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(54) Device for the production of corrugated cardboard with a single flat surface

(57) A device for the production of corrugated cardboard with a single flat surface, wherein the marks of the junction lines of the crests of the first permanently corrugated cardboard ribbon (8) with the second flat cardboard ribbon (10) are invisible and the cardboard's mechanical strength within the same is not reduced, in which the corrugating cylinders (2, 3) corrugate and preheat the first cardboard ribbon (7) and overlay it on the flat cardboard ribbon (9). The first contact between the two ribbons occurs on the heating cylinder (4), keeping only the second ribbon in a stretched and heated condition while the first cardboard ribbon is not subjected to any pulling or stretching force capable of altering it. The coupling thus occurs without the application of any direct or indirect pressure during the gluing process, which is the source of the undesired phenomenon.

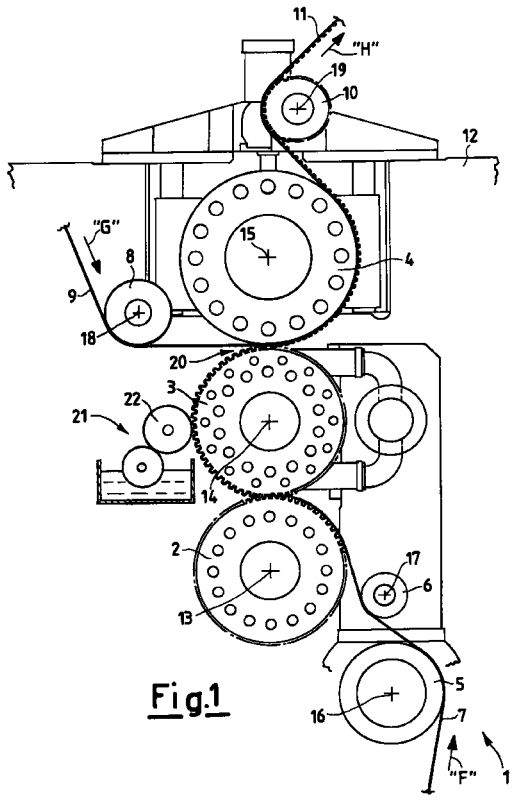

Fig.1

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Description

[0001] This invention refers to a device for the production of corrugated cardboard with a single fat surface.

[0002] The machines producing such a cardboard generally comprise as essential elements a pair of corrugating cylinders, a glue applying cylinder and a pressing cylinder. In the cardboard production process, a first cardboard ribbon is corrugated by a pressure simultaneously exerted on it by a pair of corrugating cylinders. The glue applying cylinder then applies the glue on the crests of the corrugations and the pressing cylinder applies a second flat cardboard ribbon under pressure on the crests of the first corrugated cardboard ribbon. During this operation, said ribbon crests are internally supported by the corresponding projections of the corrugating cylinder. The final adhesion is achieved by pressing and heating the glue spread between the ribbons.

[0003] Machines of such a type are for instance described in the patent FR-A-1538604.

[0004] The outer surface of the second flat cardboard ribbon of the product obtained from such machines, consisting in a corrugated cardboard with a single flat surface, reveals the junction lines of the crests with the mentioned second ribbon, usually known as "pressure lines".

[0005] The presence of these lines is a source of both technical and esthetic drawbacks. They decrease the esthetic attractiveness of the product and may further denote that the mechanical pressing action exerted on the cardboard in order to glue the product has determined a certain yielding of its cellulose fibers, thus affecting the cardboard's mechanical properties.

[0006] In order to overcome this drawback, the patent application FR-A-2719521 offers a machine in which the pressure directly exerted on the cardboard by the pressing cylinder is reduced (and eventually annulled), while on the contrary applying a stretching force, through the second corrugating cylinder, on the second flat cardboard ribbon, while both of the cardboard ribbons are still running on the same.

[0007] This kind of operation is not easily managed, as the second flat cardboard ribbon is still substantially applied to the first corrugated cardboard ribbon under pressure, while the latter is still running on the second corrugating roller and the glue has still not taken hold.

[0008] This application won't totally exclude that on the second flat cardboard ribbon of the product obtained from such machines some pressure lines may still appear, especially when the operating production parameters need to be changed.

[0009] The purpose of this invention consists in achieving an improved device for the production of corrugated cardboard with a single flat surface, free of any junction lines of the crests of the first corrugated cardboard ribbon on said second flat cardboard ribbon, even if the production parameters are changed; in other words, an easily manageable machine.

[0010] The invention therefore covers both a device as defined in its essential aspects both by the first claim and in its preferential embodiments by the claims referring to the same, as well as a process defined in its essential features by the fourth claim.

[0011] In order to outline the characteristics and advantages of this invention with better clarity, the same will be described with reference to a typical embodiment as shown in Figure 1, for exemplifying and non-limiting purposes, which represents a simplified side view of the device.

[0012] In this machine the corrugating rollers essentially perform only the functions of permanently corrugating and preheating the first cardboard ribbon. In these rollers, no superposition or pressure of the second flat cardboard ribbon occurs on the first permanently corrugated cardboard ribbon. This means that there's no need for any pressing cylinder with a direct or indirect action.

[0013] It is highly interesting that in this embodiment the line along which the first contact occurs between the first corrugated cardboard ribbon 7 and the second flat cardboard ribbon 9 is set either next to the passage between the second corrugating cylinder 3 and the heating cylinder 4, or on the heating cylinder 4. The superposition of the two cardboard layers occurs only by keeping the second flat cardboard ribbon in a stretched and heated condition, while the first corrugated cardboard ribbon is simply laid down in a preheated form and without any significant stretching force which may affect its corrugation. The pre-heating phases allow stabilizing the structure assumed by the product until the glue finally takes hold. The stretching force needed on the produced cardboard in order to extract it from the machine is totally sustained only by the first flat cardboard ribbon.

[0014] In the embodiment shown in Figure 1, the number 1 generally indicates the overall machine for the production of corrugated cardboard with a single flat surface. It essentially comprises a first corrugating cylinder 2 and a second corrugating cylinder 3, a heating cylinder 4, a first cylinder 5 and a second cylinder 6 introducing the first cardboard ribbon 7, at least one cylinder 8 introducing a second ribbon 9 and at least one cylinder 10 extracting the corrugated cardboard with a single flat surface 11.

[0015] The cylinders 2, 3, 4, 5, 6, 8, and 10 are supported by a frame 12 (only partially shown), so as to be capable of rotating around their respective central symmetry axes 13, 14, 15, 16, 17, 18 and 19, all arranged in parallel to each other.

[0016] The machine 1 comprises certain devices, for instance pneumatic or hydraulic devices not shown for simplicity, capable of generating a depression on the outer face of the cylinders, as in the case shown in the figure on the cylinders 2-4. This depression is aimed at attracting the cardboard ribbons to the surfaces of said

cylinders.

[0017] The machine 1 also comprises some devices for the preheating of at least one of said cylinders or the outer surface of said cylinders, with which the cardboard under processing is destined to come into contact. These devices are in themselves known, and are for instance described in the French patent FR-A-2622145.

[0018] Both the devices to apply the glue to said cardboard ribbons as well as the rotary driving devices of said cylinders are known in the state of the art, for instance in the document FR-A-2719521.

[0019] In the device according to the invention the cylinder 4 is fitted with a heating system and connected to a suction system; it is essentially arranged tangentially to the second corrugating cylinder 3 along the line 20, downstream of which the first contact between the first already corrugated cardboard ribbon 7 and the second flat cardboard ribbon 9 occurs.

[0020] The cylinder 8 introducing the second flat cardboard ribbon 9 is positioned above the gluing cylinder 22. The cylinder 10 extracting the corrugated cardboard 11 with a single flat surface is arranged on the side of the heating cylinder 4 that happens to be opposite the one where the first point of contact 20 between the first corrugated cardboard ribbon 7 and the second flat cardboard ribbon 9 occurs.

[0021] The section in which the first contact 20 occurs is therefore the one where the first corrugated cardboard ribbon 7 is transferred, without being subjected to any significant force, from the second corrugating cylinder 3 to the heating cylinder 4. The second corrugating cylinder 3 and the heating cylinder 4 are positioned very closely to each other, but without the need for an actual contact between them, which may occur or not. The line of first contact 20 between the two cardboard ribbons may therefore already rest on the cylinder 4 or in their passage between the cylinders 3 and 4. The adjustment of the line or portion of contact is done based on the processing parameters, and may be performed by modifying the position of the cylinder 8, and/or by eventually increasing the distance between the axes 14 and 15 of the cylinders 3 and 4.

[0022] The adjustment of the contact 20 between the cardboard ribbons 7 and 9 is always made in such a manner as to avoid the formation of pressure lines or the appearance of the junction lines of the crests of the first corrugated cardboard ribbon 7, independently of the changes in the operating parameters.

[0023] According to a preferred embodiment of the invention, the heating cylinder 4, the first corrugating cylinder 2 and the second corrugating cylinder 3 have their rotating axes arranged in the same plane.

[0024] The process for producing the corrugated cardboard 11 with a single flat surface according to this invention substantially unfolds in the following phases.

[0025] In the phase introducing the first cardboard ribbon 7 in the direction of the arrow "F", the process involves a pair of corrugating cylinders 2 and 3 fitted with some projections of a shape corresponding to the corrugation to be applied to the cardboard. The cylinders are facing each other and reciprocally engage so as to permanently corrugate said first cardboard ribbon 7. The cylinders 5 and 6 serve the purpose of introducing and properly channeling the first cardboard ribbon between the pair of corrugating cylinders 2 and 3.

[0026] A phase for the application of glue on the tops of the crests or corrugations of the first cardboard ribbon 7 follows. During this phase the second corrugating cylinder 3 acts as a matching unit against the gluing cylinder 22 of the glue application system 21, preventing the just profiled crests of the first cardboard ribbon 7 from being deformed or squashed.

[0027] This is followed by a phase of applying a second flat cardboard ribbon 9 on the crests of the first cardboard ribbon 7, so as to form a corrugated cardboard 11 with a single flat surface.

[0028] The ribbon 9 runs in the direction of the arrow "G".

[0029] This phase does not provide for a significant pressure between the first cardboard ribbon 7 and the second cardboard ribbon 9, or at most for a very limited pressure, such as to essentially merely affect the interspersed layer of glue. The first contact 20 between the first corrugated cardboard ribbon 7 and the second cardboard ribbon 9 occurs downstream of the gluing cylinder 22, and is preferably set just before or on the heated lateral surface of the heating cylinder 4. On this surface the second cardboard ribbon 9 is kept stretched, while the opposite crests of said first cardboard ribbon 7 are left unsupported.

[0030] The contact and superposition of the two ribbons is followed by a glue heating and activating phase, designed to shape and produce the corrugated cardboard 11 which is discharged from the machine along a path marked by the arrow "H". The cylinder 10 takes care of extracting it.

Claims

1. A device (1) for the production of corrugated cardboard (11) with a single fat surface, comprising a first corrugating cylinder (2) and a second corrugating cylinder (3), a heating cylinder (4), at least one introducing cylinder (5, 6) for the first corrugated cardboard ribbon (7), at least one introducing cylinder (8) for a second cardboard ribbon (9) and at least one extracting cylinder (10) for the corrugated cardboard produced with a single flat surface (11), where all said cylinders (2, 3, 4, 5, 6, 8, and 10) are supported by a frame (12) and are capable of rotating around their respective axes all arranged parallel to each other, characterized in that the heating cylinder (4) is arranged tangentially to the second corrugating cylinder (3) and downstream of the line (20) where the first contact between the first already corrugated cardboard ribbon (7) and the

second flat cardboard ribbon (9) occurs; that the introducing cylinder (8) for the second flat cardboard ribbon (9) is positioned above the gluing cylinder (22); that the extracting cylinder (10) for the produced corrugated cardboard (11) with a flat surface is arranged on the side of the heating cylinder (4) that happens to be opposite the side on which the first point of contact (20) occurs.

2. A device according to claim 1, characterized in that the line (20) where the first contact occurs between the first corrugated cardboard ribbon (7) and the second cardboard ribbon (9) lies on the lateral surface of the heating cylinder (4).

3. A device according to claim 1, characterized in that the heating cylinder (4), the first corrugating cylinder (2) and the second corrugating cylinder (3) are arranged with their rotating axes (13-15) in the same plane.

4. A process for the production of corrugated cardboard with a single flat surface comprising the phases of:

- introducing a first cardboard ribbon (7) between a pair of corrugating cylinders (2, 3) fitted with projections engaging each other, so as to corrugate said first cardboard ribbon (7);
- applying glue on the crests of the corrugations of said first cardboard ribbon (7);
- applying a second flat ribbon (9) on the tops of the corrugations of the first ribbon (7), so as to form a corrugated cardboard (11) with a single flat surface;
- heating and activating the glue;

characterized in that the first point of contact (20) between the corrugated cardboard ribbon (7) and the second cardboard ribbon (9) is set on the heated lateral surface of the cylinder (4) and that the gluing occurs during the residence on the cylinder (4), on which said second cardboard ribbon (9) is kept stretched, while the opposite crests of said first corrugated cardboard ribbon (7) are unsupported.

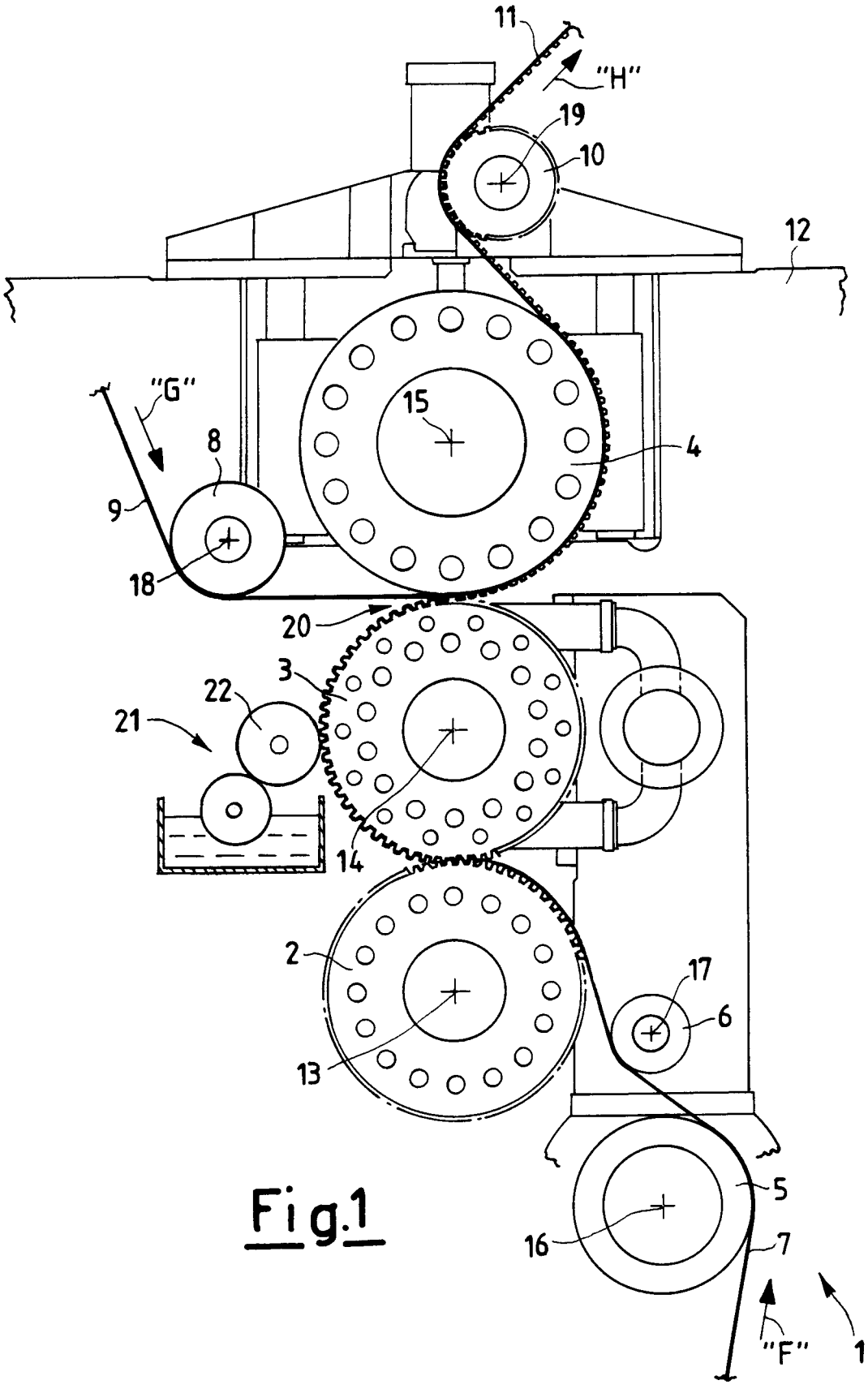

Fig.1