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(54) **Sound-absorbing elements**

(57) The invention relates to a method for manufacturing a sound-absorbing element by stacking on top of each other a plurality of discarded vehicle tyres (2) and at least partially filling the space (12) formed by the thus stacked tyres with a filler (15). A curing material, for instance a foam, is herein chosen as filler, whereby the tyres are mutually connected.

The part of the space not filled with foam can further be filled with a weighting material (16), for instance waste material reduced in size. A robust sound-absorbing element is thus formed in rapid and simple manner and at low cost.

The invention further relates to a thus formed sound-absorbing element.

Finally, the invention further relates to a method for manufacturing a noise barrier by placing a plurality of such sound-absorbing elements mutually adjacently on a ground, in addition to a thus formed noise barrier.

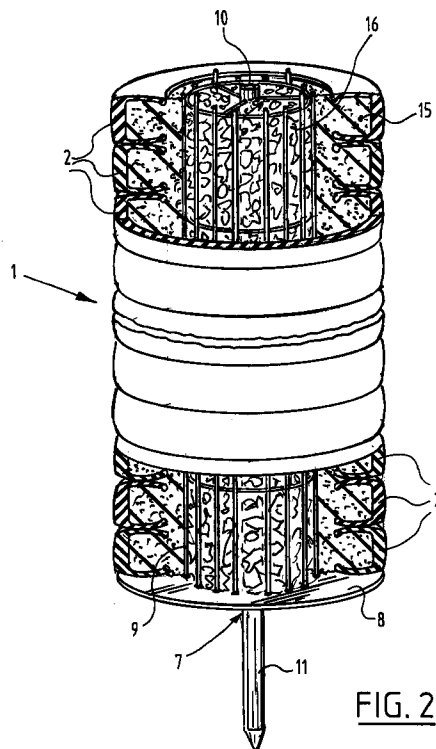


FIG. 2

EP 0 841 435 A1

Description

The invention relates to a method for manufacturing a sound-absorbing element by stacking on top of each other a plurality of substantially annular members and at least partially filling the space formed by the thus stacked annular members with a filler. Such a method is known from the American patent specification 4,785,577.

In this known method annular members, in particular discarded vehicle tyres, are partially cut through, folded open and stacked on top of each other in this state along a reinforcing frame. The tyres which have been cut and folded open and which are therefore substantially W-shaped in top view are then stacked onto each other layer by layer and fixed to the reinforcing frame, and the space formed by the tyres and the reinforcing frame is filled with earth in which shrubbery can be arranged. This method is relatively time-consuming since the tyres must first be cut through and folded open one at a time and subsequently connected to the frame before they can be filled. The thus formed sound-absorbing elements are moreover not very easy to handle.

Further known from the German utility model 7734600 is a sound-absorbing element which is constructed from horizontal rows of annular members, likewise in the form of used vehicle tyres, which are suspended mutually adjacently from horizontal suspension rods which in turn are supported locally by vertical uprights. The tyres are mutually connected herein by connecting strips and enclosed by a jacket. This method is also time-consuming because the tyres must be placed one by one over the horizontal suspension rods which must then be supported such that each tyre can pass the support. In addition, the thus formed sound-absorbing element is also not very easy to handle.

The invention therefore has for its object to provide an improved method of the above described type. This is achieved according to the invention by a method which has the feature that a curing material is chosen as filler, whereby the annular members are mutually connected. By making use of a curing material as filler whereby the annular members are connected, a sturdy and easily handled sound-absorbing element is obtained in simple manner in one operation. Use can herein be made of a foam as filler. In addition, the unfilled spaces inside the stack of annular members, generally a stack of tyres, can be filled with a weighting material, for which purpose can be used a waste material reduced in size. An easily handled and robust sound-absorbing element is thus obtained in simple manner and with very low material costs, while the waste problem is moreover alleviated through the use of a large number of waste materials.

Preferably applied variants of the method according to the invention are described in the sub-claims.

The invention also relates to a method for manufac-

turing a noise barrier wherein a plurality of sound-absorbing elements manufactured by applying the above described method are placed mutually adjacently on a ground.

5 Variants of this method which can advantageously be applied are likewise described in the sub-claims.

The invention is now elucidated on the basis of an embodiment, wherein reference is made to the annexed drawing, in which:

10 fig. 1 shows a partially sectional perspective view of a stack of annular members during a first stage of the method according to the invention,

15 fig. 2 shows a partially sectional perspective view of a practically finished sound-absorbing element obtained by applying the method according to the invention,

20 fig. 3 is a view corresponding with fig. 2 of a finished sound-absorbing element, and

fig. 4 is a partially sectional perspective view of a noise barrier constructed from sound-absorbing elements manufactured by applying the method according to the invention.

25 A sound-absorbing element 1 is manufactured by stacking on top of each other a plurality of annular members 2, in the shown embodiment discarded vehicle tyres (fig. 1). Use is preferably made therein of tyres having substantially the same diameter. In order to form a substantially cylindrical stack the tyres 2 are stacked between three adjusting members 3 which are displaceable in radial direction by means of displacing jacks 4. Adjusting members 3 each have on their top a clamping element 5 which is displaceable in height direction by means of a jack 6. Tyres 2 are further stacked round an upright reinforcing element 7 formed by a base plate 8, a basket 9 arranged thereon and a central pin 10 which has an end part 11 which protrudes beyond base plate 8.

40 Bounded by the tyres 2 stacked onto each other is a space 12 which is divided by the basket 9 of reinforcing element 7 into a space 13 located outside the basket and a space 14 bounded by the basket 9. In order to mutually connect the tyres 2 stacked on top of each other a curable filler 15 is arranged in space 13, which, after curing, forms a strong connection between tyres 2 (fig. 2). Such a filler 15 could for instance be a foam such as PUR foam.

50 The space 14 inside basket 9 can herein be filled with a weighting material 16, for which purpose a waste material reduced in size can for instance be used. Very suitable for this purpose are for instance the ground remnants of used carpets, but it is also conceivable for this purpose to grind for instance used vehicle tyres of little used sizes which cannot be processed into the stacks. Mixtures of such waste materials can of course also be used. Because the weighting material 16 is poured into basket 9 and is thus bounded, the desired

degree of weighting can be obtained by compressing this material in the basket 9.

The basket 9 having therein weighting material 16 is further enclosed by the curing foam 15 and thus firmly connected to the outer cylinder formed by tyres 2. The basket 9 will in any case generally first be filled with weighting material 16 before filler 15 is introduced into the remaining space 13. As stated, filler 15 can be a foam, but other substances, for instance liquid glues and the like, can also be envisaged. It is also conceivable for the weighting material to be simply mixed with the filler, or even for the whole inner space 12 defined by the tyres 2 to be filled with a curing filler.

Once the spaces 13 and 14 inside the stack of tyres 2 have been filled and filler 15 has cured, the stack is closed at the top by a cover element 17 (fig. 3) in which a plurality of apertures 18 are arranged through which pass threaded ends 19 of a plurality of bars of basket 9. Nuts 20 are tightened onto these threaded ends 19 whereby cover element 17 is fixed to the tyre stack. In addition, cover element 17 has in the middle an opening through which a lifting eye 21 functioning as connecting member can be fixed to the central pin 10 of reinforcing element 7. Using this lifting eye 21 the sound-absorbing element 1 is simple to handle. After the sound-absorbing element 1 is finished by arranging cover plate 17, it is provided with a coating layer to allow the sound-absorbing element 1 to better withstand all manner of environmental influences, in particular ultra-violet radiation. The coating layer can further be chosen such that sound-absorbing element 1 is embellished thereby.

The sound-absorbing element 1 manufactured in the above described manner can be used as component of a noise barrier 25 (fig. 4). For this purpose a number of receiving spaces 23 are formed in a ground 22, for instance by pressing or striking foundation tubes into the ground, in which tubes can be received the protruding part 11 of reinforcing element 7 of each of the sound-absorbing elements 1. In this way the sound-absorbing elements 1 can be placed adjacently of each other in simple manner, whereafter they are further connected to each other for reinforcement by for instance a connecting cable 24 trained through the lifting eyes 21. The sound-absorbing elements 1 can otherwise be placed in any desired pattern on the ground 22, wherein all that is important is that an uninterrupted row is formed. A very dense construction is achieved in simple manner with the staggered arrangement as shown in the figure. The cavities between the cylindrical sound-absorbing elements 1 can further be filled with shrubbery by way of embellishment. The noise barrier 25 can of course also be wholly concealed from view by placing shrubbery in front of it or for instance by covering it completely with earth.

The advantage of the method according to the invention and the thereby formed sound-absorbing elements 1 lies in the fact that a sturdy, robust and well manageable sound-absorbing element is obtained in

relatively simple manner which can moreover be easily combined with other sound-absorbing elements for rapid forming of a noise barrier. In addition, the manufacturing cost is relatively low because manufacture is simple and manufacture furthermore starts from basic materials easily obtainable at practically no cost such as discarded vehicle tyres and all kinds of reduced waste material. Finally, a contribution is also made in this way toward solving the waste problem, since a large quantity of waste material which cannot be processed in other ways is thus used effectively.

Claims

1. Method for manufacturing a sound-absorbing element (1) by stacking on top of each other a plurality of substantially annular members (2) and at least partially filling the space (12) formed by the thus stacked annular members (2) with a filler (15), **characterized in that** a curing material is chosen as filler (15), whereby the annular members (2) are mutually connected.
2. Method as claimed in claim 1, **characterized in that** at least a part (13) of the space (12) is filled by filling thereof with foam.
3. Method as claimed in claim 2, **characterized in that** the part (14) of the space (12) not filled with foam is filled with a weighting material (16).
4. Method as claimed in claim 3, **characterized in that** waste material reduced in size is used as weighting material (16).
5. Method as claimed in any of the foregoing claims, **characterized in that** the annular members (2) are stacked round a standing reinforcing element (7) and the reinforcing element (7) is joined to the annular members (2) by the filler (15).
6. Method as claimed in claims 4 and 5, **characterized in that** the reinforcing element (7) is hollow and the weighting material (16) is arranged therein.
7. Method as claimed in claim 5 or 6, **characterized in that** the reinforcing element (7) protrudes at the bottom outside the stack of annular members (2).
8. Method as claimed in any of the foregoing claims, **characterized in that** connecting means (21) are arranged at the top of the stack of annular members (2).
9. Sound-absorbing element (1) manufactured with use of the method as claimed in any of the claims 1-8.

10. Method for manufacturing a noise barrier (25) by placing mutually adjacently on a ground (22) a plurality of sound-absorbing elements (1) which are manufactured with use of the method as claimed in any of the claims 1-8. 5
11. Method as claimed in claim 10, **characterized in that** receiving spaces (23) are formed in the ground (22) and the sound-absorbing elements (1) are placed with their protruding reinforcing elements (7) 10 in the receiving spaces (23).
12. Method as claimed in claim 10 or 11, **characterized in that** the mutually adjacent sound-absorbing elements (1) are connected to each other by means 15 of their connecting means (21).
13. Method as claimed in any of the claims 10-12, **characterized in that** the sound-absorbing elements (1) are placed in staggered manner relative 20 to each other.
14. Method as claimed in claim 13, **characterized in that** shrubbery is arranged in the cavities formed by the staggered placing of the sound-absorbing elements (1). 25
15. Noise barrier (25) manufactured with use of the method as claimed in any of the claims 10-14. 30

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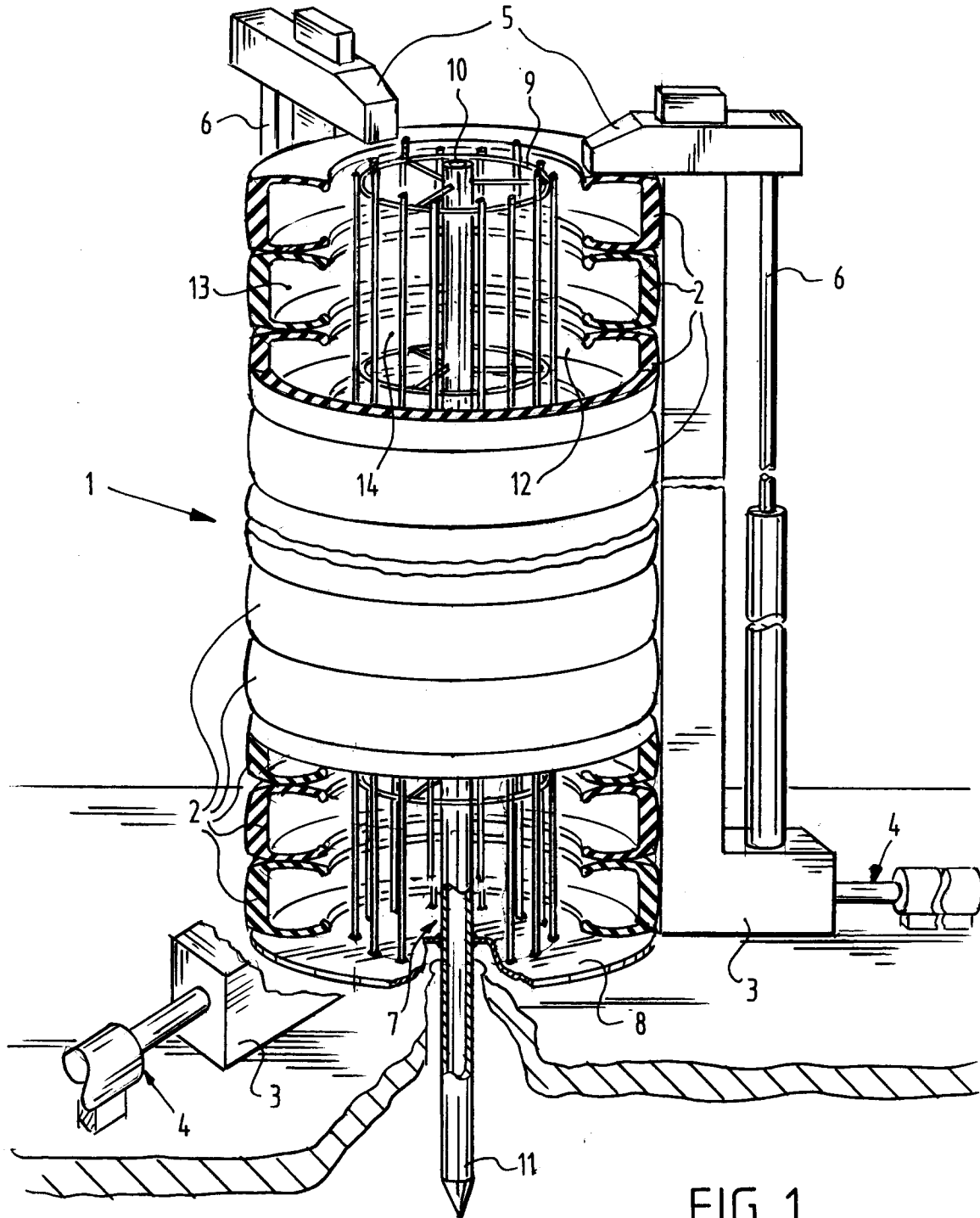


FIG. 1

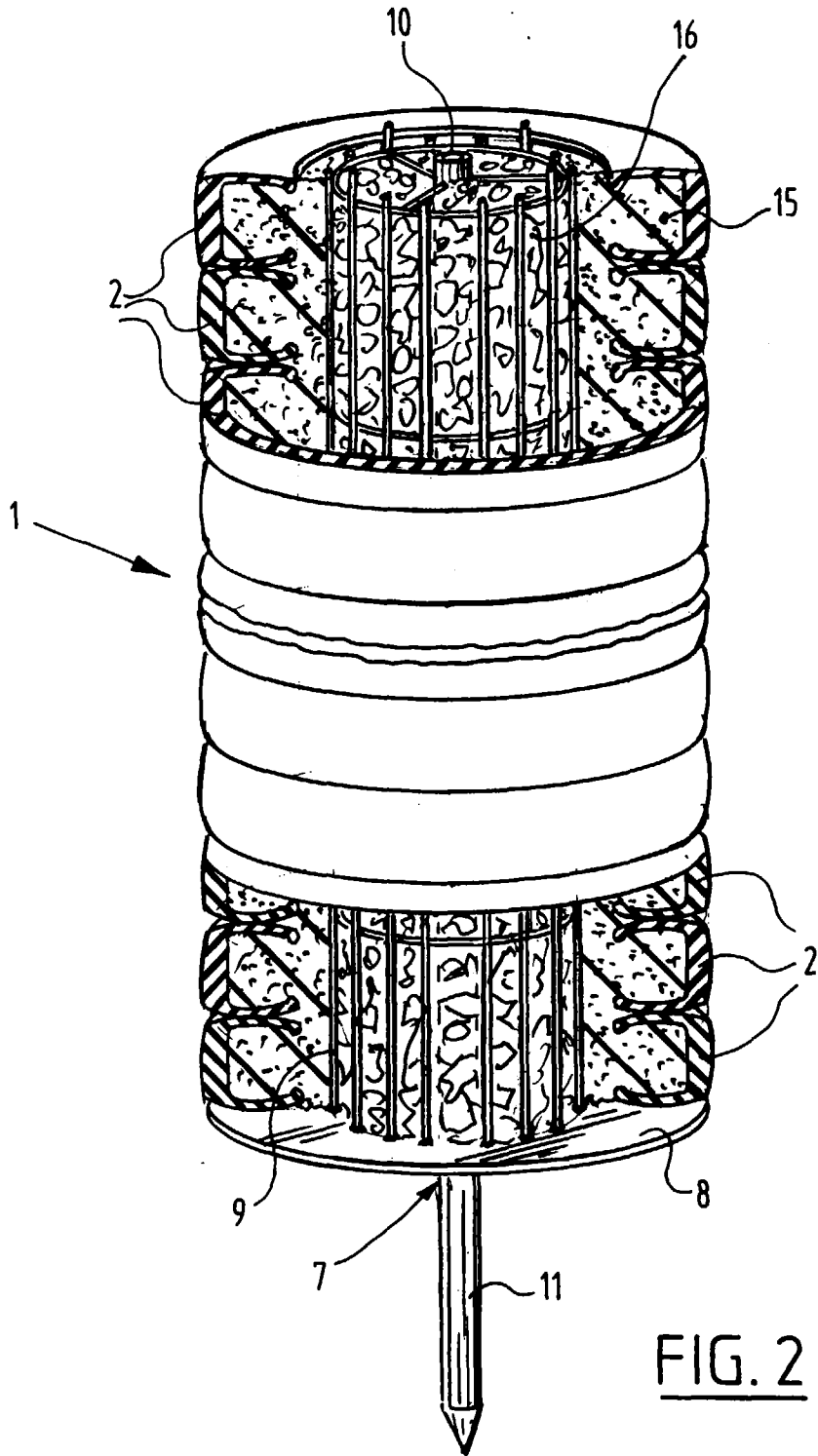


FIG. 2

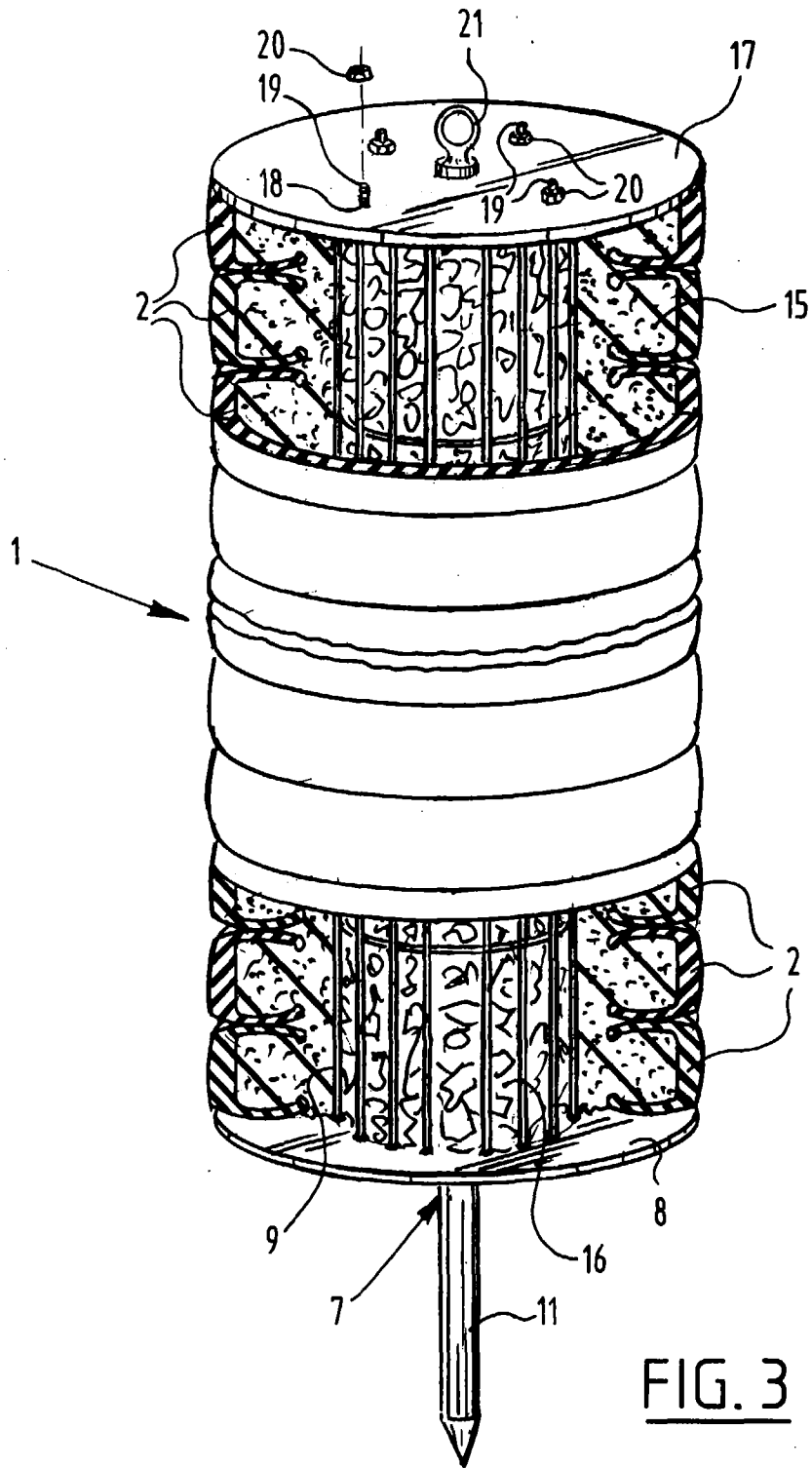


FIG. 3

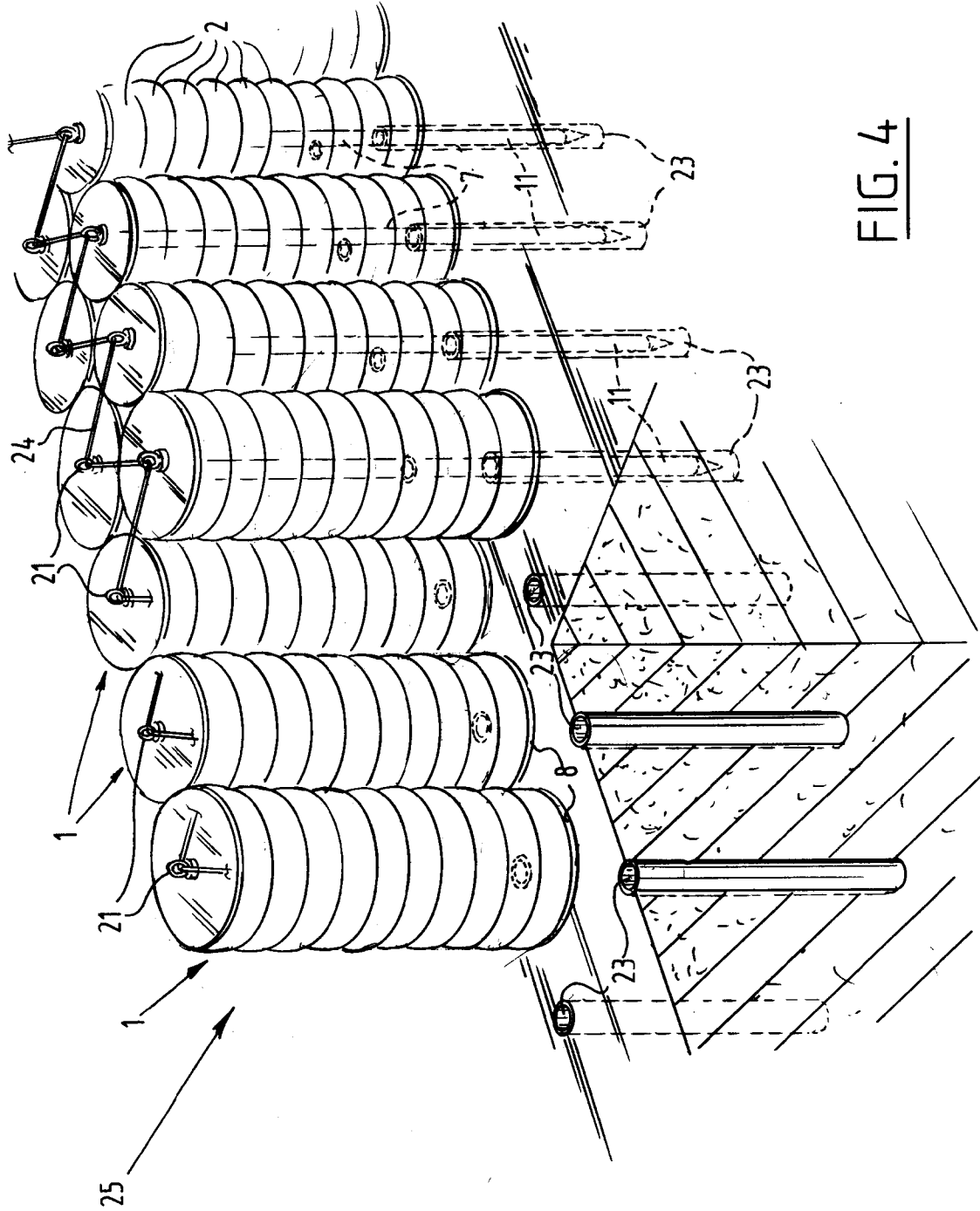


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 3402

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.6)
X A	DE 195 03 804 C (F. HUBERT) 21 March 1996 * the whole document * ---	1,2 9,10,12, 13,15	E01F8/02 E01F15/14
X A	EP 0 694 653 A (STEINWERKE LUDWIG WEBER GMBH.) 31 January 1996 * column 1, line 33 - line 46 * * column 2, line 51 - column 3, line 4 * * column 3, line 32 - line 34; figures * ---	1,3,5-7, 9-15 2	
A	GB 991 522 A (F.N. PLATT) 12 May 1965 * page 2, line 61 - page 3, line 25; figures * ---	1,3,5-7	
A	US 5 238 228 A (D.G. MOON) 24 August 1993 -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E01F
Place of search THE HAGUE		Date of completion of the search 4 February 1998	Examiner Verveer, D
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