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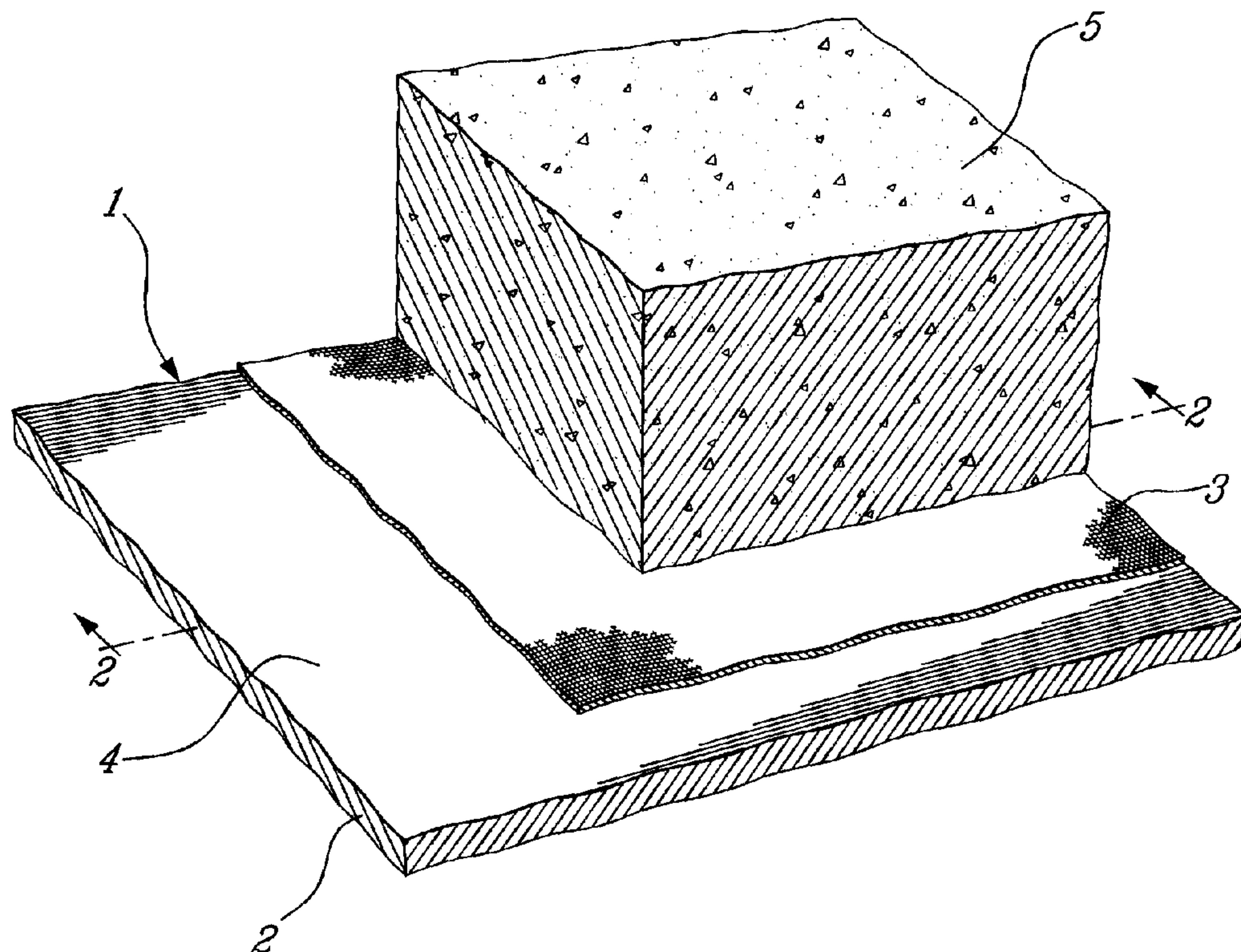
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(54) Titre : UTILISATION DE TOILE COMME DOUBLURE DE COFFRAGE A BETON

(54) Title: THE USE OF FABRIC AS A CONCRETE FORM LINER



(57) Abrégé/Abstract:

A form for casting concrete comprising: (a) a support with a concrete facing surface; (b) a form liner comprising a water absorbent fabric juxtaposed with and attached to the concrete facing surface of the support.

ABSTRACT OF THE DISCLOSURE

A form for casting concrete comprising:

- (a) a support with a concrete facing surface;
- (b) a form liner comprising a water absorbent fabric juxtaposed with and attached to the concrete facing surface of the support.

## THE USE OF FABRIC AS A CONCRETE FORM LINER

## FIELD OF INVENTION

The present invention relates to a concrete form liner and to a form for concrete works which facilitate the removal of (e.g. elimination) of water (and air) from wet concrete; the liner (and form) may be used to yield concrete having a relatively smooth surface which may be relatively free of cavities such as for example blowholes and pores.

## BACKGROUND OF THE INVENTION

In the fabrication of concrete works, the concrete is usually cast using a concrete form wherein the set or cured concrete ultimately takes the shape of the form. Thus, wet concrete is poured into or against a concrete form; once the concrete has set the form is removed to expose the concrete surface which is a reverse impression of the concrete facing surface of the form.

In addition to water which is often added in excess of the amount required for hydration, air is also often added to the wet concrete mix. Such air and excess water are useful to render the mix flowable so as to facilitate handling and pouring. However, the excess water, entrapped between the concrete and the form, if left in place, results in concrete having a weakened surface or skin which is adorned with cavities such as for example blowholes and/or pores which may for example be as large as 0.1 to 5 cm across and up to 3 cm or more in depth; such cavities leave an uneven surface open to the effects of aggressive chemicals such as

salts, acids, etc, and scaling due to the freeze-thaw cycles of water. The air, if not removed from the wet concrete skin may also contribute to the presence of such surface cavities in the set concrete skin.

Attempts have been made to provide water removal (i.e. water drainage) during setting of concrete in contact with a concrete facing surface of a concrete form; see for example, Canadian patent no. 2,098,119, as well as U.S. patent nos. 5,124,102, 5,135,692, 5,302,099, 4,815,892 4,856,754 and 4,730,805. The known water removal (e.g. drainage) mechanisms such as shown in the above mentioned patents are relatively complicated to exploit.

Accordingly, it would be advantageous to have an alternative means for inhibiting the formation of a relatively porous concrete skin and/or inhibiting a skin cratered by cavities. It would also be advantageous to have a means for providing a relatively smooth concrete skin, i.e. a relatively dense concrete skin. It would in particular be advantageous to have a relatively simple water extraction means for application to the concrete facing surface of a concrete form for the extraction of entrapped water during setting or curing of the concrete.

#### SUMMARY OF THE INVENTION

The present invention in a general aspect relates to the use of a fabric as a form liner for a form for casting concrete.

The present invention in an aspect provides a form for casting concrete comprising:

- (a) a support means with a concrete facing surface;

(b) a form liner directly juxtaposed with and attached to the concrete facing surface of the support means, the form liner comprising a water absorbent fabric (e.g. cotton fabric).

In accordance with another aspect the present invention provides a process for making a form for casting concrete comprising the steps of:

- (a) providing a support means having the shape desired of a concrete article to be made, the support means having a concrete facing surface; and
- (b) directly juxtaposing and attaching a form liner to the concrete facing surface of the support, the form liner comprising a water absorbent fabric.

In accordance with the present invention the concrete facing surface of the support may be an (essentially) uninterrupted surface i.e. a surface having no water drainage means such as for example drainage holes or the like.

In accordance with the present invention, in relation to the form liner, the expressions "directly juxtaposed with and attached to the concrete facing surface" and "directly juxtaposing and attaching a drainage form liner comprising a water absorbent fabric to the concrete facing surface" mean that the form liner is attached to (or to be attached to) the concrete facing surface such that the form liner and surface are side by side, i.e. the form liner is not spaced apart from the surface by lugs or a grid system for example.

In accordance with the present invention a concrete skin may be obtained which is (relatively) smooth, i.e. a concrete skin relatively free of significantly sized cavities.

The form liner (e.g. cotton fabric) should be sufficiently dry prior to pouring of the wet concrete such that the form liner (e.g. cotton fabric) may carry out its intended purpose during setting of the concrete i.e. provide for the elimination of water. By sufficiently dry it is meant herein that the fabric not be so wet as to not be able to carry out its intended function. It is to be understood herein that the elimination of water may not only involve water absorption but also water dispersion (i.e. redistribution of water over the concrete surface covered by the liner), and/or water drainage.

The applicant has further found that a form liner (e.g. cotton fabric) may be successfully used in a concrete form for elimination of water without the express need for liner tensioning, i.e. an element of known prior art systems. If desired, however the fabric may be subjected to some tensioning in any suitable manner such as for example shown in patents mentioned above.

Thus in another aspect of the present invention the form liner may be attached in an non-tensioned or tensioned manner and be positioned such that one side of the fabric (e.g. porous fabric) of the form liner is able to contact concrete during setting thereof for effecting absorption of water present in the concrete.

The form liner may consist of a single fabric e.g. a single fabric layer.

The present invention in particular provides a form for casting concrete comprising:

- (a) a support means with an uninterrupted concrete facing surface; and
- (b) a form liner directly juxtaposed with and attached to the concrete facing surface of

the support means, said form liner consisting of a single layer of a water absorbent fabric, said fabric comprising cotton.

The present invention further provides a process for making a concrete form for casting concrete comprising the steps of

- (a) providing a support means having the shape desired of a concrete article to be made, the support means having an uninterrupted concrete facing surface; and
- (b) directly juxtaposing and attaching a form liner to the concrete facing surface of the support means, said form liner consisting of a single layer of a water absorbent fabric, said fabric comprising cotton.

The present invention also provides for the use of a fabric comprising cotton as a form liner for a form for casting concrete

The water absorbent fabric may, for example, have a water absorption capacity of up to 5.0 g/g fabric or more; for example, the fabric may have a water absorption capacity of from 0.3 to 5.0 g/g fabric.

The water absorbent fabric (e.g. cotton fabric) is to be sufficiently permeable so as to be able to permit the passage (i.e. drainage) of water (and air) there through without letting concrete particles go through. In this respect the fabric may if desired have some resistance to water wetting which may be overcome under the influence of pressure from the wet concrete, i.e. a pressure dependent water resistance. The fabric may thus include a water resistance component or agent (e.g. sizing) such as starch, the agent (e.g. starch) being present in any suitable amount sufficient to provide the desired water resistance.

The fabric may be of any convenient mass, but it must be adequate to withstand the high compaction pressures brought against it by the wet concrete. It should also be able to withstand the tension applied when removing the liner from the set concrete. The fabric may have any suitable mass keeping in mind its purpose; e.g. a fabric mass of from 60 to 650 g/m<sup>2</sup> (e.g. 65 to 610 g/m<sup>2</sup>). The fabric may for example have a fabric mass in units of the English system of from two (2) to eighteen (18) ounces per square yard and in particular six (6) ounces per yard (i.e. 67.8 to 610 g/m<sup>2</sup>). As mentioned above the fabric may be a cotton fabric and it may have a prior mentioned fabric mass.

The fabric may have a thickness for example of from 0.2 to 2.0 mm.

The fabric of the form layer may be woven.

The form layer fabric may, for example, consist of a single material. The fabric may for

example be 100% cotton; alternatively the cotton fabric may comprise cotton and another fibre material (e.g. a polyester, nylon, rayon, linen, ) provided that the fabric has the desired or necessary water absorption quality. The fabric may for example be twill, drill, denim, bull-denim, sateen, etc.. Alternatively, the form liner may be of polyester, nylon, rayon, linen, or other material, keeping in mind the above mentioned purpose thereof, i.e. water elimination as mentioned above. The form liner may be of a canvas or canvas like material.

The cotton fabric may for example be 100% cotton and if desired comprise an agent to provide a desired degree pressure sensitive water resistance. The cotton fabric may for example have a fabric count in the warp direction of 41.73/cm (106/inch) and in the weft direction of 22.76/cm (57.8/inch); comprise warp yarn and weft yarn in “Z” twist; comprise yarn in the warp direction having a count of 31.68 Tex and in the weft direction a count of 22.76 Tex; a fabric mass of 215.35g/m<sup>2</sup> (6.35 oz/yd<sup>2</sup>); be in 3 x 1 “S” twill. The cotton fabric may have a thickness of 0.3 mm. The cotton fabric may have a water absorption capacity of 1.39 g/g fabric. The cotton fabric may comprise 9.24 % by weight of enzyme extractable non-fibrous materials (starch, glue or gelatin, etc.) on a dry weight basis,

The form liner may be attached to the support in any suitable manner keeping in mind the purpose of the absorbent liner (i.e. to remove water and/or to facilitate the redistribution of water over the surface of the concrete so as to minimise localised high concentrations of water); the attachment mechanism should seek to avoid interfering with this purpose or function. Thus, the form liner may be attached to the concrete face of a support by means of a contact adhesive; for example, a contact adhesive may be applied over part or all of the concrete facing surface and the form liner applied thereto so as to avoid or minimize folds or

creases. Alternatively, the form liner may be attached to the concrete face of a support by means of a double sided adhesive tape. As a further alternative, the form liner may be attached to the concrete facing surface by staples means (such as for example the two staple means described below with respect to figure 4). As may be understood the form liner is positioned such that one side of the fabric (e.g. porous fabric) of the form liner is able to contact concrete during setting thereof and the fabric is able to effect absorption of water present in the (setting) concrete.

The surface skin of a set concrete made with a form liner in accordance with the present invention may be more compact, relatively free of cavities such as blowholes or pores, and relatively less permeable to water or gases (i.e., slower carbonation), thereby increasing the life of the concrete especially when used in harsh environments.

In drawings which illustrate an example embodiment of the present invention:

Figure 1 is a schematic partial sectional perspective view of an example form in contact with concrete;

Figure 2 is a cross sectional view along 2-2 of the form of figure 1;

Figure 3 is a schematic partial sectional perspective view of another example form wherein the fabric liner is glued to the support by glue strips; and

Figure 4 is a schematic partial sectional perspective view of a further example form wherein the fabric liner is attached to the support by staple means.

In the following the same reference numerals will be used to designate common elements.

Figure 1 illustrates a portion of a concrete form 1 which comprises a support 2 and a cotton fabric liner 3 attached to the concrete facing surface 4 thereof and over which is disposed (wet) concrete 5; as may be seen the concrete facing surface 4 is that surface of the support 2 which is to be adjacent the wet concrete.

The support 2 may be of any material suitable for forming a concrete form. The support must have enough strength to maintain the wet concrete in the desired form during setting or curing thereof. The support 2 may for example be of wood (e.g. plywood, wood chip boards, plastic, metal etc.). The concrete facing surface 4 may if desired be relatively smooth (and flat) for use in the preparation of concrete having a concrete skin which is also relatively smooth; alternatively, the facing surface 4 may be provided with a desired texture or contour for the purpose of transferring the desired texture or contour to the concrete surface skin.

The cotton fabric liner 3 may be attached to the support 2 in any suitable manner keeping in mind the purpose of the liner 3 (i.e. to remove or eliminate water).

The cotton fabric liner 3 in the embodiment shown in figure 3 is attached to the concrete facing surface 4 by a suitable spray on contact adhesive 6; this attachment mechanism may for example be used with a support (e.g. a metallic support) not suited to receive staples or when textures or shapes are to be applied to the concrete surface skin. The contact adhesive 6 is shown as a layer or strip sandwiched between the support 2 and cotton fabric liner 3.

The contact adhesive 6 is shown as being applied only onto portions of the facing surface. In order to facilitate the avoidance of creases or the like the cotton fabric may be subjected to a tension, in any suitable manner, sufficient to avoid such creases. The contact adhesive 6

may be an adhesive such as Super No 77 from 3M . Alternatively, in place of the contact adhesive 6, a double sided tape may be used such as for example a carpet tape such as made by Canadian Technical Tapes Ltd., Montreal Quebec.

The cotton fabric liner 3 in the embodiment shown in figure 4 is attached to the concrete facing surface 4 by suitable metal staples 7 or nailer strips 8 usually made of wood or plastic; this procedure applies when the support material 2 is suitable (e.g. plywood); referring to figure 4, the staples 7 are shown securing the cotton liner 3 along the edge on the top of the concrete facing surface 4 of the support material 2; the staples 7 could also be placed over the side or the back of the support material 2; an example of a nailer strip 8 is also represented; a nailer strip 8 is nailed or stapled (e.g. staple 7) to the support material 2, the cotton fabric being sandwiched in between.

## I CLAIM:

1. A form for casting concrete comprising:
  - (a) a support means with an uninterrupted concrete facing surface; and
  - (b) a form liner directly juxtaposed with and attached to the concrete facing surface of the support means, said form liner consisting of a single layer of a water absorbent fabric, said fabric comprising cotton.
2. The form as defined in claim 1 wherein the fabric is woven.
3. The form as defined in claim 1 wherein the form liner is attached to the concrete facing surface by a contact adhesive.
4. The form as defined in claim 1 wherein the form liner is attached to the concrete facing surface by a double sided adhesive tape.
5. The form as defined in claim 1 wherein the form liner is attached to the concrete facing surface by staple means.
6. A process for making a concrete form for casting concrete comprising the steps of
  - (a) providing a support means having the shape desired of a concrete article to be made, the support means having an uninterrupted concrete facing surface; and
  - (b) directly juxtaposing and attaching a form liner to the concrete facing surface of the

support means, said form liner consisting of a single layer of a water absorbent fabric, said fabric comprising cotton.

7. The process as defined in claim 6 wherein the fabric is woven.
8. The process as defined in claim 6 wherein the form liner is attached to the concrete facing surface by a contact adhesive.
9. The process as defined in claim 7 wherein the form liner is attached to the concrete facing surface by a double sided adhesive tape.
10. The process as defined in claim 7 wherein the form liner is attached to the concrete facing surface by staple means.
11. The use of a fabric comprising cotton as a form liner for a form for casting concrete.

