



(22) Date de dépôt/Filing Date: 1994/01/21

(41) Mise à la disp. pub./Open to Public Insp.: 1994/07/27

(45) Date de délivrance/Issue Date: 2005/07/26

(30) Priorité/Priority: 1993/01/26 (P 43 02 031.3) DE

(51) Cl.Int.⁵/Int.Cl.⁵ D03D 1/00, D21F 1/10

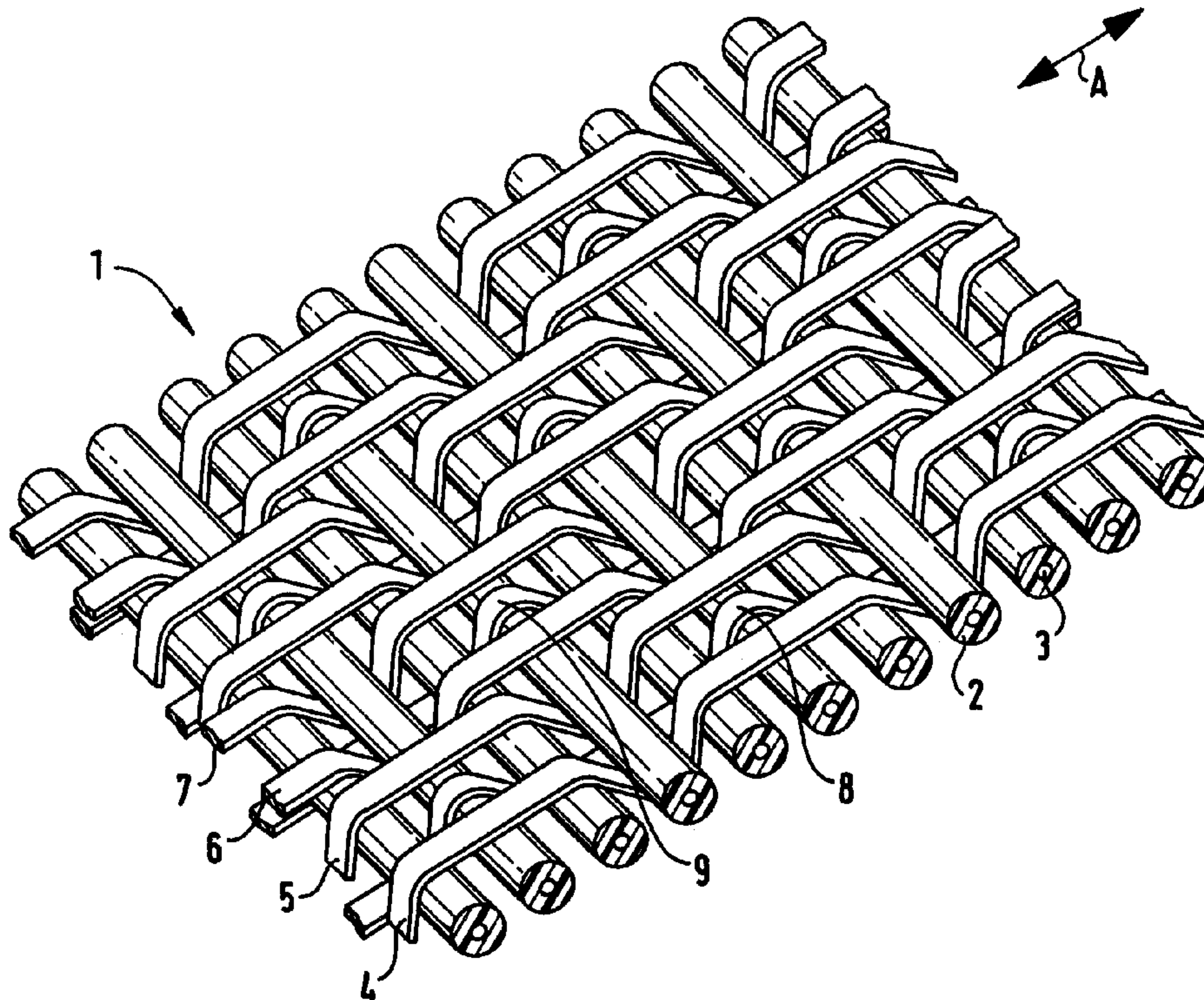
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(54) Titre : TAMISEUR A SEC ET SON PROCEDE DE FABRICATION

(54) Title: DRY SCREEN AND PROCESS FOR MAKING IT



(57) Abrégé/Abstract:

A dry screen (1) reveals longitudinal threads (4, 5, 6, 7, 8, 9) that run in machine movement direction (A) and lateral threads (2) that extend laterally thereto and that consist of synthetic material, with a first group of longitudinal threads (4, 5, 6, 7) floating on the paper side over several lateral threads (2), and a second group of longitudinal threads (8, 9) being present, said group tying up in a manner different from the first group of longitudinal threads (4, 5, 6, 7). To make sure that such a dry screen (1) will have good flexibility in spite of the large contact surface on the paper side, at least two neighboring longitudinal threads (4, 5 or 6, 7), each time, of the first group, form subgroups of longitudinal threads (4, 5, or 6, 7) that run identical binding, at least on the paper side, and the longitudinal threads (4, 5 or 6, 7) of one group rest next to each other, side by side.

Abstract

A dry screen (1) reveals longitudinal threads (4, 5, 6, 7, 8, 9) that run in machine movement direction (A) and lateral threads (2) that extend laterally thereto and that consist of synthetic material, with a first group of longitudinal threads (4, 5, 6, 7) floating on the paper side over several lateral threads (2), and a second group of longitudinal threads (8, 9) being present, said group tying up in a manner different from the first group of longitudinal threads (4, 5, 6, 7). To make sure that such a dry screen (1) will have good flexibility in spite of the large contact surface on the paper side, at least two neighboring longitudinal threads (4, 5 or 6, 7), each time, of the first group, form subgroups of longitudinal threads (4, 5, or 6, 7) that run identical binding, at least on the paper side, and the longitudinal threads (4, 5 or 6, 7) of one group rest next to each other, side by side.

Description

This invention relates to a dry screen with longitudinal threads that extend in the machine movement direction and lateral threads that extend laterally thereto and consist of synthetic material, with one first group of longitudinal threads floating on the paper side over several lateral threads and a second group of longitudinal threads being present and binding in a manner different from that of the first group of longitudinal threads.

Dry screens are fabrics consisting of synthetic threads with longitudinal threads that extend in the machine movement direction and with lateral threads that extend laterally thereto. They are inserted in the dry sector of a paper machine, and there they guide the paper web over the hot dry cylinders. Here the essential thing is that the dry screens provide for a good heat transfer and that condensate formation is prevented. An effort has therefore been made to shape the dry screens as thin as possible and to make large contact surfaces available.

Many fabric designs are known for dry screens. Reference is made here, merely by way of example, to PCT Application WO 91/19044 and to the state of the art described there. This publication discloses paper machine fabrics where a first group of longitudinal threads floats on the paper side over several lateral threads, the longitudinal threads here being made in the form of flat monofilaments. This group of longitudinal

threads runs above a second group of longitudinal threads that can also be made in the form of flat monofilaments.

The known dry screen does, of course, have a good contact surface due to the use of very wide flat monofilaments, especially for the longitudinal threads of the first group. But these threads impair the flexibility of the dry screen. Besides, the very wide flat monofilaments are special threads that are not easy to process and that are expensive.

The purpose of the invention, therefore, is to design a dry screen of the kind mentioned initially so that good flexibility will be attained in spite of the large contact surface on the paper side.

According to the invention, this problem is solved in that at least two neighboring longitudinal threads of the first group in each case form subgroups of longitudinal threads that run in an equally binding manner, at least on the paper side, and that the longitudinal threads of one subgroup rest next to each other, side by side. Preferably, the longitudinal threads of one subgroup should also run in an equally binding manner for the rest. The term "equally binding" means the kind of course where the particular longitudinal threads are tied up next to each other identically into the fabric.

According to the invention, in other words, the two contact surfaces are generated with the help of several longitudinal threads that are combined to form subgroups

with an identically binding course. For this purpose, one can use standard longitudinal threads that are preferably made in the form of flat monofilaments with a cross-section ratio of 1.2:1 to 3:1. The flexibility of the dry screen is not impaired because the longitudinal threads, in spite of their combination into subgroups and their mutual contact, are movable among each other.

By way of a further feature of the invention, it is provided that, looking at it from the paper side, a longitudinal thread of the second group runs underneath two neighboring longitudinal threads of a subgroup. Here it is particularly preferred that no longitudinal threads of the second group run between two subgroups of longitudinal threads of the first group. When each subgroup consists only of two longitudinal threads, then only one longitudinal thread of the second group goes with two longitudinal threads of the first group. On the one hand, this achieves a concentration of the longitudinal threads on the paper side to attain a big contact surface; on the other hand, the dry screen is comparatively open on the machine side and that makes for a good steam passage.

As a further feature of the invention, it is provided that the longitudinal threads of the second group tie up on the paper side only with those lateral threads over which float the longitudinal threads of a subgroup, said threads running above this longitudinal thread of the second group. In this way, one can avoid a

crossover of the longitudinal threads of the first and the second group. Corresponding features are also provided in a practical fashion on the underside or the machine side of the dry screen in that the longitudinal threads of the second group float on the machine side over those lateral threads that tie up on the machine side with the longitudinal threads of one subgroup, said threads running above the particular longitudinal thread of the second group.

The longitudinal threads of the first group should, on the paper side, float at least over three lateral threads before they tie up anew. Floating, however, can also run over up to nine lateral threads. On the machine side, the longitudinal threads of the first group should tie up only with one lateral thread. A corresponding feature is also provided for the longitudinal threads of the second group where one gets a mirror-image course to the longitudinal threads of the first group.

According to yet another feature of the invention, it is provided that the lateral threads are made as open, hollow monofilaments such as they are known, for example, from U.S. Patent No. 4,251,588. Here it is possible to make either all or only a part of the lateral threads in the form of hollow monofilaments. In the latter case, the other part of the lateral threads should then be made as massive monofilaments so that the hollow monofilaments then should alternate with the massive monofilaments, specifically and preferably, always one hollow

monofilament with a massive monofilament. To attain a dry screen that would be as thin as possible, the hollow monofilaments can then be made flattened, using a bowl glazing procedure.

Another feature of the invention consists of the fact that lateral threads with a larger diameter alternate with lateral threads that have a comparatively smaller diameter, specifically and preferably, in such a way that one lateral thread with a larger diameter will always alternate with a lateral thread having a smaller diameter.

The longitudinal threads of a subgroup are in a practical fashion staggered with respect to the neighboring longitudinal threads of a subgroup, in the machine movement direction, as far as their tie-up is concerned. Furthermore, the longitudinal threads of the first group should have an identical cross-section shape and surface.

Although the dry screen can also be made in the form of several layers, an effort is to be made to fashion this as a single-layer dry screen to keep the thickness of the dry screen as small as possible.

A dry screen, according to the invention, can be made in a simple manner in that, for the weaving process, one uses shrinkable lateral threads, and the dry screen is heat-treated after the weaving process so that the particular identically binding, longitudinal threads of one subgroup will come to rest against each other, side

70233-65

by side. It is known that synthetic threads, such as, for example, polyester threads or the like, are subject to shrinkage when impacted with heat. The shrinkability here is used in a specifically determined fashion to place the
5 longitudinal threads of one subgroup against each other, and also to place the longitudinal threads of two neighboring subgroups against each other, which makes for a large surface and practically uninterrupted contact surfaces.

Thus, according to a broad aspect, the invention
10 provides a dry screen (1) with longitudinal threads (4, 5, 6, 7, 8, 9) extending in the machine movement direction (A) and with lateral threads (2) extending laterally thereto and made of synthetic material, with a first group of longitudinal threads (4, 5, 6, 7) floating on a paper side
15 over a plurality of adjacent lateral threads (2) and a second group of longitudinal threads (8, 9) that binds differently when compared to the first group of longitudinal threads (4, 5, 6, 7), characterized in that a plurality of subgroups of longitudinal threads are each formed by at
20 least two neighboring first group longitudinal threads (4, 5) (6, 7), that run equally binding on the paper side, the longitudinal threads (4, 5) (6, 7) of each subgroup resting next to each other side by side.

In accordance with another aspect, the invention
25 provides a process for making the above dry screen, characterized in that, for a weaving process, one uses shrinkable lateral threads (2) and that the dry screen (1) is heat-treated after the weaving process so that the longitudinal threads (4, 5) (6, 7) of one subgroup come to
30 rest next to each other, side by side, said longitudinal threads running in each case in an identically binding manner.

70233-65

The drawing illustrates the invention with the help of a practical example in greater detail.

Figure 1 is an excerpt of a dry screen according to the invention in perspective view, on its paper side,
5 after the weaving process and prior to the shrinkage process; and

Figure 2 is the excerpt according to Figure 1 after the shrinking process, in the identical view.

Dry screen (1), illustrated in Figure 1, is made
10 as a single-layer fabric and has a machine movement direction that runs along arrow A. Round lateral threads - labeled (2), by way of example - run laterally with respect to that machine movement direction A. These round lateral threads are made in the form of hollow
15 monofilaments, in other words, in the untreated state, they reveal cavities, labeled (3), by way of example. Lateral threads (2) consist of a synthetic material, for example, polyester, that is highly shrinkable when heat is applied.

Longitudinal threads tie up with lateral threads (2) in machine movement direction A, and those longitudinal threads are made as flat monofilaments with a rectangular cross-section. A first group of longitudinal threads -- labeled (4, 5, 6, 7), by way of example -- in each case floats over three lateral threads on the paper side, before the longitudinal threads (4, 5, 6, 7) tie up with one lateral thread (2), underneath, on the machine side. Here, two adjacent longitudinal threads (4, 5,) or (6, 7) each time run in an identically binding fashion, in other words, they run identically and always parallel to each other. Two longitudinal threads (4, 5) or (6, 7) at a time thus form subgroups in the first group of longitudinal threads (4, 5, 6, 7), with the subgroups running next to each other, although staggered in machine movement direction A by two lateral threads (2), each time.

Between two longitudinal threads (4, 5) or (6, 7), forming a subgroup, there runs each time an additional longitudinal thread (8, 9), and together they form a second group of longitudinal threads. They run in mirror-image fashion with respect to the longitudinal threads (4, 5) or (6, 7) of the first group, that is to say, in each case they tie up only with one lateral thread (2) on the paper side and they then float on the machine side over three lateral threads (2).

Longitudinal threads (8, 9) of the second group here, on the paper side, tie up only with those lateral threads

70233-65

(2) over which float the longitudinal threads (4, 5) or (6, 7) of the pertinent subgroup. Two longitudinal threads (8, 9) of the second group, that run next to each other, are likewise staggered by two lateral threads (2) in machine movement direction A, as regards to their tie-up.

Figure 1 shows the condition of the dry screen (1) after the weaving process. Longitudinal threads (4, 5) or (6, 7) of a subgroup are then at an interval from each other that is somewhat greater than the width of the longitudinal threads (8, 9) of the second group. The dry screen thus made (1) is subjected to heat treatment at temperatures at which the lateral threads (2) shrink rather considerably. As a result, longitudinal threads (4, 5) or (6, 7) come to rest against each other and, in the process, they are shoved along the paper side over the longitudinal threads (8, 9) of the second group and on the machine side between the particular lateral threads (2) and the particular longitudinal threads (8, 9) that float there. The neighboring longitudinal threads (5, 6) of the two subgroups also come to rest against each other then. In this way, one gets the fabric picture according to Figure 2 that is characterized by large contact surfaces on the paper side.

Dry screen (1) is then subjected to a bowl glazing treatment as a result of which the lateral threads (2) are pressed flat so that the insides of the cavities (3)

come to rest against each other, in other words, that there will no longer be any cavities (3). This generates a very thin dry screen (1) with favorable heat transfer properties.

70233-65

CLAIMS:

1. Dry screen (1) with longitudinal threads (4, 5, 6, 7, 8, 9) extending in the machine movement direction (A) and with lateral threads (2) extending laterally thereto and
5 made of synthetic material, with a first group of longitudinal threads (4, 5, 6, 7) floating on a paper side over a plurality of adjacent lateral threads (2) and a second group of longitudinal threads (8, 9) that binds differently when compared to the first group of longitudinal
10 threads (4, 5, 6, 7), characterized in that a plurality of subgroups of longitudinal threads are each formed by at least two neighboring first group longitudinal threads (4, 5) (6, 7), that run equally binding on the paper side, the longitudinal threads (4, 5) (6, 7) of each subgroup resting
15 next to each other side by side.

2. Dry screen according to Claim 1, characterized in that the longitudinal threads (4, 5) (6, 7) of one subgroup also run equally binding on a machine side.

3. Dry screen according to Claim 1 or 2,
20 characterized in that, looking at it from the paper side, a longitudinal thread (8, 9) of the second group runs below two neighboring longitudinal threads (4, 5) (6, 7) of each of the subgroups.

4. Dry screen according to any one of Claims 1 to 3,
25 characterized in that the area between adjacent subgroups of longitudinal threads (4, 5) (6, 7) is free of longitudinal threads (8, 9) of the second group.

5. Dry screen according to any one of Claims 1 to 4, characterized in that each of the longitudinal threads
30 (8, 9) of the second group binds on the paper side only with

70233-65

those lateral threads (2) over which float the longitudinal threads (4, 5) (6, 7) of one of said subgroups, said longitudinal threads of one of said subgroups running above this longitudinal thread (8, 9) of the second group.

5 6. Dry screen according to any one of Claims 1 to 5, characterized in that each of the longitudinal threads (8, 9) of the second group floats on the machine side over those lateral threads (2) that, on the machine side, bind with the longitudinal threads (4, 5) (6, 7) of one of said subgroups,
10 said longitudinal threads of one of said subgroups running above the said longitudinal thread (8, 9) of the second group.

7. Dry screen according to any one of Claims 1 to 6, characterized in that the longitudinal threads (4, 5, 6, 7) of the first group float on the paper side each time over
15 three to nine lateral threads (2).

8. Dry screen according to any one of Claims 1 to 7, characterized in that the longitudinal threads (4, 5, 6, 7) of the first group on the machine side in each case bind
20 only with one lateral thread (2).

9. Dry screen according to any one of Claims 1 to 8, characterized in that the longitudinal threads (8, 9) of the second group float on the machine side over three to nine lateral threads (2).

25 10. Dry screen according to any one of Claims 1 to 9, characterized in that the longitudinal threads (8, 9) of the second group, on the paper side, tie up only in each case with one lateral thread (2).

11. Dry screen according to any one of Claims 1 to 10,
30 characterized in that the longitudinal threads (4, 5, 6, 7)

70233-65

of the first group tie up in mirror-image fashion in relation to the longitudinal threads (8, 9) of the second group.

12. Dry screen according to any one of Claims 1 to 11,
5 characterized in that the lateral threads (2) are made as open, hollow monofilaments.

13. Dry screen according to any one of Claims 1 to 11,
characterized in that the lateral threads alternate between those that are made as open, hollow monofilaments, and those
10 that are made as massive monofilaments.

14. Dry screen according to Claim 12 or 13,
characterized in that those lateral threads (2) that are, made as hollow monofilaments, are flattened out.

15. Dry screen according to any one of Claims 1 to 14,
15 characterized in that the lateral threads alternate between those having a larger diameter and those that have a smaller diameter by comparison.

16. Dry screen according to any one of Claims 1 to 15,
characterized in that at least the longitudinal threads
20 (4, 5, 6, 7) of the first group are made as flat monofilaments whose extent in a plane defined by the dry screen is greater than perpendicularly thereto.

17. Dry screen according to Claim 16, characterized in that the longitudinal threads (4, 5, 6, 7) have a cross-
25 section ratio of 1.2:1 to 3:1.

18. Dry screen according to any one of Claims 1 to 17,
characterized in that the longitudinal threads of one subgroup, with respect to longitudinal threads of a

70233-65

neighboring subgroup, are staggered in the machine movement direction as regards to their tie-up.

19. Dry screen according to any one of Claims 1 to 18, characterized in that longitudinal threads (4, 5, 6, 7) of
5 the first group have identical cross-section shapes and surfaces.

20. Dry screen according to any one of Claims 1 to 19, characterized in that the dry screen is made in the form of one layer.

10 21. Process for making a dry screen according to any one of Claims 1 to 20, characterized in that, for a weaving process, one uses shrinkable lateral threads (2) and that the dry screen (1) is heat-treated after the weaving process so that the longitudinal threads (4, 5) (6, 7) of one
15 subgroup come to rest next to each other, side by side, said longitudinal threads running in each case in an identically binding manner.

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PATENT AGENTS

FIG. 1

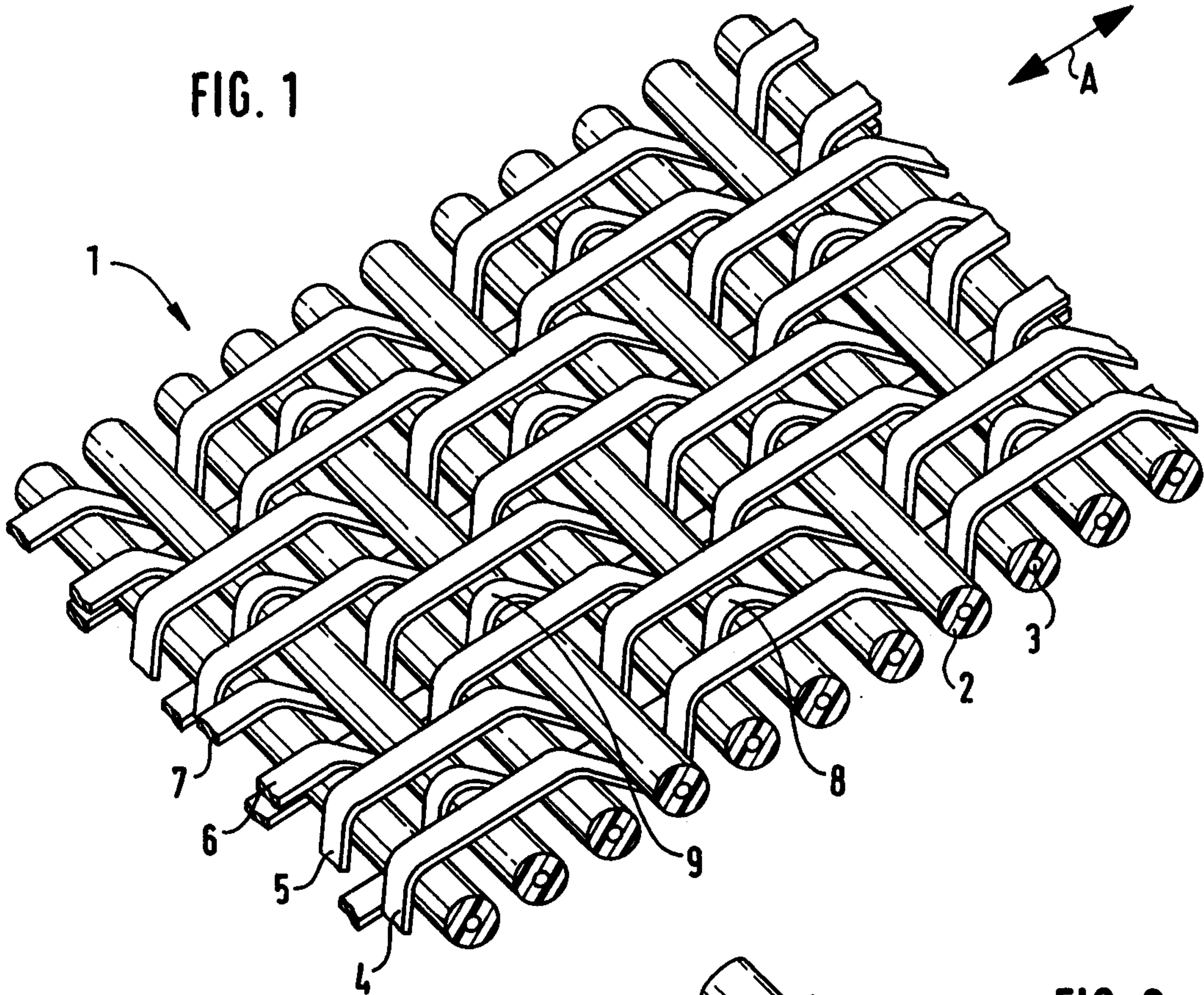


FIG. 2

