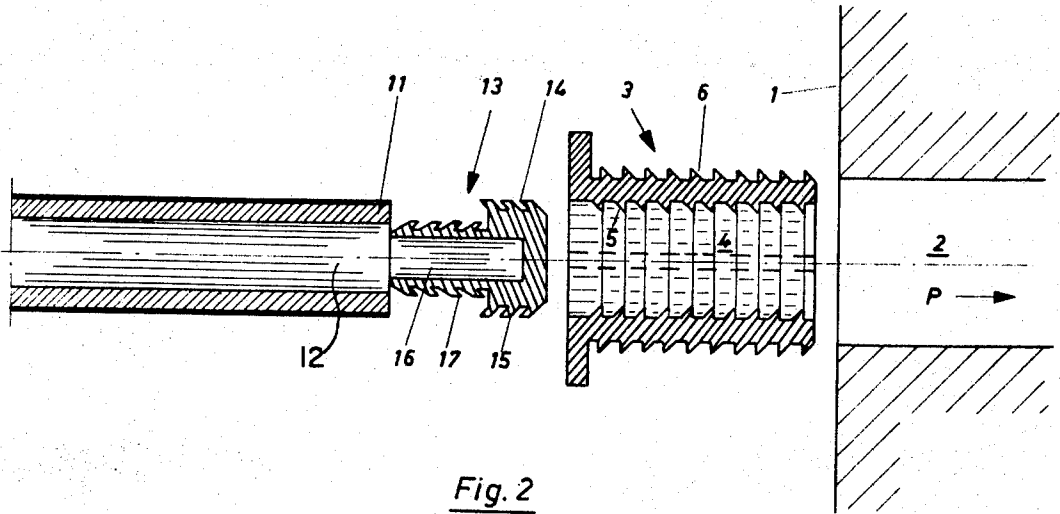


Fig. 1



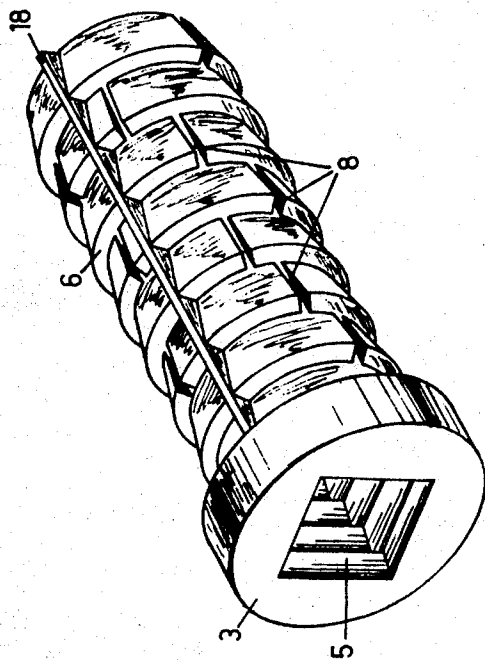


Fig. 5

MOUNTING SUPPORT FOR CLIMBING ELEMENTS

The present invention relates to a mounting support for climbing elements or the like, the free ends of which are tube-shaped and capable of being anchored in a wall by means of sleeves which are insertable into bores in the wall.

The term "climbing element" is intended to include U-shaped stirrups of steel, light metal or other suitable materials, ladders made of one piece or assembled from individual components, associated aids to climbing such as handholds, guard railings and the like.

Such climbing elements are appropriately clad in a plastic material or with aluminum, are used in sewer manholes, water reservoirs, sewage treatment plants which are subjected to various chemicals, moisture and vapors, and similar objects, and serve for moving about on such objects.

Traditionally, the fastening of the climbing elements has been accomplished by cementing them in or embedding them in concrete. This necessitates quite large cutouts in the wall which weaken it, so that cracks often result through which water can penetrate into the passages. The mounting and fastening of the climbing elements involves a great deal of wasted material and is expensive. Further, there is a serious danger of oxidation and rusting-through in cases where the ends of the climbing elements are cemented in, so that it is not uncommon for a climbing element to break unexpectedly. The replacement of climbing elements anchored in this manner is both time-consuming and costly.

The object of the present invention is to provide a mounting support for such a climbing element which overcomes the above-mentioned disadvantages. The climbing element can be fastened into the wall easily and quickly and the fastening is not subject to any danger of corrosion.

In accordance with the present invention, a mounting support is provided for climbing elements, the free ends of which are tube-shaped and capable of being anchored in a wall by means of sleeves which are insertable into internal bores in the wall. The invention is characterized by the fact that at least the exterior surface of each sleeve is provided with peripheral fins which are sub-divided into sector-shaped segments in fish-scale fashion, and which are so arranged that they slope counter to the insertion direction of the sleeve, the gaps between adjacent fins being staggered with respect to each other peripherally, so that these gaps form a labyrinth seal. It is also advantageous to provide the interior surface of each sleeve with peripheral fins which are sub-divided into sector-shaped segments in fish-scale fashion and which are arranged to slope in the insertion direction of the sleeve.

The preferred embodiments of the invention will be better understood from the following description and accompanying drawings, in which:

FIG. 1 is a general illustration of a passage with climbing elements;

FIG. 2 shows a mounting support in axial section;

FIG. 3 shows a developed projection of the exterior surface of a sleeve;

FIG. 4 is an alternative embodiment of FIG. 3; and

FIG. 5 is a perspective view of a sleeve.

FIG. 1 illustrates a partly installed set of climbing equipment for a sewer manhole. The equipment con-

sists of a number of pieces of pipe bent in U-shape and provided with a covering, the pieces being fastened vertically one above the other in the wall 1 of the sewer manhole. For this purpose, bores 2 are drilled into the manhole wall, the diameter of the bores being somewhat smaller than the largest diameter of the sleeves 3 to be inserted into the bores, thereby providing a force fit. Such a sleeve 3 is shown in axial section in FIG. 2.

The sleeve consists of a hard, strong, yielding plastic material and its inner wall is in the form of a cylindrical or square interior bore 4, the inner surfaces of the bore being provided with serrations 5 in the form of ring-shaped fins which are interrupted peripherally so that sector-shaped segments are formed in fish-scale fashion with gaps between them. The plastic materials useful for manufacturing the sleeve elements are well-known and such materials as Delrin, polyethylene terephthalate, polycarbonate resin and nylon may be used.

The exterior surface of the sleeve 3 is similarly provided with ring-shaped fins 6 which are also interrupted to form sector-shaped, fish-scale segments 7 having intermediate gaps 8 (see FIG. 5). These segments 7 of the ring-fins 6 are of unequal size and have surfaces of varying dimensions and areas. The oblique slopes of these segments 7 run counter to the insertion direction P of the sleeve 3. In contrast, the surfaces of the interior fins 5 are sloped in the insertion direction P. The gaps 8 between the individual scale-shaped segments 7 lie clamped against the bore wall to lock the sleeve in the bore 2 so that the sleeve is prevented from being pulled out of the bore 2. Even if the bore wall is of a non-uniform nature or is out-of-round, the scale-shaped segments 7 adjust themselves to the adjoining wall surface of the bore because of the yielding character of the plastic material and because of the spacing between the scale-shaped segments.

According to the alternative embodiment shown in FIG. 4, the exterior fins are arranged in helical fashion and are again sub-divided into individual scale-shaped segments 9. As in the embodiment of FIG. 3, the gaps 10 of adjacent helical "threads" do not lie directly one behind the other but are staggered peripherally so that a labyrinth seal is formed. The slope of the surfaces of the helically-arranged fins is counter to the insertion direction P of the sleeve.

The shape and arrangement of the interior fins 5 are exactly the same as those of the exterior fins with the exception of the slope of the fin surface, which is in the same direction as the insertion direction P.

After the sleeves 3 have been forcibly inserted into the bores 2, each of the shanks 11 of a climbing element 19 is anchored in one of the sleeves 3. Preferably, the open end 12 of the tube-shaped shank end is closed off by means of a closure piece 13 which is made of plastic material such as nylon or the like. The closure piece consists of a plug 14 having an outer diameter corresponding to the interior bore 4 of the sleeve 3 and having on its outer surface interrupted ring-fins 15 which are sloped in the opposite direction as the interior fins 5 of the sleeve 3. Furthermore, the closure piece is provided with a tube extension 16 of smaller diameter and projecting axially, the outer diameter of which corresponds to the inner diameter of the climbing element 19. This tube also has interrupted ring- or helically-arranged fins 17, which are directed counter to the fins 15, so that the tube can easily be inserted into

the bore of the climbing element 19 but cannot be withdrawn from it.

After the ends 12 of the climbing element 19 have been closed off with closure pieces 13, the shanks 11 of the climbing element together with closure pieces 13 are inserted, one each, onto the sleeves 3, which were previously anchored in the wall 1 of the manhole wall. The ring-fins 15 interlock with the fins 5 of the sleeve 3, which also press against the inserted shank end 11 of the climbing element 19, so that the climbing element 19 is held immovably fast. The longitudinal fins 18 prevent any turning of the sleeve in the bore.

As mentioned above, FIG. 1 shows a partially installed set of climbing equipment with three fully-anchored climbing elements 19 for ascending and descending the illustrated sewer manhole. In exactly the same manner, climbing aids of different shapes can be fastened to the wall, such as the rod-shaped climbing aid 21 equipped with sockets, also shown in FIG. 1. The rod-shaped climbing aid 21 is supported adjustably in the sockets and can be shifted from the illustrated working position into the rest position, shown in dotted lines, by pushing it in the axial direction.

If, for any reason, a climbing element must be removed from its anchorage, this can be done by using a hydraulic jack set in between the cross-support portion of the climbing element 19, which is parallel to the wall, and the wall.

What is claimed is:

1. In combination, a mounting support for insertion into a bore in a wall and a climbing element, said climbing element having a hollow shank portion which is inserted into said mounting support, said mounting support comprising a hard, strong, yielding plastic sleeve

having a cylindrical cross-section, said sleeve having uninterrupted inner and outer peripheral surfaces with serrations thereon in the form of annular fins which are interrupted to form fish-scale sectors with gaps between them, said gaps being arranged in staggered relation to each other peripherally, said serrations on the inner surface having oblique slopes running in the direction of insertion of the sleeve into the bore in the wall and the serrations on the outer surface having oblique slopes running in the opposite direction whereby, when the shank of the climbing element is inserted into the sleeve and the sleeve is force fitted into the bore in the wall, said serrations resist pulling away of the climbing element from the wall and said staggered gaps between adjacent fish-scale sectors form a labyrinth seal.

2. A mounting support as claimed in claim 1, wherein said serrations are helically disposed.

3. A mounting support as claimed in claim 1, wherein a plastic closure plug is provided to close the end of said hollow shank portion.

4. A mounting support as claimed in claim 3, wherein said plastic closure plug is cylindrical and has an outer surface corresponding to the inner bore of said sleeve which is also cylindrical and wherein said closure plug includes a tube extension smaller in diameter than said plug which smaller diameter corresponds to the inner diameter of said hollow shank.

5. A mounting support as claimed in claim 4, wherein said outer surface of said closure plug is formed with interrupted ring-shaped fins which slope in the opposite direction as the interior fins on the inner surface of said sleeve.

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