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[54] DEVICE FOR REINFORCING HYDRAULIC STRUCTURES

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[58] **Field of Search**.....138/109, 177, 178, 123; 61/3, 61/4, 37, 38

[56] **References Cited**

UNITED STATES PATENTS

1,275,859	8/1918	Cunningham	61/38
1,421,857	7/1922	Store	61/38 X
3,425,228	2/1969	Lamberton	61/38
2,041,950	5/1936	Pierce	138/109 X
2,577,427	12/1951	McDermott	138/154 X
3,098,664	7/1963	Waugh	138/109 X
3,114,568	12/1963	Buono	138/109 X
3,459,229	8/1969	Craft	138/109 X
2,133,091	11/1938	Gettig	138/109 X

FOREIGN PATENTS OR APPLICATIONS

570,879	9/1958	Belgium	61/38
168,469	3/1906	Germany	138/109

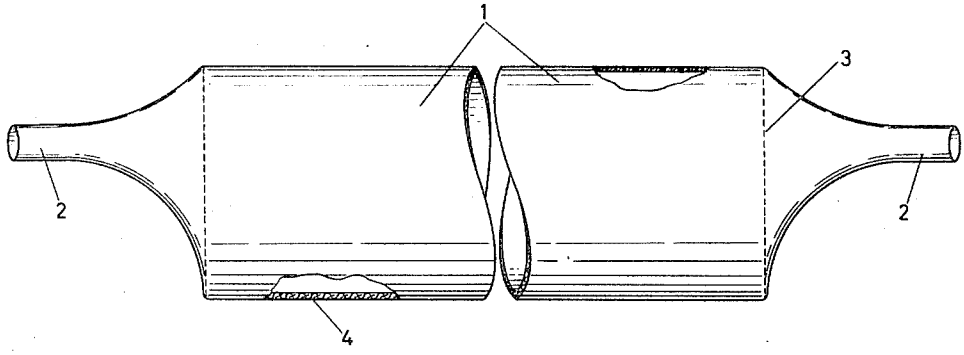
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[57] **ABSTRACT**

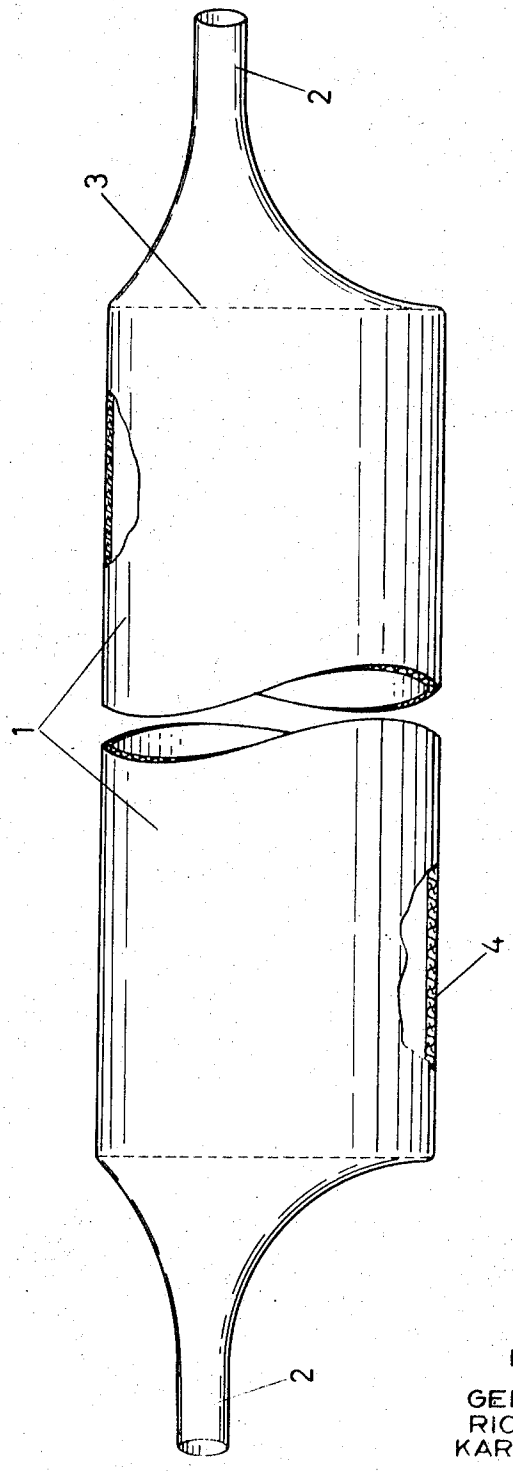
Device for reinforcing hydraulic structures, especially dams, groins, rinsing fields, and for transporting materials which can be transported by means of pumps or similar devices. The device consists of a hose of plastic material provided at both ends with sockets for the inlet and outlet of a sand-in-water mixture and having a length which corresponds to a multiple of its diameter.

7 Claims, 1 Drawing Figure



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DEVICE FOR REINFORCING HYDRAULIC STRUCTURES

It is known that for reinforcing hydraulic structures, for example dams (embankments) and groins, brushwood or twigs are used, which are held by piles driven into the soil at narrow distances from one another. For this purpose, the brushwood must be interlaced with the piles. Such a brushwood netting, for example at a dam at the North Sea, stands for about 2 years. Apart from the extensive work required for interlacing the brushwood, it is also particularly disadvantageous because the brushwood is relatively voluminous and is harvested at places which in general are remote from the dam location. Thus the cost for harvesting and transporting the brushwood is correspondingly high.

We have found now a device which is very suitable for reinforcing hydraulic structures, especially dams, groins, flooded flatland fields at seashores, etc., and for transporting materials, transportable by means of pumps or similar devices, this device consists of a plastic hose that is provided at both ends with sockets for the inlet and the outlet of a sand-in-water mixture and whose length corresponds to a multiple of its diameter.

Such a hose can be placed instead of the brushwood between the piles and filled with sand by flushing it in such a manner that the sand-in-water mixture is introduced at one socket. The sand settles within the hose so that mainly clear water is discharged at the other socket.

The sand-in-water mixture can be produced in the usual manner by means of a circulatory suction pump. In general, it is recommended to use a mixture of about one part of sand per 10 parts of water; this ratio, however, may vary within wide limits, since a ratio of one part of sand to seven parts of water may also be suitable.

In order to benefit of the full advantages of the device of the invention, it is recommended to use a hose having a diameter of at least 0.3 m., preferably 0.6 m. to 1.5 m. The length of the hose is at least 10 m., preferably 60–200 m., especially the length may be adapted to the requirements of each individual case.

In reference to the FIGURE herein, the same depicts a device according to this invention.

This device is a plastic hose 1, of the type herein described, provided at each end with a socket 2, each socket suitable either as an inlet or an outlet for a sand-in-water mixture. The sockets 2 have the form of hoses and are sewed, welded or flanged with the body of the hose thus defining a seam 3. Multiple hose sections may be joined together in the same manner as the socket is joined to the hose body. Devices having a face part 4 thicker than the rest of the hose body can also be produced.

A particularly advantageous embodiment of the device of the invention is a hose which is woven in one piece from bands or ribbon of plastic. Especially suitable for this purpose are polyolefins and polyvinyl chloride.

In this respect, it is advantageous to weave the face parts of the hose from one piece.

Several advantages result from weaving the hose is one piece from plastic bands. Thus, a stable hose with regard to the hose body as well as with regard to the face parts of the hose is obtained with a relatively small amount of material. On the other hand, the texture itself is sufficiently water permeable while retaining at the same time the sand flushed into the hose. In this manner the woven hose has the function of a sieve. The sand settles along the hose, while water passes through the fine apertures of the texture.

Of course, hose length and hose diameter are to a certain degree interdependent. A certain influence is also exerted by the diameter of the socket piece as a measure for the amount

of sand-in-water-mixture introduced by the suction pump at end of the hose. Very acceptable results were found with a hose length of 100 m. and a hose diameter of 1 mm., the socket pieces having a diameter of about 165 m.

Another hose constructed according to the invention has a diameter of 1.20 m. and a length of 125 m. This hose is to be flushed by a suction pump having a capacity of 3,000 $m.^3/h$, the sockets provided having a diameter of 500 mm. each. In this case too, the sand-in-water mixture will settle within the length of the hose. A hose having a length of 125 m. may still be woven in one piece. If greater lengths are required, it is recommended to make the hose from at least two parts which are then sewed and/or welded with one another or connected by sockets. The socket pieces are also fastened, in corresponding manner, either by sewing and/or welding or by means of flanges. The face parts are of course to be made stronger than the hose body. In the case the faces should be woven in one piece with the hose body, the woven structure of the face parts is also made stronger than that of the hose body.

The tube coming from the suction pump and feeding the sand-in-water mixture is inserted by about 1 to about 2 meters into the socket of one face side, while the woven socket—in actuality it represents a coupling sleeve—is fastened to the steel tube by means of clamps.

The socket provided at the other face of the hose serves mainly for the discharge of the water and is normally without a tube or a similar device.

However, it is advisable to provide both faces advantageously with the same sockets, in order to be able to flush the hose from both ends. It is suitable to arrange the inlet socket as well as the outlet socket excentrically, i.e., at the upper half of the hose in order to enable the sand to settle easier within the hose. A further advantage of the device of the invention is that the piles for maintaining the hose of the invention filled with sand may have a considerably large distance from one another than those used for binding brushwood.

We claim:

1. A device for reinforcing hydraulic structures such as dams, groins, flooded flatland fields, etc., which consists of a hose with inlet and outlet sockets at its ends, the length of which corresponds to a multiple of its diameter, said sockets being of smaller diameter than said hose and radially spaced from the axis of said hose, said hose being woven from plastic bands and being water permeable at the intersection of said woven plastic bands but capable of retaining sand flushed to the same as a sand-in-water mixture.

2. A device according to claim 1, wherein face parts of the hose are woven in one piece with the hose body.

3. A device according to claim 1, wherein the sockets are sewed, welded, or flanged with the body of the hose.

4. A device according to claim 1, wherein the hose has a diameter of at least 0.3 meter.

5. A device according to claim 1, wherein the hose has a length of at least 10 meters.

6. A device according to claim 1, wherein the woven structure of the face part of the hose is stronger than that of the hose body.

7. A device for reinforcing hydraulic structures, such as dams, groins, flooded flatland fields, etc., which consists of a hose body having inlet and outlet sockets attached to said hose body, said sockets being of smaller diameter than said hose and radially spaced from the axis of said hose, said hose body containing as an integral part of same a face portion, a plurality of interwoven plastic bands forming said hose body and a plurality of apertures at intersections of said interwoven plastic bands, whereby sand from a sand-in-water mixture introduced into the hose body is retained and said sand-filled hose body reinforces said hydraulic structure.

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