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(54) Method and arrangement for manufacturing framed panels

(57) A method and an arrangement for manufacturing framed panels (1) having a supporting frame and a wire mesh portion, comprising providing a frame including two frame members (5a, 5b), providing a plurality of wires (10) extending in between said frame members (5a, 5b), arranging a plurality of transverse sections (7) extending transversely to said wires, between the frame members (5a, 5b), and attaching each transverse section (7) to the wires (10) and the frame members (5a, 5b), thereby forming the wire mesh portion (3) integrally with the frame.

According to the method, the only required attachment operation is directed to the transverse sections, spanning across the framed panel, connecting the frame members and securing the longitudinal wires running essentially in parallel with the frame members. Therefore, the manufacturing process can be performed continuously and cost effectively.

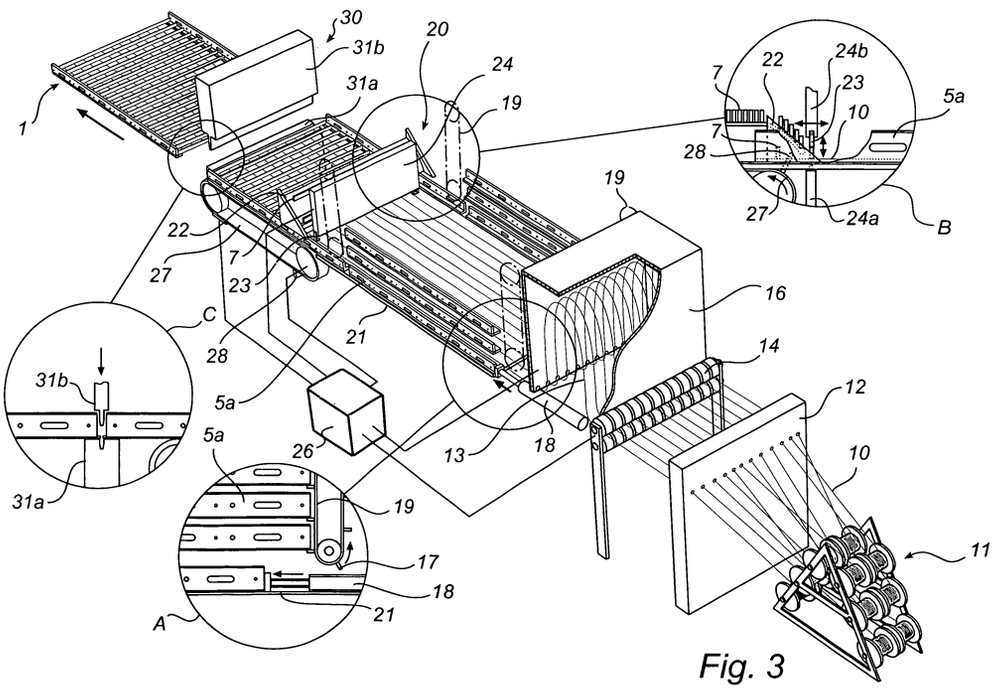

Fig. 3

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Description

Technical Field

[0001] The present invention relates to a method for manufacturing framed panels having a rigid frame and an infill member, such as a wire mesh portion. The invention also relates to an arrangement for performing the method.

Technical Background

[0002] This mentioned type of framed panels are known in the art, and intended to form a continuous fence by interconnecting the frames of a plurality of framed panels.

[0003] Such fences can be used in a wide variety of applications, such as for enclosing dangerous industry equipment, enclosing a construction site, dividing a storage space (such as the attic or basement of an apartment building) into separate cubicles, or providing a stop at the back end of shelves in a storage facility.

[0004] When manufacturing framed panels of the above mentioned kind, the following procedure is normally followed:

[0005] First, a number of required holes are drilled in two precision tubes, e.g., according to the norm DIN 2395. These tubes are then connected with 3-4 shorter transverse tubes to form a frame defining the size and shape of the framed panel. The tubes are welded together using MIG welding. On the frame a prefabricated, pressure welded wire mesh is attached. The wire mesh is attached using pressure welding, which requires a high welding power as the current must cross the tubes. In order not to deform the tubes the welding is performed using low pressure during a long time, which results in increased heat generation in the material. The welded framed panel then needs to be straightened in a straightener, as the wire mesh deforms the frame during the pressure welding. Finally, the entire element is surface treated, typically epoxy coated or hot dip galvanized.

[0006] This process is very time consuming and expensive, due to the many different types of discontinuous process steps. For example, the step of surface treatment of the assembled element is complicated, as it includes either complex coating application or submerging the entire element in a container of coating. At the same time, this step must be performed after the assembly of the elements, as the surface coating makes welding of precision tubes difficult or impossible.

Summary Disclosure of the Invention

[0007] An object of the present invention is to mitigate the above mentioned problems, and to enable cost efficient manufacturing of framed panels.

[0008] This and other objects are achieved with a method of manufacture of the type mentioned by way of introduction, comprising providing a frame including two frame members, providing a plurality of wires extending in between the frame members, arranging a plurality of transverse sections extending transversely to said wires between the frame members, attaching each transverse section to the wires and the frame members, thereby forming the wire mesh portion integrated with the frame.

[0009] According to this method, the only required attachment operation is directed to the transverse sections, spanning across the framed panel, connecting the frame members and securing the longitudinal wires running essentially in parallel with the frame members. Therefore, the manufacturing process can be performed continuously and cost effectively.

[0010] The method can comprise advancing the frame members and the wires during the attachment of the transverse sections. In this case, the manufacturing process is further improved and automated. Each transverse section can then be attached during a separate attachment operation, and the wires and frame members are advanced after each attachment operation. Thereby, the attachment operation can take place in the same location for all transverse sections, as the framed panel gradually is being formed.

[0011] The wires can be continually provided during the attachment of the transverse sections, and then cut off after completion of the framed panel. The cut can be effected essentially in level with the upstream end of the frame members, marking the end of the framed panel. This is particularly useful when the frame and wires are advanced by a conveyor, as several consecutive framed panels can be assembled without interruption. After the completion of each element, a new pair of frame members is provided, and the attachment of transverse sections continues during forward movement of the frame.

[0012] The wire sections can be attached by a welding process, such as pressure welding. In this case, although closed profiles may be used, the frame members are preferably open profiles, such as U-profiles, L-profiles, I-profiles, etc, eliminating the need to drive current through the thin walls of precision tubes or the like. Further, the profiles preferably have a corrugated portion, to which the wires are attached.

[0013] Such a corrugation limits the contact surface between the profiles and the wire sections, thereby decreasing the heat generation during welding. This makes is possible to perform the welding operation without deteriorating any surface treatment of the wires and profiles, allowing for such treatment to be performed before assembly of the framed panel. This further simplifies the process of framed panel manufacturing, eliminating the complicated step of coating the assembled framed panel.

Brief Description of the Drawings

[0014] The present invention will be better understood from the preferred embodiments more clearly described

with reference to the appended drawings.

[0015] Fig 1 shows an example of a framed panel assembled by the method according to the invention.

[0016] Fig 2 shows an example of an U-profile suitable for use in the framed panel in fig 1.

[0017] Fig 3 shows schematically a manufacturing line according to an embodiment of the invention.

Detailed description of preferred embodiments

[0018] The framed panel 1 in fig 1 comprises a frame 2, and a wire mesh 3. The frame 2 only extends along two opposing sides 4a, 4b of the framed panel, and is formed by two frame members 5a, 5b. The wire mesh 3 includes a first set of longitudinal wires 6, aligned in parallel with the members 5a, 5b, and a second set of transverse sections 7. The transverse sections 7 are connected to the two frame members 5a, 5b, and are further attached to each of the wires 6.

[0019] The frame members 5a, 5b are preferably pieces of U-profile, which will be described in more detail with reference to fig 2. The longitudinal wires 6 are preferably made from steel wire, for example with a diameter of 2-5 mm. The transverse wire sections 7 are preferably flat rolled wires arranged to be attached standing up, i. e., with their thin side facing the longitudinal wires 6. This improves the stability of the framed panel, which compensates for the lack of conventional transverse frame members. As there are several transverse sections connected to each pair of frame members, a satisfying stability is obtained. Also, the small contact area between the frame members 5a, 5b and the flat sections 7 results in a higher welding pressure, and thus shorter welding time.

[0020] Note, however, that the transverse sections 7 may also be plain wire, preferably of a dimension greater than that of the wires 6. The sections 7 may also be of open section, such as U-section, or of closed section, such as a square-section. In case of a closed section, it may be advantageous to provide the sections 7 with protruding flanges in order to improve welding performance.

[0021] An example of such a frame member is illustrated in fig 2 with reference numeral 5. The illustrated frame member 5 is of U-section with three section portions 8a, 8b, 8c. At least one of the section portions 8a is corrugated, offering a limited contact surface with a contacting material, i.e., the sections 7. During manufacturing, this side 8a can be arranged to face the transverse sections 7, so that the sections 7 only make contact with the member 5 at the crests 9 of the corrugation 8a. During welding, this restricts the heat generation in the material, reducing the risk for damage of the surface treatment.

[0022] As shown in fig 2, the corrugation 8a can have a plurality of crests 9. However, in principle only one crest is necessary, even though at least two crests are preferred in order to achieve a satisfactory stability.

[0023] The crests can be of elongated form, and extend in parallel with a bending between two section portions. This is advantageous, as the frame member normally is welded to components arranged transversely to the frame member. The crests will then be oriented across such a transverse component, thereby offering satisfying welding strength.

[0024] The crests can further extend along the entire length of the profile, which facilitates manufacturing of the members in a continuous process.

[0025] It is understood that the crests can have any suitable form and shape, and that the invention is not restricted to the simple shape shown in fig 2.

[0026] Further, the frame member 5 is provided with a number of holes 15, adapted to facilitate the connection of several framed panels with each other. For this purpose, it may be advantageous to provide holes of different shape and size, as illustrated in fig 2.

[0027] The corrugation 8a and the holes 15 can be formed during the drawing of the frame member 5 in a manner known per se. Most preferred, however, is to form the member in a roll forming line, in which the desired profile is obtained by folding a strip of sheet metal using many small folding steps.

[0028] The manufacturing of framed panels 1 according to the invention is shown in fig 3.

[0029] First, to the right in fig 3, a plurality of runs 10 of wire are continuously provided from a number of rolls 11 or the like. The wire can be surface treated, using for example hot dip coating (thermo-galvanized), zinc-aluminum coating (thermo-zinc/aluminum, zinc-iron alloy coating. These runs 10 are guided by guides 12 to form a pattern of parallel wires, and pulled by feeding rollers 14 to the following process steps.

[0030] The wire runs 10 are fed to a buffering arrangement 16, shown schematically in fig 3 as a partially broken away cover in which the runs 10 of wire form loops 13. The buffering arrangement 16 is adapted to receive the wire runs 10 with a constant speed governed by the rollers 14, while providing wire to the following manufacturing process in discontinuous steps. The size and frequency of these steps are governed by the following welding procedure, described below.

[0031] After the buffering arrangement 16 is arranged an arrangement 17, 19 for providing frame members in the form of U-profiles 5a, 5b, one along each side of the wires 10. The U-profiles can be surface treated in the same way as the wires 10. The arrangement 17, 19 can comprise chains 17 with supports 19, cooperating to hold a number of profiles 5a, 5b. By moving the chains 17, the profiles 5a, 5b are released one at a time onto a supporting surface 21, arranged immediately below the wires 10. After being released onto the supporting surface 21, the U-profiles 5a, 5b are pushed in position by cylinders 18. This is shown in more detail in the enlarged area A.

[0032] The wire runs 10, surrounded on their free sides by the U-profiles 5a, 5b, are next fed to an assem-

bly arrangement 20, more closely shown in the enlarged area B. The arrangement 20 includes a feeder 22, for providing transverse sections 7, extending across the wire runs 10, from one U-profile 5a to the other 5b. The sections 7 can be, e.g., flat rolled wires, and can also be surface treated in the same way as the wires 10 and U-profiles 5a, 5b.

[0033] The arrangement 20 further includes a welding device 24a, 24b, for attaching the transverse sections 7 to the wire runs 10 and the U-profiles 5a, 5b. The welding device comprises an first member 24a providing the welding energy, in the illustrated case positioned below the wires 10. On the other side of the wires, i.e., in this case on the top side, the welding device has an abutment member 24b.

[0034] The welding device 24a, 24b comprises one set of members 24a and 24b for each run of wire 10, and one additional set for each profile 5a, 5b. The welding process can be of any conventional kind, but is preferably a pressure welding process.

[0035] A gripping unit 23 is arranged to the abutment member 24b and adapted to remove a section 7 from the feeder 22 and place it between the welding device members 24a, 24b, in an upright position, i.e., having a small contact surface with the profiles 5a, 5b and the wires 10. The griping unit 23 then holds the section 7 in place during the welding procedure.

[0036] The assembly arrangement 20 cooperates with a conveyor 27, arranged to pull the partly assembled framed panel, comprising U-profiles 5a, 5b, wire runs 10 and a number of attached transverse sections 7, past the assembly arrangement 20. The conveyor 27 can comprise protrusions or fingers 28 that engage with the first transverse section attached to a panel, and then pulls the partly assembled panel forward in steps. For each step, the attaching arrangement 20 provides and attaches a new transverse section 7. Through this process, transverse sections 7 are attached along the length of the U-profiles 5a, 5b, at regular intervals, while wire 10 is simultaneously pulled from the buffering arrangement in steps.

[0037] The conveyor 27 is in the illustrated example a continuous conveyor track 27, onto which the fingers 28 are attached. Other conveyors can be used, such as a sliding unit with fingers 28, arranged to slide back and forth between the attaching arrangement 20 and the following process.

[0038] The distance between the transverse sections 7 is decided by a controller 26, arranged to control the operation of the conveyor 27, the feeder 22 and the welding device 24. The controller 26 also controls the profile providing arrangement 17, 19, the buffering arrangement 16 and the feeding rollers 14, in order to synchronize the preceding wire feeding process with the assembly process.

[0039] On the down stream side of the assembly arrangement 20, the assembled framed panel is conveyed past a cutting device 30, adapted to cut each of the wire runs 10. The cutting device 30 can comprise upper and lower members 31a, 31b, one on each side of the wire runs 10, the members being arranged to be forced together thereby cutting each wire run 10. This is shown in some detail in the enlarged area C.

[0040] By cutting all wire runs 10, the longitudinal wires 6 are formed. At the same time, the framed panel 1 is dislocated from the preceding process, and can be handled separately. A supporting device (not shown) can be arranged to handle the framed panel 1 in a suitable manner, for example moving it onto a carrier such as a pallet.

[0041] In the case of pretreated components (wire 10, U-profiles 5a, 5b and sections 7), the framed panel 1 is ready to use directly from the manufacturing line.

[0042] A number of variations of the above described embodiment is possible within the scope of the appended claims, as will be appreciated by the skilled artisan. For example, certain sections of the process may be excluded, such as the buffering arrangement 16 and the supporting device.

[0043] Further, even though it is preferred to provide wire continuously and to cut the wire for each framed panel, this is not necessary for the invention. If advantageous, the wires can be precut, and then assembled, making the cutting device 30 superfluous. Such implementing choices have to be made in accordance with the intended application.

[0044] I addition, the attachment process, herein described as a welding process, may be any other suitable process. The welding device 24 is then of course substituted by a corresponding device, such as a device for adhesive attachment, a device for applying mechanical fasteners, etc.

[0045] Also, other frame members than U-profiles can be used, including other open profiles such as L-profiles, I-profiles, Y-profiles, etc. In principle, any configuration of member can be used, as long as it provides the required structural strength. Even closed section frame members may be used, by adapting them to enable a welding process of the kind described herein. Such adaptation may include providing corrugations in one of the section sides, in order to minimize the contact surface.

Claims

1. A method for manufacturing framed panels (1) having a supporting frame (4a, 4b) and a wire mesh portion (3), said method comprising the steps of:

   providing a frame including two frame members (5a, 5b),
   providing a plurality of wires (6; 10) extending in between said frame members (5a, 5b),
   arranging a plurality of transverse sections (7) extending transversely to said wires between

said frame members (5a, 5b), and
attaching each transverse section (7) to said wires (6; 10) and said frame members (5a, 5b), thereby forming said wire mesh portion (3) integrally with said frame (4a, 4b).

2. A method according to claim 1, further comprising advancing said frame members (5a, 5b) and said wires (6; 10) during the attachment of said transverse sections.

3. A method according to claim 2, wherein each transverse section (7) is attached during a separate attachment operation, and wherein the wires (6; 10) and frame members (5a, 5b) are advanced after each attachment operation.

4. A method according to claim 1 - 3, wherein said wires (6; 10) are continually provided during the attachment of the transverse sections (7), and then cut off after completion of the framed panel (1).

5. A method according to claim 1, wherein said transverse sections (7) are attached by a welding process, such as pressure welding.

6. A method according to any of the preceding claims, wherein said frame members (5a, 5b) are open profiles, such as U-profiles.

7. A method according to claim 6, wherein said profiles (5a, 5b) have a corrugated portion (8a), to which said transverse sections (7) are attached.

8. A method according to claim 6, wherein said profiles (5a, 5b) have a plurality of holes (15), adapted for joining separate framed panels (1) together.

9. A method according to claim 7, wherein said profiles (5a, 5b) are drawn in a roll forming line, said corrugated portion (8a) being formed during the drawing process.

10. A method according to claim 8, wherein said profiles (5a, 5b) are drawn in a roll forming line, said holes (15) being formed during the drawing process.

11. An arrangement for manufacturing framed panels (1) having a supporting frame (4a, 4b) and a wire mesh portion (3), comprising
means (17) for providing a frame including two frame members (5a, 5b),
means (11, 12, 14, 16) for providing a plurality of wires (6; 10) extending in between said frame members,
means (22) for arranging a plurality of wire sections (7) transversely to said wires (6; 10), said transverse sections (7) extending between said frame members, and
means (24) for attaching each transverse section (7) to said wires (6; 10) and said frame members (5a, 5b), thereby forming said wire mesh portion (3) integrated with said frame (4a, 4b).

12. An arrangement according to claim 11, further comprising means (14, 19) for advancing said frame members (5a, 5b) and said wires (6; 10) past said attaching means (24).

13. An arrangement according to claim 11 or 12, wherein said wires (10) are continually provided, and further comprising means (30) for cutting said wires (10) after completion of each framed panel (1).

14. A framed panel manufactured in a method according to any one of claims 1-10.

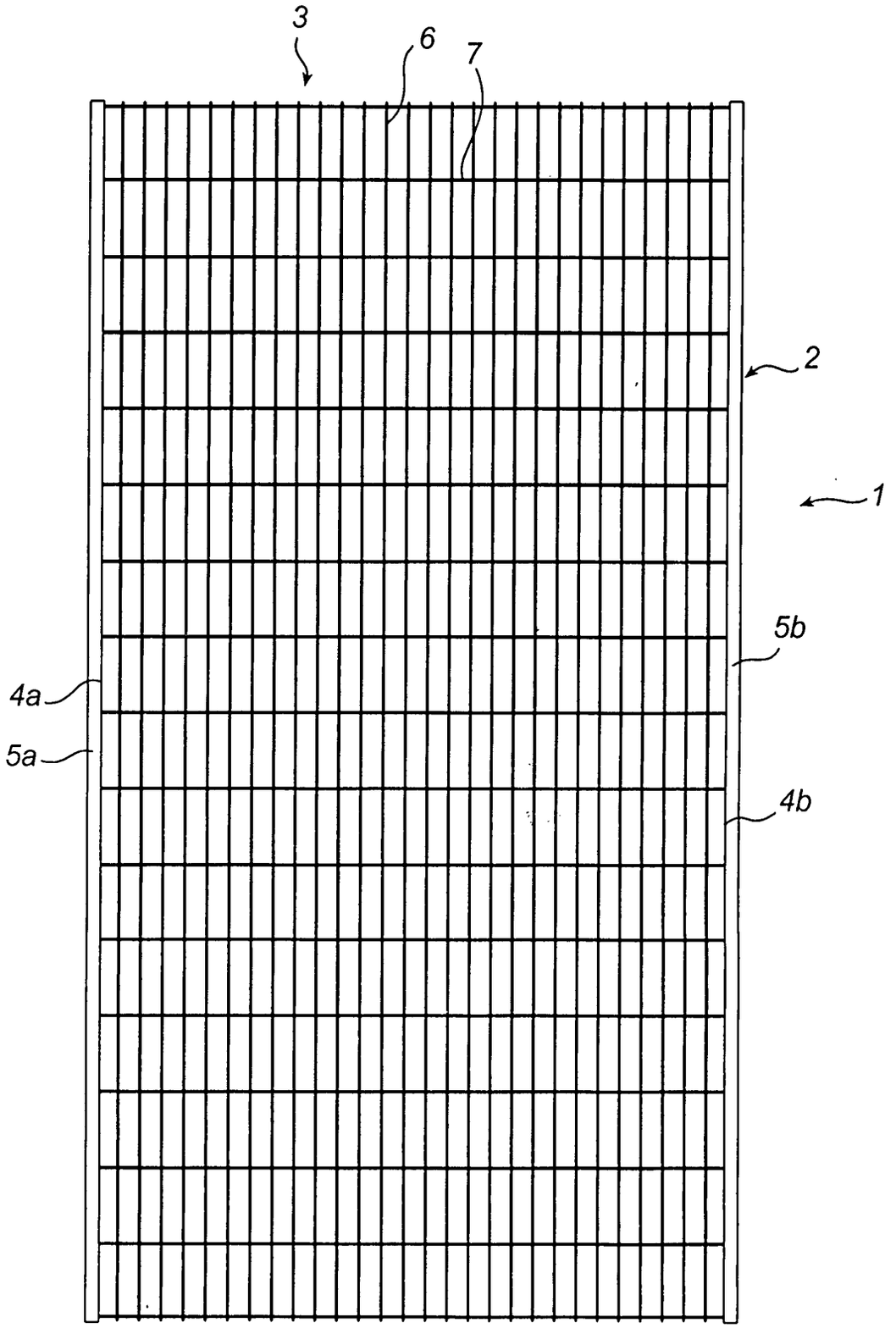

Fig. 1

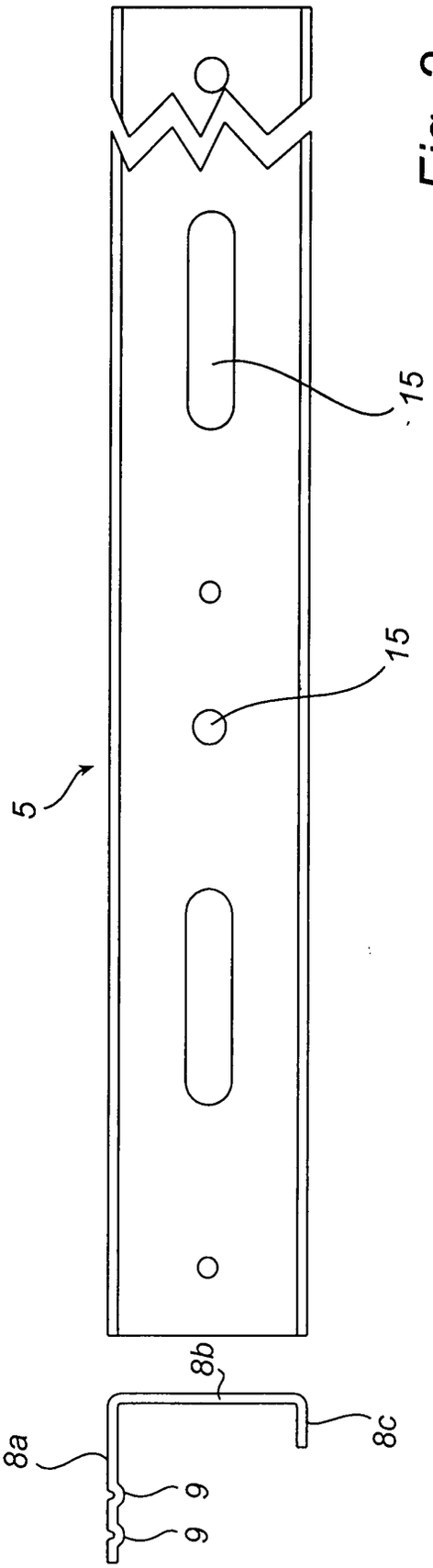

Fig. 2

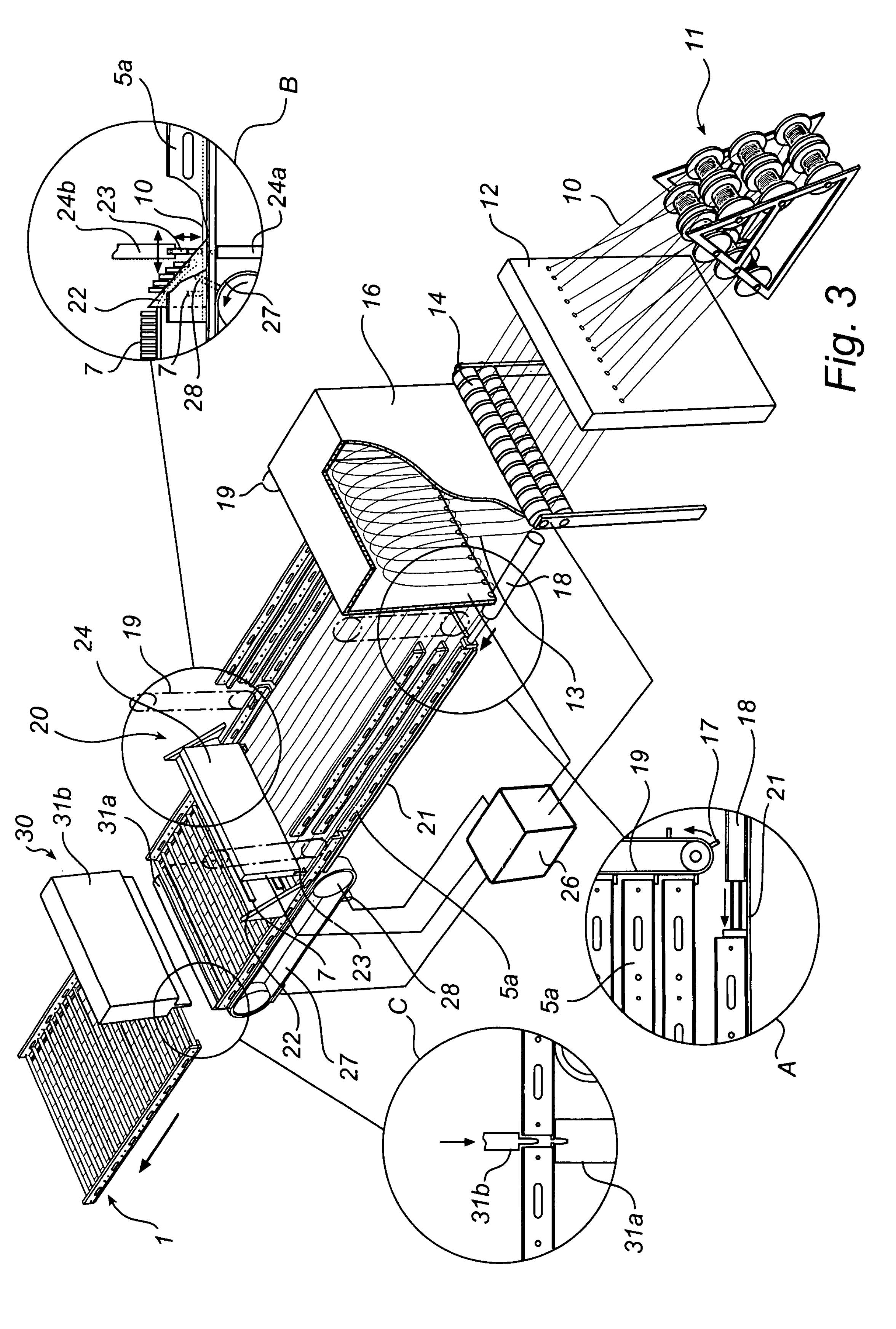
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 8703

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.7)
X Y	US 3 770 245 A (MURDOCK R) 6 November 1973 (1973-11-06) * column 2, line 66 - column 5, line 47; figures 1-6 *	1,6,7,14 8	E06B3/70 E04H17/16
Y	US 1 251 926 A (SCHLESINGER A H) 1 January 1918 (1918-01-01) * page 3, line 54-63; figure 3 *	8	
A	FR 2 775 494 A (BERGAMINI ROGER) 3 September 1999 (1999-09-03) * page 4, paragraph 5; claims 1,9; figure 2 *	1-14	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E06B
E04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	20 September 2002	Kofoed, P

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 8703

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20-09-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3770245 A	06-11-1973	NONE	
US 1251926 A		NONE	
FR 2775494 A	03-09-1999	FR 2775494 A1	03-09-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82