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(54) Device to load-unload articles between two work stations and relative method

(57) Device and method to load-unload articles (11) from a first work station (12) to a second work station (13), comprising at least a first movable surface (14) able to move from a first position to receive the articles (11), cooperating with said first work station (12), to a second position to unload said articles (11) onto a second movable surface (18), said second movable surface (18) being able to move from a first position to receive the articles (11), located below said first movable surface (14), to a second position to unload said articles (11) cooperating with said second work station (13).

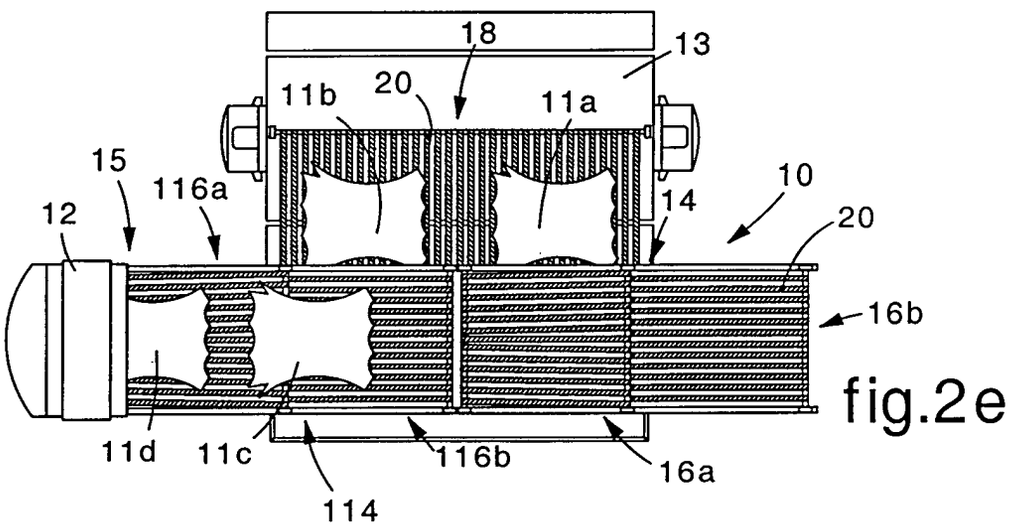

fig.2e

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Description

FIELD OF THE INVENTION

[0001] The invention refers to a device to load-unload articles between two work stations. The invention also refers to the method actuated by said device.

[0002] The invention is applied, preferably but not exclusively, in the tanning industry and more generally in the working of industrial hides, to transfer the hides substantially automatically between two work stations, in particular between a pressing station and a drying station.

BACKGROUND OF THE INVENTION

[0003] In the state of the art, industrial hides arriving from tanning and dying processes must be subjected to drying treatments so that they can be sent to subsequent treatments and/or for making up. These treatments normally provide a first pass in a press device, the function of which is to stretch, open and clean the hides and to remove a first part of their humidity, and a subsequent pass in a vacuum drying device in which the drying is completed, until all or most of the residual humidity is eliminated.

[0004] The dried hide can then be transferred to a further device to re-acquire, at least in part, the required softness.

[0005] To accelerate the transfer of the hides between the various stations and to reduce the incidence of the work force, automatic devices have been proposed to load the hides from the work station upstream and unload them in the downstream work station. These devices normally comprise transport elements arranged to receive the hides emerging from the press device and to transfer them to the vacuum drying device.

[0006] One conventional embodiment in this field, described in EP-B-791.080, provides a loading-unloading device comprising a first fixed surface adjacent to the press device, a second upper movable surface located immediately downstream of said first fixed surface and a third lower movable surface arranged below said second movable surface.

[0007] In one embodiment of EP'080, the third lower movable surface is equipped with a movement orthogonal to that of the second upper movable surface and is able to deposit the hides on the various levels of the dryer.

[0008] This device has a problem of productivity, since it has downtimes deriving from its structure which cannot be eliminated, and problems caused by the number of movements of the articles.

[0009] To be more exact, the presence of a fixed surface associated with a movable surface has the disadvantage that the transfer of the hides from the press device has to be interrupted, or in any case slowed down, when the upper movable surface is performing the cycle to unload the hides onto the lower movable surface.

[0010] Moreover, since the upper movable surface is made of a single element, there is the further disadvantage that, to unload the hides onto the lower movable surface, it must necessarily perform a travel for its whole length; this causes problems because the times of the cycle are extended and because of the space required at the side of the device.

[0011] The presence of a fixed surface adjacent to the press device in practice prevents the downtimes from being used during the transfer of the hides between the two movable surfaces, for example using two first movable surfaces in alternative.

[0012] Moreover, the device has problems of overall bulk deriving from the very presence of the fixed surface.

[0013] The present Applicant has devised and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

SUMMARY OF THE INVENTION

[0014] The invention is set forth and characterized essentially in the main claims, while the dependent claims describe other innovative characteristics of the invention.

[0015] The purpose of the invention is to achieve a method and a device to load-unload articles between two work stations which will allow to increase productivity and operational efficiency with respect to conventional devices, given the same labor force requirements and the same energy used.

[0016] A further purpose is to reduce the overall bulk occupied by the device, with respect to conventional devices.

[0017] In accordance with these purposes, a device to load-unload articles between two work stations according to the invention comprises at least a first upper movable surface, able to move from a first position to receive the articles, cooperating with the first work station, to a second position wherein it unloads the articles onto a second lower movable surface, wherein said second unloading position is located remote from said first work station.

[0018] The second lower movable surface is able to move, in a direction substantially orthogonal, or in any case angled, to the direction of movement of the first upper movable surface, from a first position to receive the articles to a second position wherein it unloads said articles onto the second work station.

[0019] In a first embodiment, the second work station lies on a lower plane with respect to the plane on which the second movable surface lies.

[0020] According to a variant, said second work station is substantially coplanar with the plane on which the second movable surface lies.

[0021] The movable surfaces mentioned above have their respective work planes consisting of transport elements, such as strips, belts, ropes or similar, with a di-

rection of movement substantially parallel to the direction of movement of the entire surface.

[0022] In a preferential embodiment, the first upper movable surface consists of at least two elements, respectively a first element and a second element substantially aligned with the first element, at least temporarily, along the direction of movement of the surface itself.

[0023] It comes within the field of the invention that said first surface is divided into three, four, five or more elements, substantially aligned with each other.

[0024] In a first embodiment, said at least two elements are mechanically constrained together.

[0025] According to a variant, said at least two elements are independent from each other.

[0026] In one embodiment of the invention, the sum of the lengths of said at least two elements corresponds substantially to the width of the second lower movable surface.

[0027] At the start of the cycle to transfer the hides, the first element is arranged in a position adjacent to the first work station and is able to receive at least one article unloaded from the first work station, to transfer it to the second element and then to receive at least a second article unloaded from said first work station.

[0028] When respective articles to be transferred have been unloaded onto said two elements, both elements translate to simultaneously unload the respective articles onto the second lower movable surface, which then in turn translates, for example, orthogonally to complete the cycle of transferring said articles between the two work stations.

[0029] The unloading of the articles is achieved thanks to the movement of the strips, belts or similar which make up the work plane of the movable surface, combined with the movement in the same direction of the whole movable surface.

[0030] By using a movable surface made of two or more elements which are able to simultaneously unload the respective articles onto the second lower movable surface, it is possible to considerably increase productivity compared with conventional devices.

[0031] In fact, to unload the articles onto the surface below, the first upper movable surface does not need to make a travel for its entire length, but only for the length of a relative element.

[0032] If for example there are five elements which make up the first surface, the travel which every element has to make is equal to 1/5 of the travel necessary if the first surface were made in a single element.

[0033] Moreover, we also obtain a considerable advantage in terms of the space required at the side of the device, since, in order to unload the articles, the first upper movable surface does not have to move completely beyond the second lower movable surface, but remains substantially contained in the lateral bulk of said second surface.

[0034] In another embodiment, there are two first upper movable surfaces, driven alternately, wherein while one of said two first upper surfaces receives the articles from the first work station and transfers them to the second lower movable surface, the other is arranged in a position to receive new articles from said first work station.

[0035] This embodiment allows to further increase the productivity of the device according to the invention, reducing downtimes to a minimum and increasing the transfer speed of the articles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] These and other characteristics of the invention will be clear from the following description of a preferential form of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

- Figs. 1a-1f show a side view of the operating cycle of the loading-unloading device according to the invention;
- Figs. 2a-2f show a plane view of the device in Figs. 1a-1f in the various operative steps;
- Figs. 3a-3b show a prospective view of a detail of the device according to the invention in a first embodiment;
- Figs. 4a-4b show a variant of Figs. 3a-3b.

DETAILED DESCRIPTION OF SOME PREFERENTIAL EMBODIMENTS

[0037] The attached Figures show in sequence the steps of the operating cycle of an automatic loading-unloading device 10, used in this case to transfer industrial hides 11 from a press device 12 to a vacuum drying device 13.

[0038] The device 10 comprises a first upper movable surface 14 to transport the hides 11, substantially horizontal and arranged, at the start of the transfer cycle, with one rear end in a position adjacent to the outlet 15 of the press device 12.

[0039] Said first upper movable surface 14 consists, in this case, of two elements, respectively 16a and 16b, arranged to receive the hides 11 emerging from the press device 12, and to transfer them onto a second lower movable surface 18 arranged below said first movable surface 14.

[0040] As we said before, there can be three or more elements which make up the first movable surface 14.

[0041] To be more exact, each of the elements 16a and 16b has a work plane consisting of transport elements 20 such as strips, belts, ropes or similar, which can be driven in the direction 17 in order to translate forwards the hides 11 resting thereon, simultaneously with the movement in the same direction 17 of the surface 14.

[0042] Therefore, at least a first hide 11a discharged

from the outlet 15 of the press device 12 can be translated forwards by activating the movable work plane of the first element 16a and progressively transferred onto the second element 16b.

[0043] The transfer is facilitated, in this case, by the fact that the second element 16b is slightly lower than the first element 16a, as can be seen in Fig. 3a.

[0044] In this case, the two elements 16a and 16b of the first upper movable surface 14 are connected to each other, on their sides, by means of a respective lever system 21 which can be selectively driven by a relative jack 22.

[0045] Driving the jacks 22 allows to take the two elements 16a, 16b from a first offset position (Fig. 3a) to receive the articles 11 to a second position, substantially coplanar (Fig. 3b) to transfer and unload the articles 11 onto the lower movable surface 18; in the coplanar position, a gap 19 is maintained between the two elements 16a, 16b, for the reasons clarified hereafter.

[0046] According to a variant, as shown in Figs. 4a, 4b, the two elements 16a and 16b are always located substantially on the same plane and, at start of cycle, and when the step of loading the respective articles 11 has been completed, can perform a movement of reciprocal separation, so as to create said gap 19. This movement of separation is actuated by a respective linear actuator 121 lying substantially on the same plane as said elements 16a, 16b.

[0047] After the first hide 11a has been located on the second element 16b, at least a second hide 11b is discharged from the press device 12 and arranged on the work plane of the first element 16a.

[0048] In the description that follows, we shall speak of first 11a and second 11b hide, but it is obvious that there can be more than one hide, for example three or four, unloaded onto each of said elements 16a, 16b.

[0049] In the variant shown with a line of dashes in Fig. 1a, the outlet 15 of the press device is located lower with respect to the plane on which the first upper movable surface 14 lies, the first element 16a of said surface is inclined downwards at the rear part and pivots on the second element 16b so that, at start of cycle, it can make a partial rotation to align with said second element 16b.

[0050] Moreover, in a preferential embodiment, at least the work planes of the elements 16a and 16b have their respective transport elements 20 slightly diverging to widen and extend the hides 11 resting thereon.

[0051] When the at least two hides 11a and 11b are resting on the two elements 16a and 16b of the first movable surface 14 (Fig. 1a), the second element 16b translates slightly forwards to allow the first element 16a to lower itself and align with the second element (Fig. 3b), or translates slightly forwards (Fig. 4b) to create the gap 19 to unload the articles 11.

[0052] The first upper movable surface 14 is lowered so as not to interfere with the outlet 15 of the press device 12 and to allow the hides 11a and 11b to be transferred to the second lower movable surface 18 underneath (Fig. 1b).

[0053] The first surface 14 advances in the direction 17, progressively and simultaneously unloading the hides 11a and 11b onto the second movable surface 18.

[0054] The hides 11a and 11b are transferred from the first upper 14 to the second lower 18 movable surface thanks to the movement of the respective movable work planes, which translate the respective hides 11a and 11b forwards, causing them to fall beyond the front ends of the respective elements 16a and 16b, and thus to be unloaded.

[0055] It is possible to unload the hide 11b thanks to the gap 19 between the first 16a and second element 16b.

[0056] As is clear from Figs. 1b and 1c, the transfer of the hides 11a and 11b onto the second lower movable surface 18 occurs with a travel of the first upper surface 14 which is equal to the length of an element 16a or 16b, that is, equal to half the overall length of the surface 14 itself.

[0057] Moreover, to unload the articles 11 the first upper surface 14 never goes beyond the space occupied by the second lower movable surface 18.

[0058] In the embodiment shown here, while the hides 11a and 11b are unloaded simultaneously from the first upper 14 to the second lower movable surface 18, another first movable surface 114, also consisting of two elements 116a and 116b, moves into correspondence with the outlet 15 of the press device 12, to repeat the same cycle of discharging and receiving two new hides 11c and 11d (Figs. 1c and 1d).

[0059] Since the operations to unload the two hides 11a and 11b from the first upper 14 to the second lower movable surface 18, and the two hides 11c and 11d from the press device 12 to the other first surface 114 occur simultaneously, the downtimes are reduced to a minimum and the speed of loading the hides 11 is considerably increased.

[0060] As soon as it has received the hides 11a, 11b, the second lower movable surface 18 moves, in this case, in a direction 23 orthogonal to the direction of movement of the surfaces 14, 114, in order to unload the hides 11a and 11b, in a conventional manner, into the vacuum drying device 13; then, it repositions itself and waits to receive the two new hides 11c and 11d (Fig. 1e) from the movable surface 114.

[0061] In this case, the drying device 13 is arranged on a lower plane with respect to the plane on which the second movable surface 18 lies, but it comes within the field of the invention that said second movable surface 18 and said vacuum drying device are substantially coplanar.

[0062] Simultaneously, the first upper movable surface 14 performs a cyclical movement to return to the initial position, prepared to receive two more hides discharged from the press device 12 (Fig. 1f).

[0063] It is obvious, however, that modifications and/or additions can be made to the method and device 10

as described heretofore, without departing from the spirit and scope of the invention.

Claims

1. Device to load-unload articles (11) from a first work station (12) to a second work station (13), **characterized in that** it comprises at least a first (14) and a second (18) movable surface, said first movable surface (14) being able to move from a first position to receive the articles (11), cooperating with said first work station (12), to a second position to unload said articles (11) onto the second movable surface (18), said second movable surface (18) being able to move from a first position to receive the articles (11), located below said first movable surface (14), to a second position to unload said articles (11) cooperating with said second work station (13).

2. Device as in claim 1, **characterized in that** said second position to unload the articles (11) onto said second movable surface (18) is located remote from said first work station (12).

3. Device as in claim 1 or 2, **characterized in that** said first work station is a press device (12) for industrial hides (11) and said second work station is a vacuum drying station (13) for said hides (11).

4. Device as in claim 1, **characterized in that** said movable surfaces (14, 18) have their respective work planes consisting of transport elements (20), such as strips, belts, ropes or similar, with a respective direction of movement (17) substantially parallel to the direction of movement (17) of the relative surface (14, 18).

5. Device as in claim 1, **characterized in that** said first movable surface (14) consists of at least two elements, respectively a first element (16a) able to be arranged, at the start of the cycle to transfer the articles (11), in a position cooperating with said first work station (12) and a second element (16b) substantially aligned with the first (16a) in the direction of movement (17) of the surface (14) itself.

6. Device as in claim 5, **characterized in that** said first element (16a) is able to receive at least one article (11) unloaded from the first work station (12), to transfer it to the second element (16b), and then to receive at least a second article (11) unloaded from said first work station (12).

7. Device as in claim 5, **characterized in that** said first and said second element (16a, 16b) are associated with each other by means (21, 121) able to define thereof at least a position to unload articles (11) wherein, on the plane on which said elements (16a, 16b) lie, there is a gap (19) to unload the articles (11) between the adjacent ends of said elements (16a, 16b).

8. Device as in any claim from 5 to 7 inclusive, **characterized in that** said first element (16a) of the first movable surface (14) is able to be temporarily arranged in a first position to receive articles (11) inclined downwards at the rear part and cooperating with an outlet of said first work station (12).

9. Device as in claim 8, **characterized in that**, once the article (11) has been received from said first work station (12), said first element (16a) is able to make a partial rotation to align itself with the relative second element (16b).

10. Device as in claim 5, **characterized in that** there are three or more elements which make up said first movable surface (14).

11. Device as in claim 1, **characterized in that** it comprises two first movable surfaces (14, 114), alternately driven, wherein, while one (14 or 114) of said two surfaces receives the articles (11) from the first work station (12) and transfers them simultaneously to the second movable surface (18), the second (114 or 14) of said first surfaces arranges itself in a position to receive new articles (11) from said first work station (12).

12. Device as in claim 5, **characterized in that** at least the work planes of the elements (16a, 16b; 116a, 116b) of the first movable surfaces (14, 114) have their respective transport elements (20) slightly diverging in order to widen and stretch the articles (11) resting thereon.

13. Device as in claim 1, **characterized in that** said second movable surface (18) is able to move in an angled direction (23) with respect to the direction of movement (17) of said first movable surface (14, 114).

14. Method to load-unload articles (11) from a first work station (12) to a second work station (13), **characterized in that** it uses at least a first (14) and a second (18) movable surface, wherein said first movable surface (14) is arranged in a first position to receive said articles (11) cooperating with the outlet of the first work station (12), and is then translated to a second position to unload said articles (11) onto a second movable surface (18), said second movable surface (18) being then translated from a first position to receive the articles (11), arranged below said first upper movable surface (14), to a second position to unload said articles (11) cooperating with

said second work station (13).

15. Method as in claim 14, **characterized in that** the second unloading position wherein the first movable surface (14) unloads said articles (11) onto the second movable surface (18) is located remote from the first work station (12).

16. Method as in claim 14, **characterized in that** the second work station (13) lies on a lower plane with respect to the plane on which said second movable surface (18) lies.

17. Method as in claim 14, **characterized in that** the second work station (13) lies substantially coplanar with the plane on which said second movable surface (18) lies.

18. Method as in claim 14, wherein said movable surface (14) consists of two elements, a first (16a) and a second (16b), comprising a work plane including transport elements (20) movable in the direction of movement (17) of said movable surface (14), **characterized in that** at least a first article (11a) emerging from the first work station (12) is arranged on the work plane of said first element (16a), then translated forwards by activating said transport elements (20) of said work plane of the first element (16a) and progressively transferred onto the work plane of the second element (16b), and then at least a second article (11b) is discharged from the first work station (12) and arranged on the work plane of the first element (16a), said first surface (14) being then translated to transfer said articles (11a, 11b) simultaneously onto said second movable surface (18) by simultaneously unloading from the respective elements (16a, 16b) thanks to the activation of said transport elements (20).

19. Method as in claim 14, **characterized in that** it provides to use in alternate fashion two of said first movable surfaces (14, 114), and **in that**, while said articles (11a, 11b) are unloaded from the first movable surface (14) to the second lower movable surface (18), the other (114) of said first upper movable surfaces moves into correspondence with an outlet (15) of the first work station (12), to repeat the cycle of receiving at least two new articles (11c, 11d).

20. Method as in claim 19, **characterized in that** while said other first movable surface (114) moves into a position to simultaneously transfer said articles (11c, 11d) onto said second movable surface (18), said first movable surface (14) returns to a position to receive other articles (11) from said first work station (12).

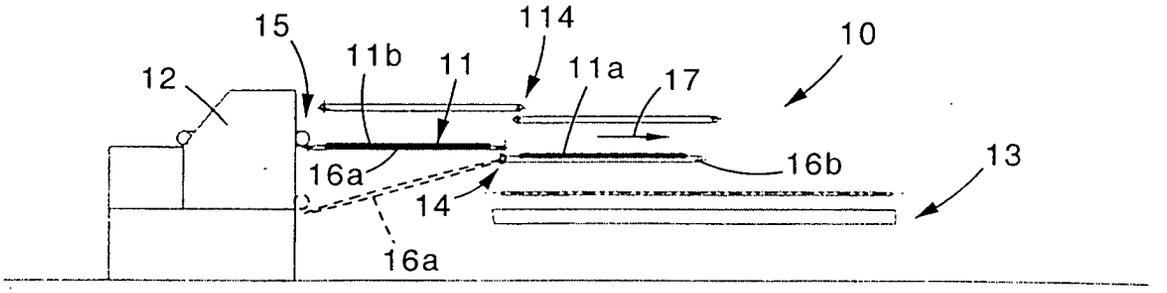

fig. 1a

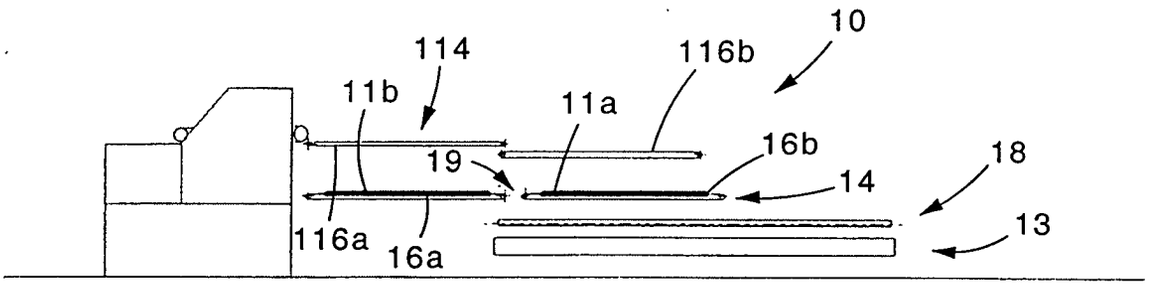

fig. 1b

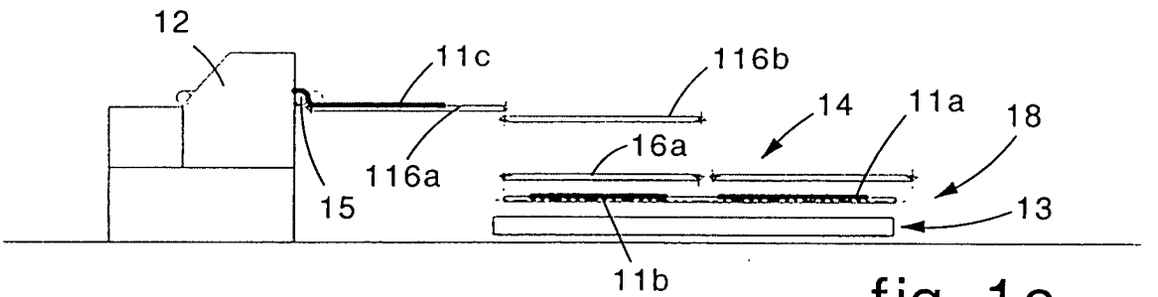

fig. 1c

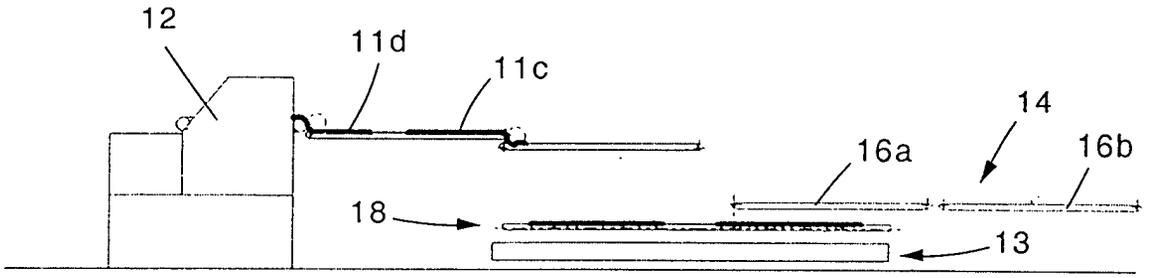

fig. 1d

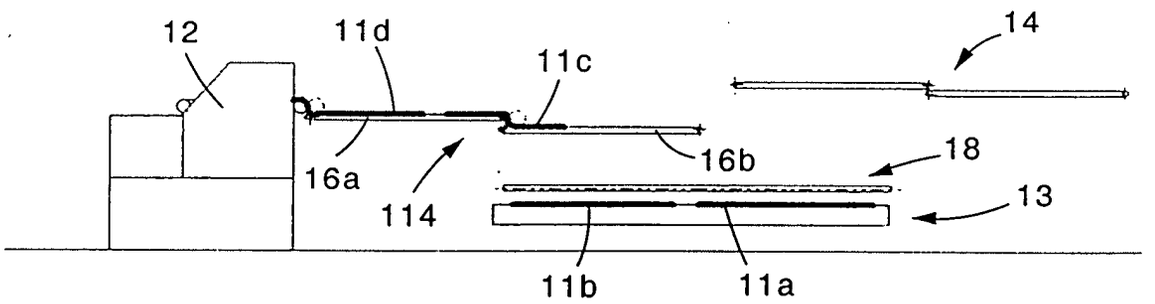

fig. 1e

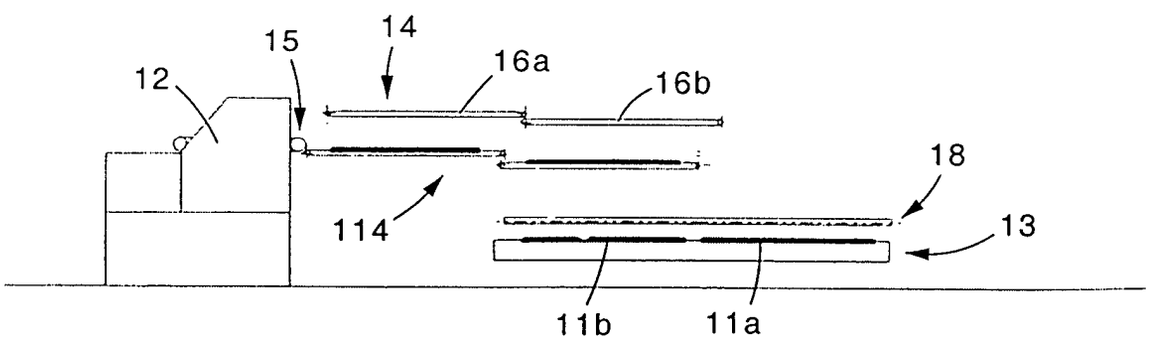

fig. 1f

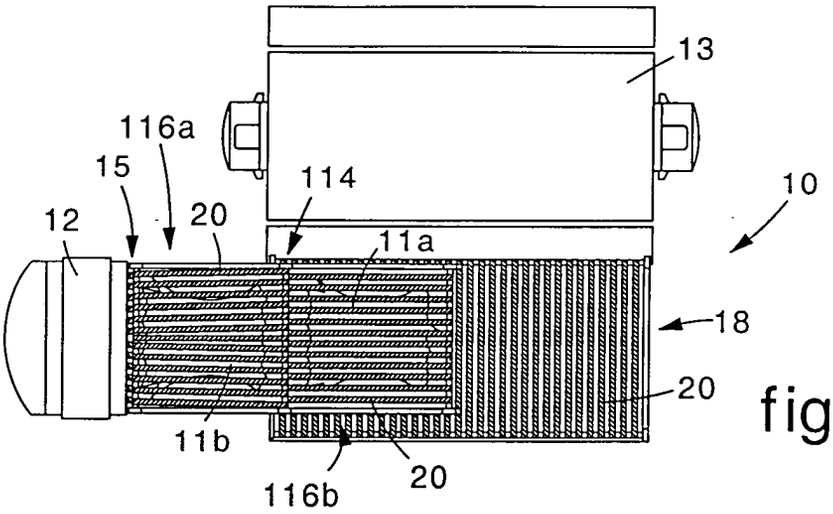

fig. 2a

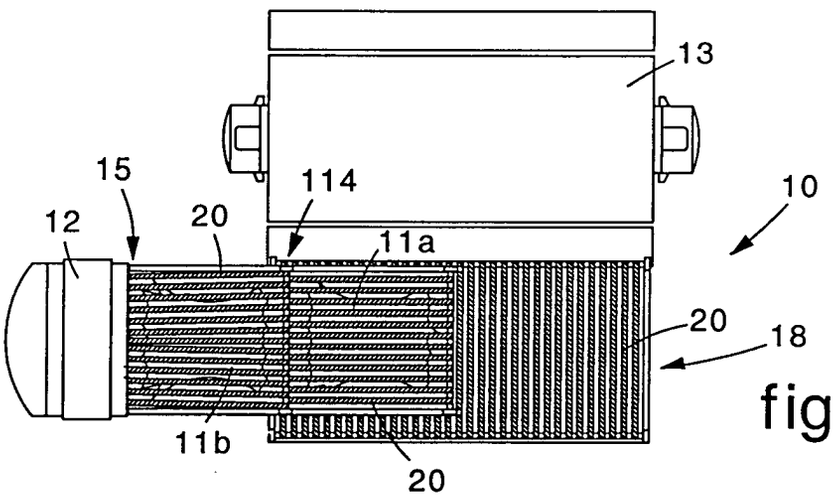

fig. 2b

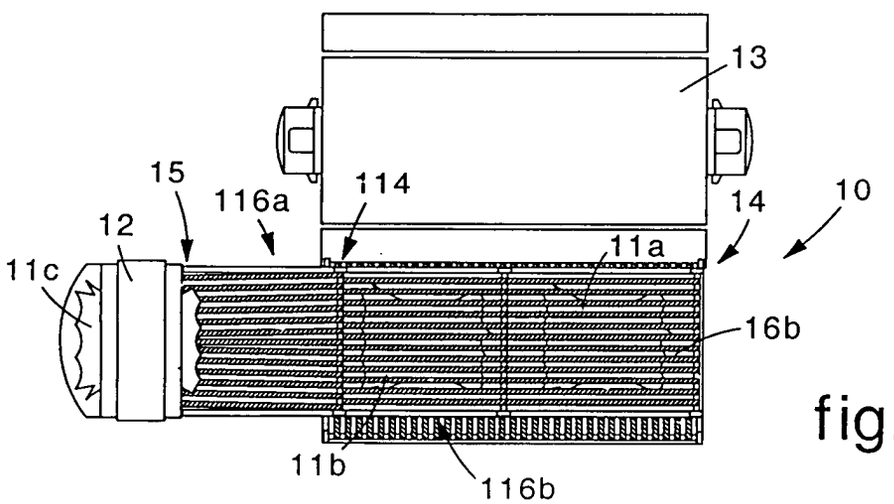

fig. 2c

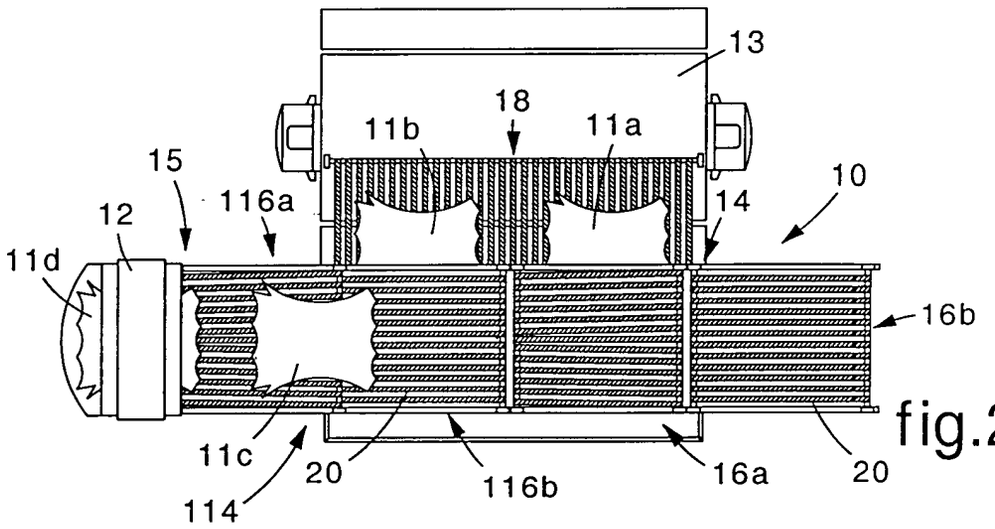

fig.2d

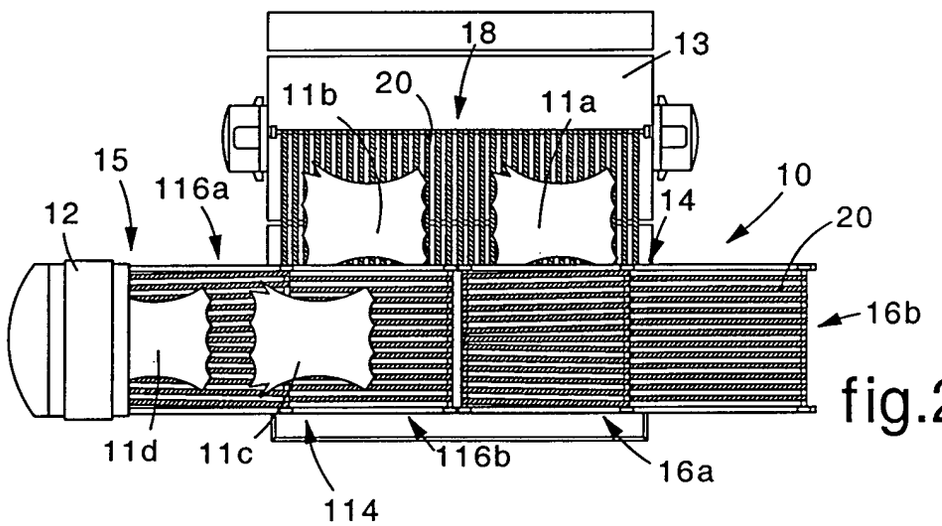

fig.2e

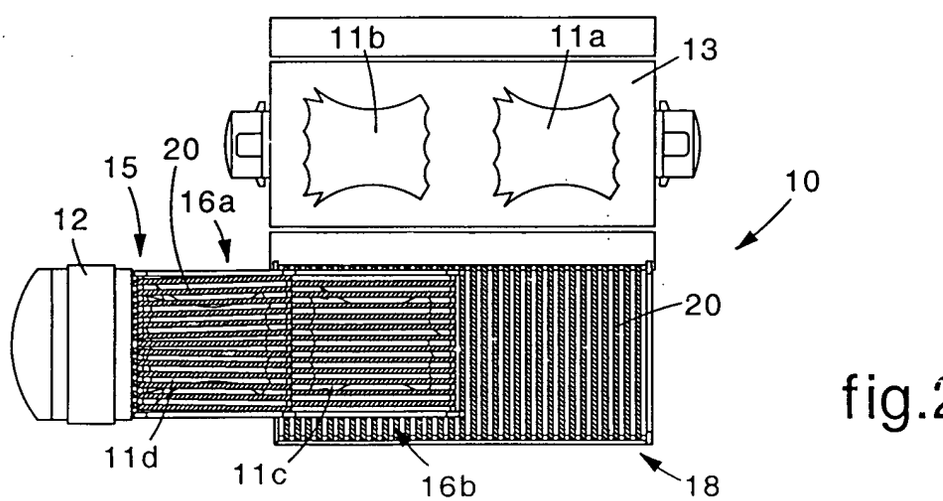

fig.2f

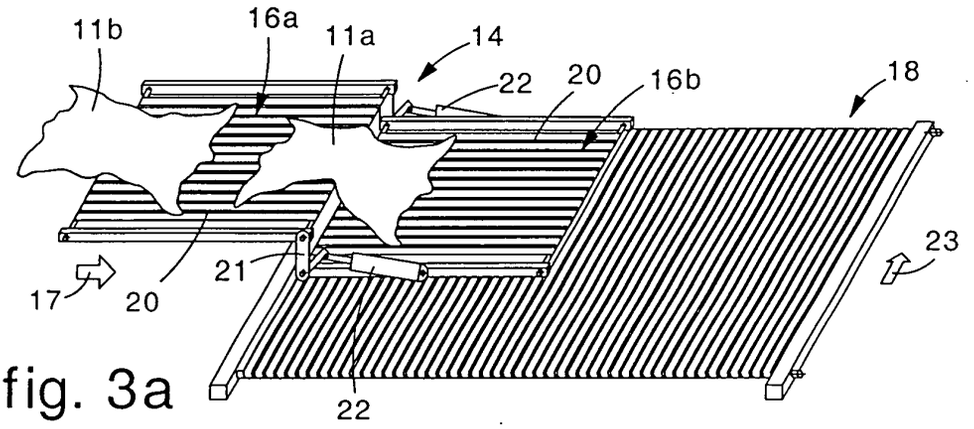

fig. 3a

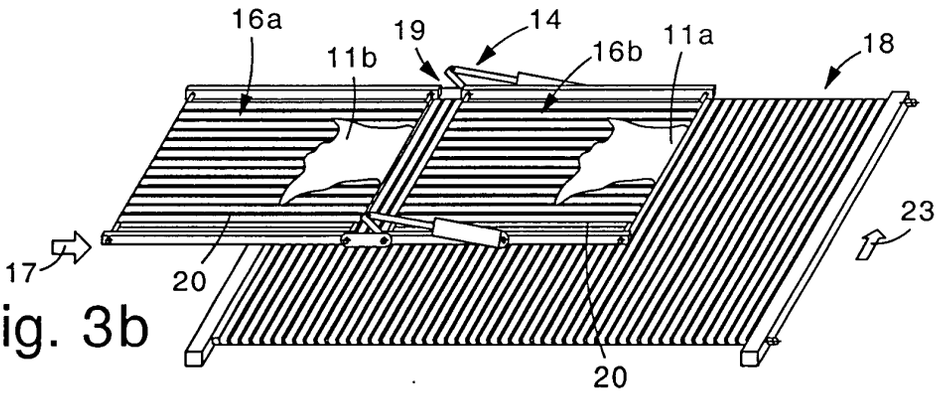

fig. 3b

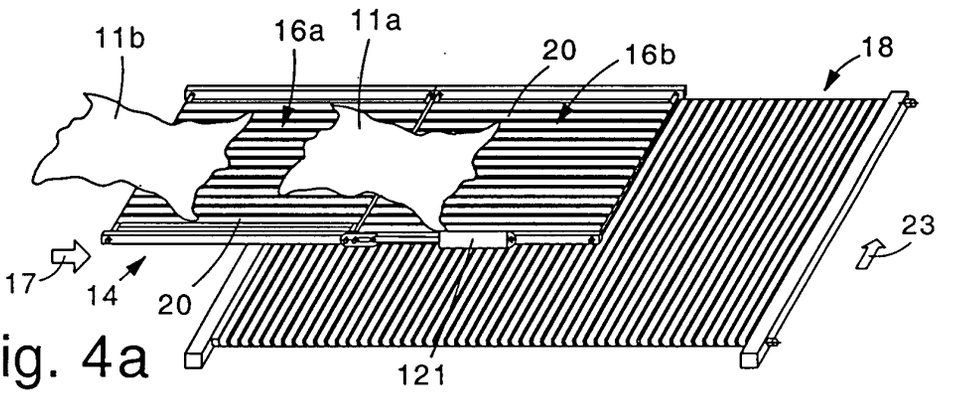

fig. 4a

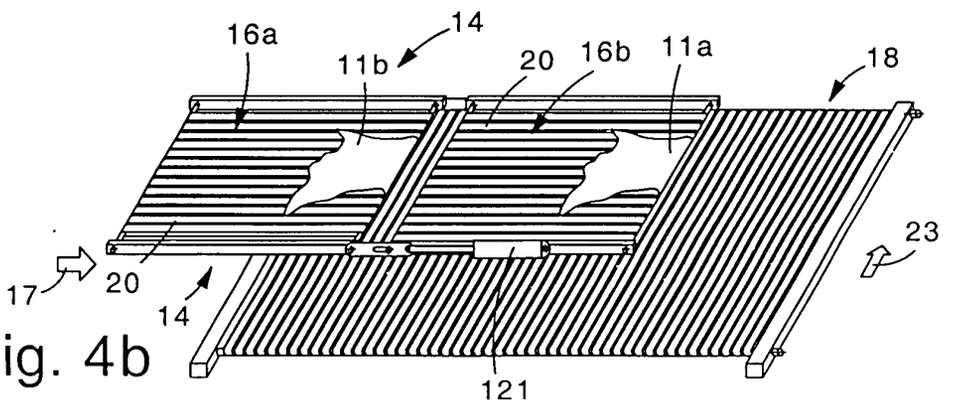

fig. 4b

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 11 6903

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)
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THE HAGUE	2 July 2002	Pussemier, B

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