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(54) **Apparatus for dry treatment of a fabric.**

(57) In the apparatus a fabric (4) disposed open width is caused to move between an infeed supply (6) and an outfeed supply (22) through a duct (38) in which currents of air flow at an appropriate temperature causing the said alternate movement. The infeed supply (6) is produced by a slow infeed of the fabric and the outfeed supply (22) by a slow withdrawal thereof. The apparatus comprises chambers (2, 20) for the said supplies (6, 22) and a blowing means (52) and heating element (88) for the air flow, as well as an automatic air flow reversing device (82, 84), without undesirable stretching of the fabric occurring at any time of the process.

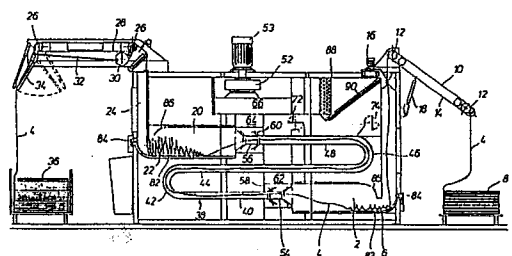


FIG. 1

Description

APPARATUS FOR DRY TREATMENT OF A FABRIC

The invention relates to an apparatus for the dry treatment of a fabric comprising first and second chambers adapted to contain respective supplies of open width fabric, said first chamber being for an infeed supply and said second chamber being for an outfeed supply; means gradually introducing the fabric in said first chamber; means gradually withdrawing the fabric from said second chamber; a flat section duct adapted to contain the open width fabric and communicating said chambers one with the other; blowing means for blowing air into said duct; heating elements for said air; a set of slots in each of the ends of said duct to allow the passage of said air inside the duct; two sets of gates alternately to regulate the direction of the air towards one of the sets of slots; drive means for said gate sets, closing the gates of one of the sets at the same time as it opens those of the other set.

Spanish patent nu 532.408 of the present applicant discloses a method and an apparatus for treating fabrics, based on the alternate flow of air transporting the fabric from one chamber to the other. Nevertheless, said patent does not precisely disclose the automatic system for reversing the air flow.

U.S. patent application Serial nu 796.605, also of the present applicant, also discloses an automatic system for reversing the air flow direction. This system is based on the friction exercised by the fabric on a rocking lever on being exhausted from one of the chambers. This system has the drawback of causing an undesired stretching of the fabric, possibly leading to deformation thereof.

The invention provides an apparatus in which the above drawbacks are overcome. According to the invention, the apparatus, being of the type described hereinabove, is characterised in that each of said chambers is provided with a generally horizontal wall on which the fabric being collected in the chamber rests, forming successive folds which generally do not overlie each other, part or all of said wall being capable of undergoing a slight rocking movement depending on the weight of fabric supported thereon, said rocking movement activating the said gate set drive means.

Without any limitation, there is described hereinafter in connexion with the accompanying drawing a preferred embodiment of the invention. In the drawings:

Figure 1 is a schematic cross section of the apparatus of the invention in the lengthwise direction thereof.

Figure 2 is a schematic perspective view of the blowing means and of the gates for regulating the air flow direction.

Figure 3 is a cross sectional view of one embodiment of the duct communicating the two chambers.

Figure 4 is a schematic perspective view of the accessory formed by tubular fabric control cages.

Figure 5 is a schematic view of the apparatus, on a larger scale, showing only the first and second supply chambers provided with the accessory of Figure 4 and connected by the communication duct.

The apparatus comprises a first chamber 2 for a fabric 4 disposed open width. An infeed supply 6 of said open width fabric may be formed in said chamber 2. On the outside of the apparatus, the fabric 4 is disposed, for example, in a folded pile 8, although it could also be wound, forming a roll. From the pile 8 (or, as the case may be, from the roll of the like) the fabric 4 is gradually fed into said first chamber 2 by a device 10 comprising rollers 12 which may guide an endless belt 14. The device 10 is driven by a motor 16 and may be rocked by an arm 18. As stated, the fabric enters the apparatus generally continuously, albeit slowly.

Opposite to said first chamber 2, there is a second outfeed chamber 20, in which an outfeed supply 22 may be formed and from which the fabric 4 may be withdrawn, also gradually. The fabric 4 passes through the space 24, being transported by rollers 26 above a conveyor belt 28 provided with orifices to allow air to pass therethrough. A cam 30 with a connecting rod 32 alternately moves an arm 34 suitably to dispose the already treated fabric 4 forming a pile 36 of folded fabric. In a similar way to the infeed, the fabric outfeed is generally continuous, albeit slow.

The chambers 2, 20 are connected together over a flat section duct 38 adapted to contain the open width fabric 4. Particularly, when it is desired to dry the fabric, it is desirable for the length of the duct to be substantial, since in this way the fabric is subjected to the action of the hot air for a longer period of time.

To avoid this considerable length requiring exaggerated longitudinal dimensions of the machine, the duct 38 is preferably disposed generally S-shaped, i.e. having a first run 40 aligned with the first chamber 4, a first 180° elbow 42 followed by a second run 44 ending in a second elbow 46, also of 180°, connected to a third run 48 aligned with the second chamber 20.

When a substantial length of the duct is not required, it is contemplated that both chambers 2, 20 face each other and that the duct therebetween be short, for example, having a length of about 1 metre.

The duct 38 normally has a width of 1.8 to 2 metres, without any limitative meaning being placed on these dimensions. When the fabric to be treated is wide, the duct is used without any modification. Nevertheless (Figure 3), the duct 38 may be divided lengthwise by a partition 50, thereby allowing the simultaneous treatment of two fabric pieces 4. This is of particular interest for the treatment of goods knitted on circular machines which provide tubular fabrics having a width of about 0.8 metre.

The apparatus comprises also blowing means 52 (preferably two fan units) adapted to blow air into

said duct 38 and said means 52 are driven by a motor 53. In turn, each end portion 54, 56 of the duct 38 (respectively adjacent the chambers 2, 20) is provided with a set of transverse slots 58, 60, inclined relative to the duct 38, allowing the access of air towards both faces of the fabric, without creating turbulence.

The slots 58 communicate with a branch 62, while the slots 60 communicate another branch 64 and both branches may communicate with a space 66 reached by the air blown by the blowing means 52.

Between the space 66 and the branches 62 and 64 there are respectively gates 68, 70 adapted to make or break the communication between the space and the branches, such that when gates 68 are open, the other gates 70 are closed.

The gates 68 are connected over conventional means with a return gate 72, such that all are simultaneously in the same position, open or closed. Similarly, the gates 70 are connected to another return gate 74, as shown in Figure 2.

All the said gates are actuated, for example, by a hydraulic mechanism 76 rotating in 90° and shafts 78 provided with bevel gears 80.

Each of the chambers 2, 20 is provided with a generally horizontal wall 82 on which the corresponding supply 6, 22 of fabric rests. The wall 82 is preferably only a part of the bottom of the respective chamber and each wall 82 may rock slightly, depending on the weight of fabric supported thereby. The said rocking movement is measured by a sensor or other device 84 adapted to emit an electrical signal activating the gate drive means (for example, the hydraulic mechanism 76).

There is means to predetermine the weight of the fabric required to cause activation.

As said above, the rocking wall 82 is only a part of the chamber floor and, preferably, is the part of the floor farthest removed from the duct 38.

In the area adjacent the chamber around and/or above the wall 82, there is a permeable area 86 closing each chamber and allowing the passage of air, on being provided with passages adapted therefor.

The apparatus also comprises a heating element 88, close to the space 66, as well as a filter 90.

Certain fabrics, particularly certain tubular fabrics are hard to collect in the respective supply chambers 2, 20. To accommodate this circumstance, the apparatus is provided with an accessory formed by baskets or cages 92 made from rods having an inlet end 94 adaptable to the communication space of the duct 38 with each chamber and the section of the said baskets or cages 92 is generally the same as the section of the duct 38.

By adapting said cages 92 to each of the chambers 2, 20, the fabric is guided better within the chamber and blockages are avoided. The cages 92 are provided with a curved outlet end 96 facilitating the gradual infeed and outfeed of the fabric.

So that the supply of fabric collected in one of the chambers 2, 20 may act on the rocking wall 82, there are provided support members 98 which extend from the cages 92 and bear against said walls 82. Thus the weight of the fabric collected in a cage 92 is

transmitted to the wall.

For operation of the machine, the first thing is to feed the fabric 4 by hand, fully flat over the rollers 12, switching the motor 16 on for a period of time of about one minute, whereby a sufficient length of cloth is deposited in the right hand side of the chamber 2. By way of pertinent side doors, not shown, the leading end of the fabric is led by hand up to the level of the slots 58 and when the blowing means 52 is started up (with the gate 68 connecting the space 66 to branch 62 being open), the current of air transports the fabric to the chamber 20, from where the fabric is led by hand over the rollers 26 and endless belt 28.

Thereafter, a substantial length of fabric is fed in until the infeed supply 6 has been formed and the blowing means 52 is used to move the fabric forward until the outfeed supply 22 is formed. The fabric 4 is moved by the flow of air through the space 66, the branch 62 slots 58 duct 38 to the interior of the outfeed chamber 20, from where it exits through the permeable enclosure area 86. The flow continues through the open gate 72, filters 90 and heater 88, from where it returns to the space 66, reinitiating the cycle.

Since the chamber 20 (like the infeed chamber 2) is provided with a permeable enclosure area 86 removed from the duct 38, the air also transports the fabric 4 to this removed area and consequently practically all the supply 22 bears on the rocking wall 82. When this supply reaches the predetermined weight referred to above (coinciding with a substantial exhaustion of the infeed supply 6), the wall 82 rocks and acts on the device 84 which emits an electrical signal for the hydraulic mechanism 76, whereby the gates 68 and 72 close and gates 70 and 74 open.

This reverses the air flow which now occurs through the space 66, branch 64, slots 60 and duct 38 towards the infeed chamber 2, from which it exits through the permeable enclosure area 86. The air flow now follows through the gate 74, filter 90 and heater 88 from where it returns to the space 66, this other cycle being reinitiated and lasting until the supply 6 of fabric in the infeed chamber 2 reaches a weight sufficient to reverse the air flow again, the movement from one chamber to the other being repeated as often as required.

Meanwhile, the motor 16 causes the gradual entry of untreated fabric and the fabric outfeed mechanism withdraws the treated fabric, said fabric being treated continuously.

At the outlet, air is blown through the conveyor belt 28 whereby the fabric is cooled from the apparatus internal temperature to room temperature.

The characteristics of the treatment are determined by the adjustable speeds of the infeed and outfeed motors, by the fabric speed, adjustable in dependence of the air blown by the fan, by the adjustable temperature provided by the heating elements. Therefore, a very uniform surface finish, a high drying performance and a high productivity and cheapening of costs are achieved within a wide range of possibilities.

As its moves through the duct 38, the fabric is not subjected to mechanical stress or to harmful abrasion with the apparatus surface, since such movements take place practically without contact with the duct walls, due to the air transport in one direction or the other.

The following types of treatment may be obtained: cotton fabrics may be aged, creped, softened and shrunk; woollen fabrics may be felted, softened and dimensionally stabilised; fibre blend fabrics may be provided with all kinds of finish corresponding to each class of fibre.

It should be highlighted that the fabric is not subjected to any stretching either at the infeed or at the outfeed. Furthermore, reversal of the air flow is triggered by a collection of the cloth, which does not imply any stretching either, contrarily to what happens with other embodiments in which the air flow is reversed by movement of a lever on exhaustion of the fabric in one of the chambers, said fabric engaging the lever and thereby being undesirably stretched.

Claims

1.- Apparatus for the dry treatment of a fabric comprising first (2) and second (20) chambers adapted to contain respective supplies (6, 22) of open width fabric (4), said first chamber (2) being for an infeed supply (6) and said second chamber (20) being for an outfeed supply (22); means (10, 16) gradually introducing the fabric (4) in said first chamber (2); means (26, 28) gradually withdrawing the fabric (4) from said second chamber (20); a flat section duct (38) adapted to contain the open width fabric (4) and communicating said chambers (2, 20) one with the other; blowing means (52) for blowing air into said duct (38); heating elements (88) for said air; a set of slots (58, 60) in each of the ends of said duct (38) to allow the passage of said air into the duct (38); two sets of gates (68, 70, 72, 74) adapted alternately to regulate the direction of the air towards one of the sets of slots (58, 60); drive means (76, 78) for said gate sets (68, 70, 72, 74), closing the gates (68, 72) of one of the sets at the same time as it opens the gates (70, 74) of the other set, characterised in that each of said chambers (2, 20) is provided with a generally horizontal wall (82) on which the fabric (4) being collected in the chamber rests, forming successive folds which generally do not overlie each other, part or all of said wall (82) being capable of undergoing a slight rocking movement depending on the weight of fabric (4) supported thereon, said rocking movement activating the said gate set (68, 70, 72, 74) drive means (76, 78).

2.- Apparatus according to claim 1, characterised in that it is provided with adjustment means adapted to predetermine the weight of fabric (4) required for said activation.

3.- Apparatus according to claim 1 or 2, characterised in that said wall (82) is capable of rocking in a portion thereof only, said portion being farther removed from said duct (38) than the non rocking portion.

4.- Apparatus according to claim 3, characterised in that each of said chambers (2, 20) is provided with a permeable enclosure area (86) allowing the passage of air therethrough, said enclosure area (86) being removed from said duct (38).

5.- Apparatus according to claim 1, characterised in that said duct (38) is generally S-shaped, having a first run (40) aligned with one of said chambers (2), a 180° elbow (42) followed by a second run (44) terminating in a second 180° elbow (46) connected to a third run (48) aligned with the other chamber (20).

6.- Apparatus according to claim 1, characterised in that said duct (38) may be divided in two longitudinal halves to allow the simultaneous treatment of two fabric pieces.

7.- Apparatus according to any one of the foregoing claims, characterised in that said means (26, 28) gradually withdrawing the fabric (4) from said second chamber (20) comprises aerating the fabric at room temperature to reduce the temperature at which the fabric (4) exits from the apparatus.

8.- Apparatus according to any one of the foregoing claims, characterised in that inside each of the chambers there is disposed a wire rod cage (92) in direct communication with the duct (38) connecting both chambers (2, 20), said cage (92) being adapted to contain the fabric (4) and supported by support members (98) on said rocking wall (82).

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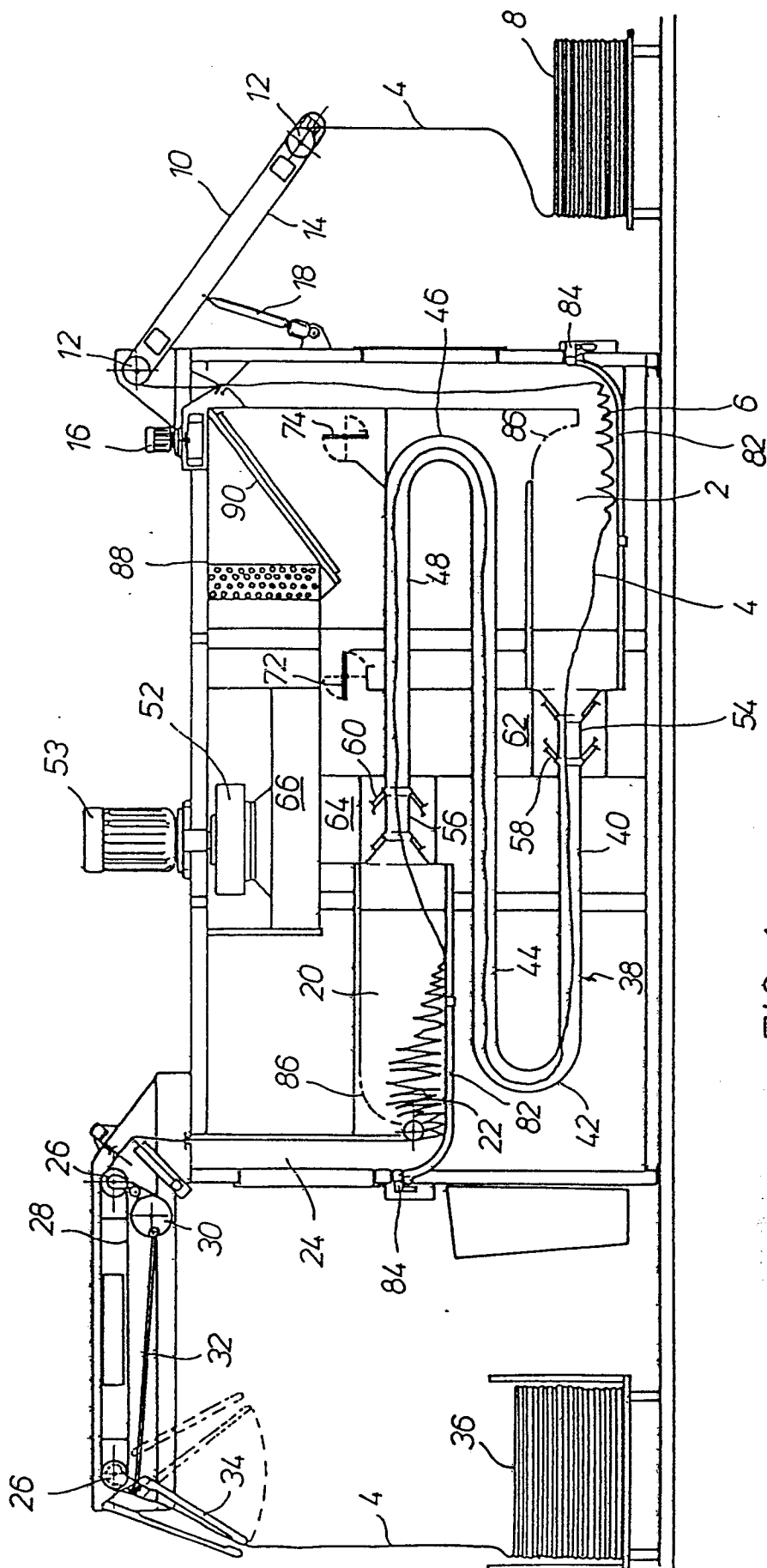


FIG. 1

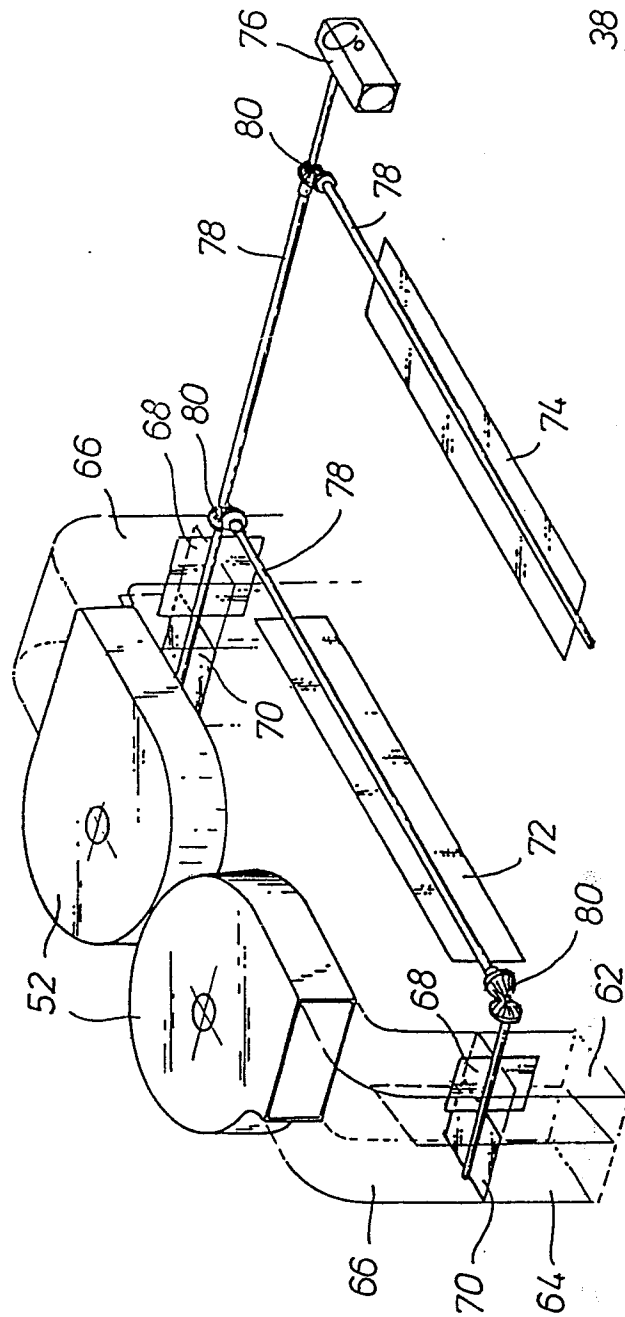


FIG. 2

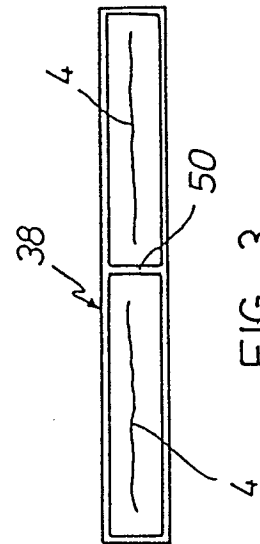
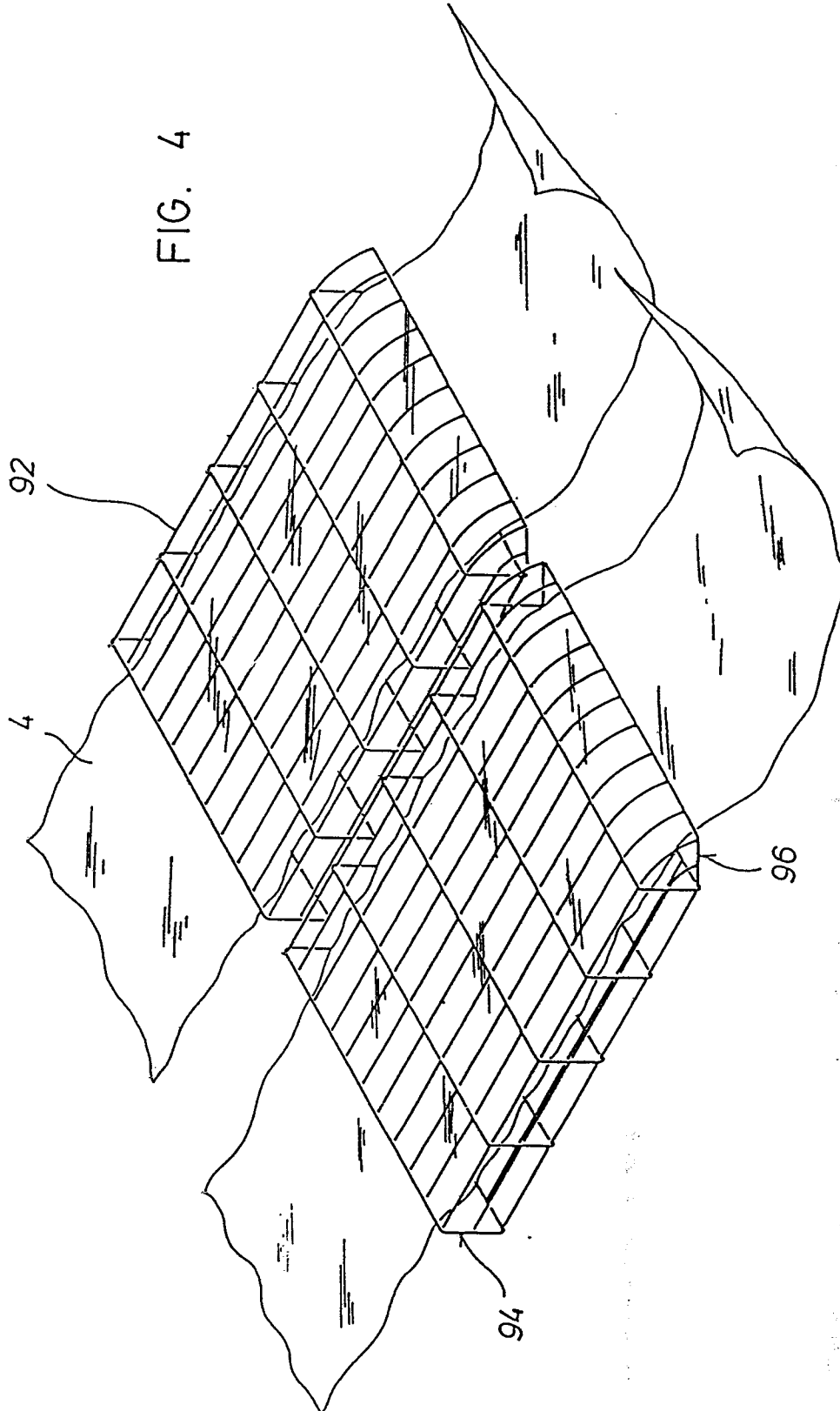


FIG. 3

FIG. 4



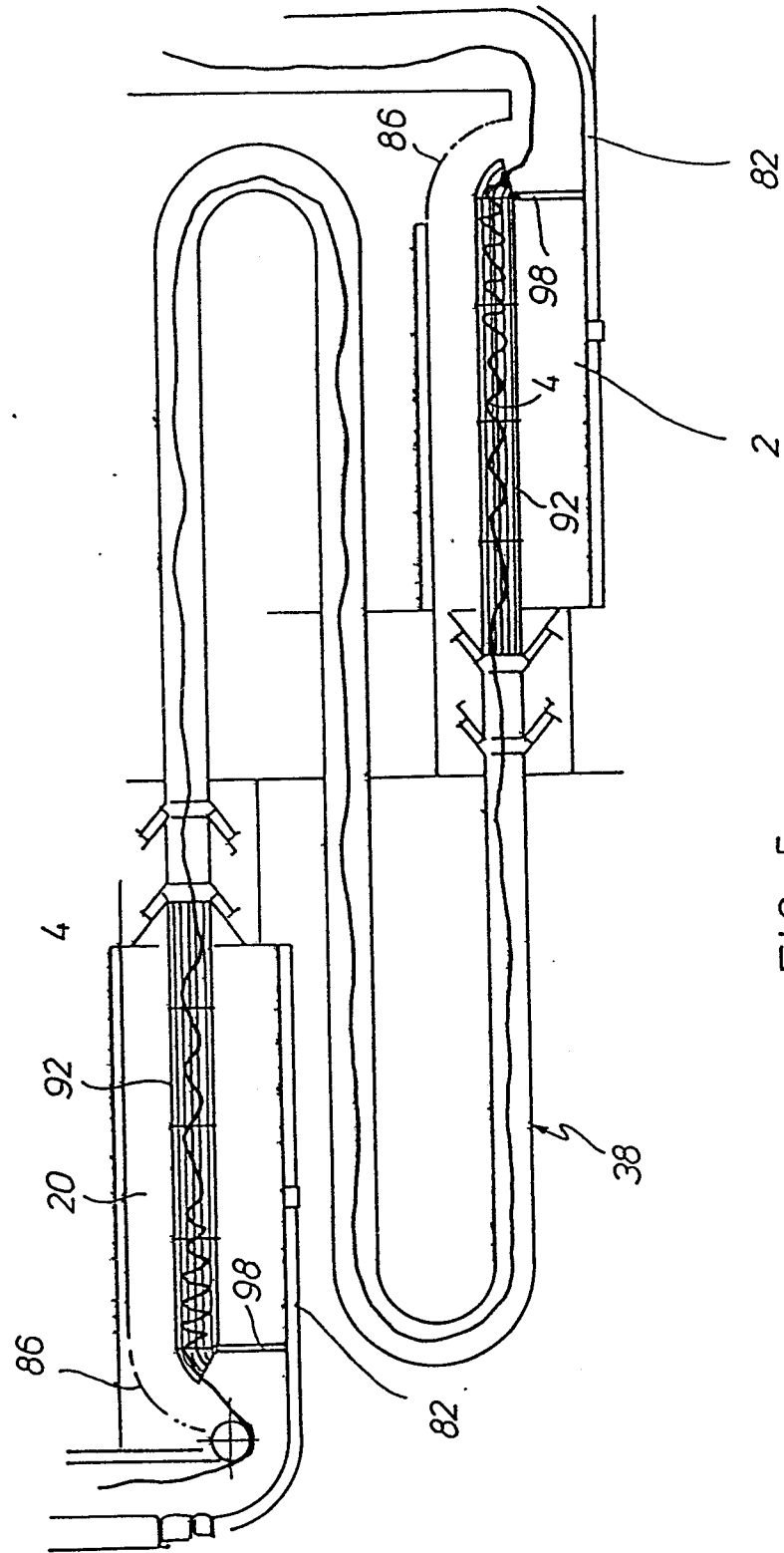


FIG. 5