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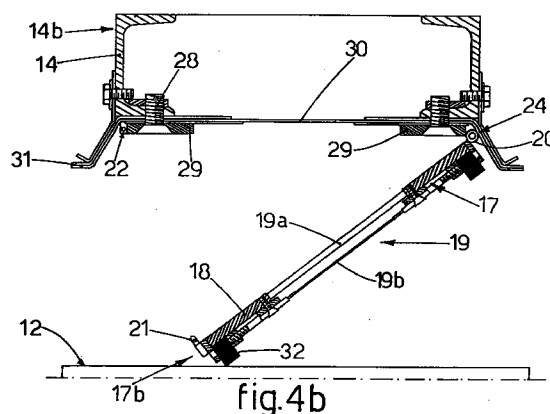
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(54) **Device for the quick hooking and unhooking of wire meshes support frame in vacuum driers**

(57) Device for the quick hooking and unhooking of wire meshes support frame in vacuum driers including at least a plane (12) to support the article to be dried cooperating at the upper part with a cover (14) which can be moved from a lowered, closed position (14a) to a raised position (14b) wherein the article is loaded/unloaded, the cover (14) supporting at least a first frame (29) supporting a covering sheet (30) defining, in the first, lowered position (14a), an air-tight chamber (23) with the supporting plane (12), the cover (14) supporting, below the covering sheet (30), at least a wire mesh element (19a, 19b) or similar or comparable element suitable to allow the passage of liquids and/or humidity in vapour form, the wire mesh element positioning itself in the working position in contact with the article to be dried, the wire mesh element (19a, 19b) being associated with a second, autonomous frame (17) including a second, inactive position (17b) at least partly remote from the cover (14) although connected solidly thereto, in the inactive position (17b) both faces of the wire mesh element (19a, 19b) being visible and easily accessible for cleaning, maintenance and/or replacement of the wire meshes (19a, 19b).



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Description

This invention concerns a device for the quick hooking and unhooking of a wire meshes support frame in vacuum driers as set forth in the main claim.

The invention is applied in order to facilitate quick operations for cleaning, maintenance and/or replacement of the wire meshes used in vacuum driers to cover the hides to be dried.

These driers are used to eliminate water, liquids or humidity from products of various types and in particular to dry hides which have undergone industrial processing such as, for example, dyeing.

There are various devices known to the state of the art for drying hides. Of these, vacuum driers are particularly appreciated by those working in the field due to the rapidity of the working cycle and because they are able to preserve the peculiar qualities of the hide processed. The functioning of such driers is based on the fact that the hide is simultaneously heated and subjected to vacuum so as to facilitate and accelerate the removal of the liquids in the form of vapour.

Vacuum drying devices such as are known to the state of the art include at least a working plane, equipped with the appropriate heating means, with which a removable cover cooperates at the upper part.

Such devices generally include a plurality of working planes and removable covers positioned one above the other so as to constitute a structure with several planes; in this way many hides can be dried simultaneously, which speeds up the working cycle.

The hide to be dried is laid on the heated working plane and then pressed by the removable cover which, closing on the working plane, causes an air-tight chamber to be formed inside which a vacuum is created by means of a pump.

The removable covers are shaped hollow inside and a single supporting frame or surround is solidly associated with the lower part thereof, by means of hooking elements such as screws, bolts, tie bars or otherwise, arranged along the whole perimeter of the cover.

The frame supports a covering sheet, for example made of PVC, suitable to create the air-tight chamber, with the lower part of which at least two filter wire meshes are associated. The wire meshes are positioned one above the other, respectively the inner wire mesh with a wide gauge and the outer wire mesh with a fine gauge, which allow the passage and subsequent discharge of the liquids removed in the form of vapour.

The fine-gauge outer wire mesh is brought into contact with the hide to be dried and serves to prevent marks being made on the surface of the hide, whereas the wide-gauge wire mesh serves to facilitate the correct flow and easy removal of the vapours.

As the working cycle is repeated, the filter wire meshes, and particularly the fine-gauge outer wire mesh, are easily subject to the accumulation between

the mesh of particles of dirt, dye, limestone and other.

In order to ensure that the vaporised liquids pass efficiently, and therefore that the hide is dried efficiently, the filter wire meshes therefore need frequent cleaning, maintenance or even replacement. In driers known to the state of the art, this involves long and laborious operations to dis-assemble the frame from the cover in order to release it from the machine to allow the wire meshes to be cleaned and/or maintained or replaced.

In this case it is necessary to remove all the hooking elements along the whole perimeter of the cover, raise the frame, position it at the side of the machine and then carry out the necessary operations; this also involves the participation of a large number of workers.

Re-assembly is equally long and laborious, and involves laborious operations to center and position the equipment which, given the weights and sizes involved, are extremely difficult.

Therefore, in driers known to the state of the art, operations to clean, maintain or replace the filter wire meshes require the machine to be stopped for a long time, and also considerable physical effort on the part of a large number of workers; as a result, the operations of cleaning, maintenance and replacing are carried out less frequently, and this causes a decrease in the efficiency of the machine and therefore a deterioration in the quality of the product obtained.

The present applicant has therefore designed and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

The invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of the invention is to enable operations of cleaning, maintenance and/or replacement of the filter wire meshes and/or the cover to be carried out simply, quickly and with a limited number of steps, so that the downtimes of the machine are reduced to a minimum, as are the risks to the safety of the workers and also the number of workers involved in these operations.

The invention is applied to vacuum driers of a substantially conventional structure, equipped with cover means which can be moved from a raised position wherein the article can be loaded/unloaded, to a lowered position closed on the supporting plane so as to form an air-tight chamber inside which the vacuum is created.

According to the invention, to the lower part of the cover means is attached a first frame over which the sheet, for example made of PVC or similar material, is laid to form the air-tight chamber, and a second frame, below the first, over which at least a wire mesh element or other similar or comparable element is laid; the wire mesh element is placed in contact with the surface of the hide to be dried when the removable cover is in the lowered position over the working plane.

The second frame is connected to the removable

cover or to the first frame by means of quick hooking and unhooking means in such a way as to be able to assume, by means of rotation and/or translation, at least an inactive position wherein it is at least partly remote from the cover although still solidly associated therewith.

When the second frame is in the inactive position, the wire mesh elements are accessible for cleaning, maintenance and replacement on both faces, which facilitates easy and quick operations.

According to the invention, the second frame cooperates with clamping means which have the function of maintaining it in its working position when the drier is operational.

The second frame is made to pass into the inactive position, when the cover is raised, by de-activating the clamping means.

According to a variant, the second frame is made to pass into the inactive position by de-activating the clamping means when the cover is in the lowered position and subsequently moving the cover into the raised position.

The transition from the inactive position to the working position can be facilitated, without any manual intervention, by moving the cover into its lowered position and subsequently activating the clamping means of the frame to the cover.

According to a variant, the transition from the working position to the inactive position and vice versa is achieved with the cover in the raised position, by means of the appropriate motor means opportunely associated with the frame.

The attached figures are given as a non-restrictive example and show some preferential embodiments of the invention as follows:

- Fig. 1 is a perspective drawing of a simplified model of a vacuum drier with a single working plane employing the device according to the invention;
- Fig. 2 shows a front view of Fig. 1;
- Fig. 3 shows a side view of Fig. 1;
- Fig. 4a shows an enlarged cross section of the detail A of Fig. 1 in a first working position;
- Fig. 4b shows the detail of Fig. 4a in a second, inactive position;
- Fig. 5 shows a variant of Fig. 4b;
- Fig. 6 shows another variant of the invention with a view from B of Fig. 2;
- Fig. 7 shows an exploded view of the enlarged detail C of Fig. 6;
- Fig. 8 shows a possible vacuum drier to which the invention is applied.

The model 10 of a vacuum drier includes a base structure 11 equipped at the upper part, for the purposes of this description, with a working plane 12 but the following comments are also valid to other driers

with more than one plane, of the type shown in Fig. 8.

The working plane 12 is heated by the appropriate heating systems, in this case of the type with circulating fluid, for example water or steam, heated by the heating means 13.

Above the working plane 12 there is a movable cover 14 suitable to assume at least two positions, respectively the first lowered position 14a, wherein it is closed on the working plane 12 so as to form an air-tight chamber 23 suitable to create a vacuum by means of a pump 15, and a second raised position 14b wherein it is raised above the working plane 12 to a desired height so as to allow the hide, dried or yet to be dried, to be loaded/unloaded.

The movable cover 14 is lifted/lowered from the first, lowered position 14a to the second, raised position 14b and vice versa by hydraulic means 16.

On the lower face of the cover 14 a first frame 29 is attached by means of hooking elements 28; the frame 29 supports a covering sheet 30, for example, made of PVC, which is suitable to create, in cooperation with air-tight means 31, the air-tight chamber 23 when the cover 14 is closed on the working plane 12. The cover 14 includes at the lower part spacers 32 which abut on the working plane 12.

On the lower part of the first frame 29 there is a second frame 17 consisting of a surround 18 on which at least two wire meshes 19 are stretched, respectively the wide-gauge inner wire 19a and the fine-gauge outer wire 19b; in this case, the surround 18 also supports air-tight means 31.

The second frame 17 is associated with moving means 24 which allow the frame 17 to pass from its normal working position, in close proximity to the first frame 29 and the cover 14, to at least a second inactive position 17b wherein it is at least partly remote from the cover 14 although connected thereto.

In this inactive position 17b, the wire meshes 19a and 19b are accessible to the workers for cleaning, maintenance and/or replacement on both faces, which facilitates easy and quick operations.

In the first embodiment as shown in Figs. 4a and 4b, the moving means 24 comprise hinge elements 20 which associate only one side of the second frame 17 to the first frame 29.

The hinge means 20 allow the second frame 17 to pass from the working position 17a to the inactive position 17b with progressive swinging movements with respect to the working plane 12.

In this case, the second frame 17 includes, at least on the side opposite that where the hinge elements 20 are, one or more hooking elements 21 cooperating with relative check elements 22 included on the first frame 29.

According to a first embodiment, the hooking elements 21 and check elements 22 are respectively nuts and tie bars.

According to a variant, the hooking elements 21

and check elements 22 are of the quick hooking and unhooking type, for example including pins.

The transition from the first position 17a to the second position 17b of the frame 17 is achieved by releasing the hooking elements 21 from the check elements 22. This operation of releasing the hooking elements 21 is advantageously carried out while the cover 14 is in the lowered position 14a, or in a position substantially near the working plane 12, in such a way that the transition from position 17a to position 17b takes place without any further manual intervention, taking the cover 14 to the raised position 14b.

When the desired intervention has been performed on the wire meshes 19a and 19b, the second frame 17 is taken from the inactive position 17b back to the working position 17, carrying the cover 14 from the raised position 14b to the lowered position 14a; in the lowered position 14a the second frame 17 is hooked to the cover 14 by constraining the hooking elements 21 to the relative check elements 22.

In the variant shown in Fig. 6 the moving means 24 comprise hinge means 120 distributed along the whole perimeter of the frame 17.

In this case, there are six hinge elements 120, two arranged on each long side and one on the two shorter sides.

The hinge elements 120 consist of at least two tubular elements 25, in this case three in number, of which at least one 25a is solidly associated with the first frame 29 and at least one 25b solidly associated with the second frame 17.

The tubular elements 25 may be temporally associated/disassociated from each other by inserting/extracting a pin 26 while they are aligned and coaxial, or when the frame 17 is in the working position 17a.

This solution allows the worker who cleans, maintains and/or replaces the wire meshes 19 to choose, according to the requirements on each occasion, which side of the second frame 17 to leave associated with the first frame 29, releasing the remaining three from the cover 14 by extracting the pins 26 from the relative tubular elements 25 of the hinge element 120.

In the variant shown in Fig. 5, the moving means 24 are of the parallelogram type and comprise pairs of arm elements 27, each one arranged on two opposite sides of the second frame 17, which allow the transition from the first working position 17a to the second inactive position 17b, while remaining on a plane parallel to the working plane 12. In this solution too, it is possible to ensure that the first working position 17a is maintained while the drier is operational, by means of hooking elements 21 included on the second frame 17 cooperating with mating check elements 22 included on the first frame 29.

According to another variant which is not shown here, the moving means 24 are of the drawer type and comprise guides which allow the frame 17 to slide and be extracted from one side of the cover 14 so that the

frame 17 assumes an inactive position 17b wherein the frame 17 is parallel and vertically in proximity to the first frame 29 but laterally released therefrom.

According to another variant of the invention which is not shown here, the second frame 17 includes a servo controlled motor drive which allows the worker who cleans, maintains and/or replaces the wire meshes 19a, 19b, to take the second frame 17 from position 17a to position 17b and vice versa automatically, by activating the appropriate activation devices.

Claims

1. Device for the quick hooking and unhooking of a wire meshes support frame in vacuum driers including at least a plane (12) to support the article to be dried cooperating at the upper part with a cover (14) which can be moved from a lowered, closed position (14a) to a raised position (14b) wherein the article is loaded/unloaded, the cover (14) supporting at least a first frame (29) supporting a covering sheet (30) defining, in the first, lowered position (14a), an air-tight chamber (23) with the supporting plane (12), the cover (14) supporting, below the covering sheet (30), at least a wire mesh element (19a, 19b) or similar or comparable element suitable to allow the passage of liquids and/or humidity in vapour form, the wire mesh element positioning itself in the working position in contact with the article to be dried, the device being characterised in that the wire mesh element (19a, 19b) is associated with a second, autonomous frame (17) including a second, inactive position (17b) at least partly remote from the cover (14) although connected solidly thereto, in the inactive position (17b) both faces of the wire mesh element (19a, 19b) being visible and easily accessible for cleaning, maintenance and/or replacement of the wire meshes (19a, 19b).
2. Device as in Claim 1, in which the second frame (17) is constrained to the first frame (29) by quick hooking/unhooking moving means (24).
3. Device as in Claim 1 or 2, in which the moving means (24) comprise at least a hinge element (20, 120) to connect at least one side of the second frame (17) to the first frame (29).
4. Device as in Claim 3, in which the hinge elements (120) are positioned on the four sides of the second frame (17) and comprise their own hooking and unhooking means.
5. Device as in Claim 4, in which the hinge elements (120) comprise at least two tubular elements (25) of which at least one (25b) is solidly associated with second frame (17) and at least one (25a) is solidly

associated with the first frame (29), the tubular elements (25) cooperating with pin-type hooking and unhooking means (26) which can be inserted/extracted.

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6. Device as in Claim 1 or 2, in which the moving means (24) are parallelogram type and comprise arm elements (27) arranged in pairs on opposite sides of the second frame (17).

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7. Device as in Claim 1 or 2, in which the moving means (24) are drawer-type means and comprise guides which allow the second frame (17) to slide laterally with respect to the first frame (29).

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8. Device as in any claim hereinbefore, in which in the first working position (17a) the second frame (17) is constrained to the cover (14) by hooking elements (21) cooperating with mating quick hooking and unhooking check elements (21).

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9. Device as in any claim hereinbefore, in which the second frame (17) cooperates with servo assisted activation means to be able to pass from the working position (17a) to the inactive position (17b) and vice versa.

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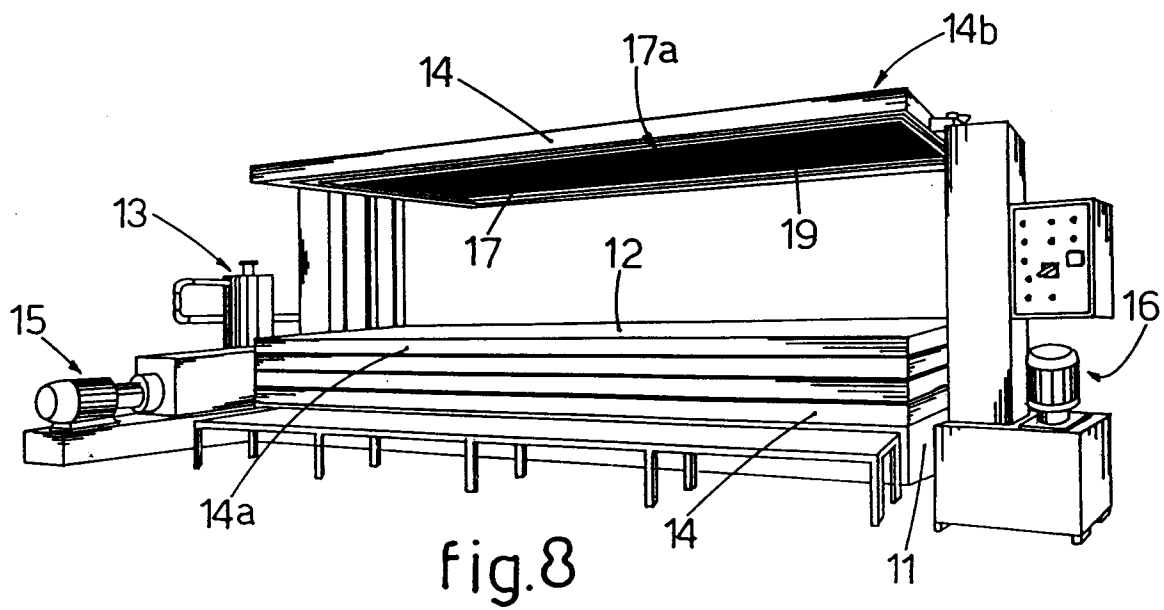
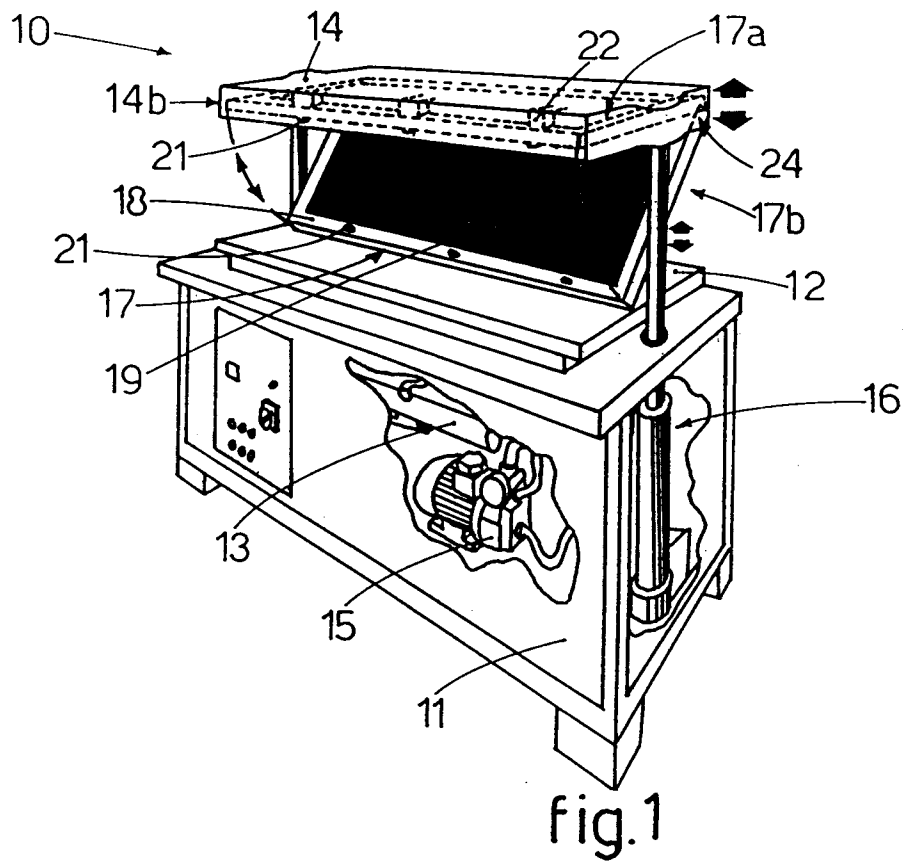
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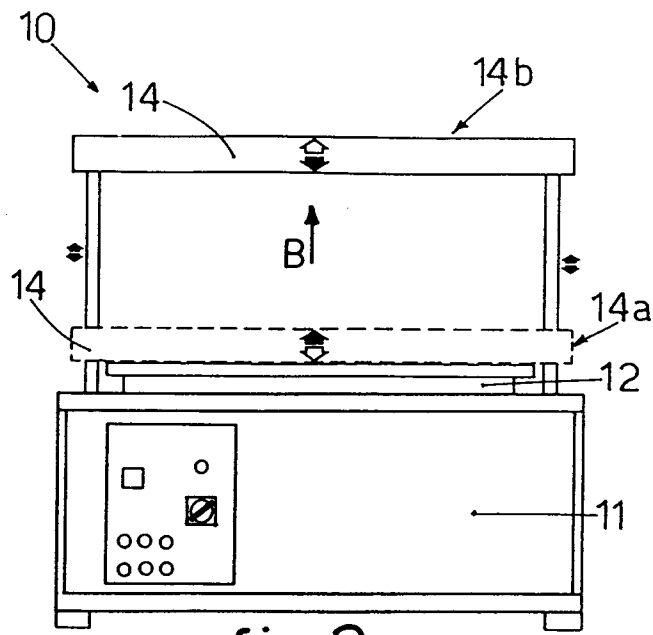


fig.2

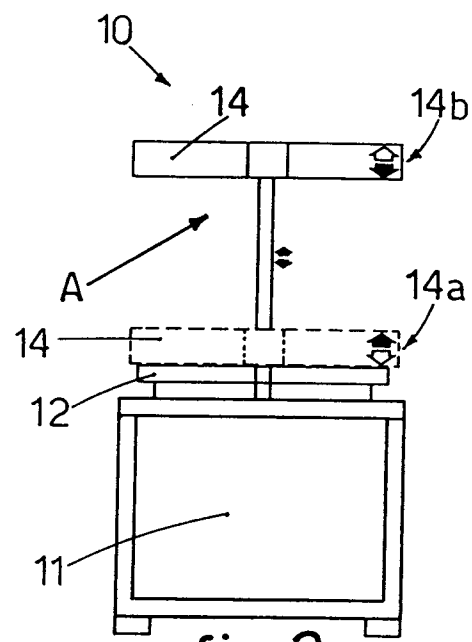


fig.3

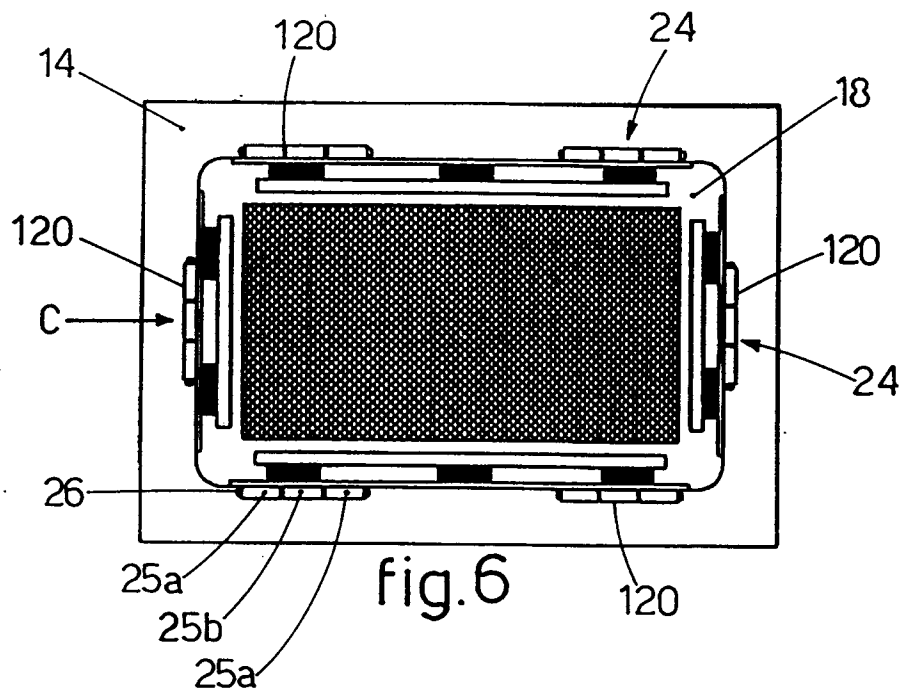


fig.6

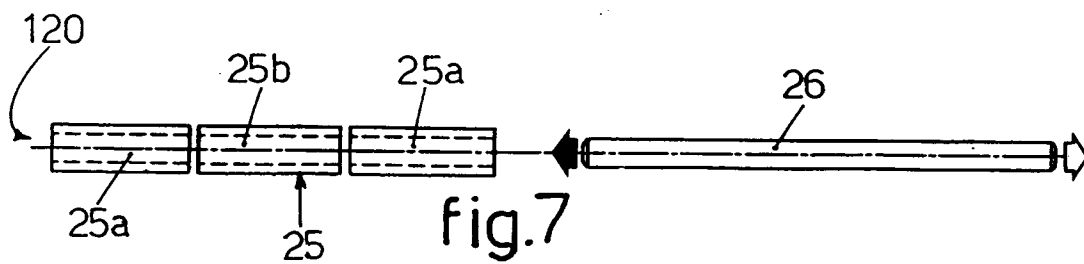


fig.7

