Feb. 9, 1943. C. O. CRANE ET AL 2,310,400

FORM LINER

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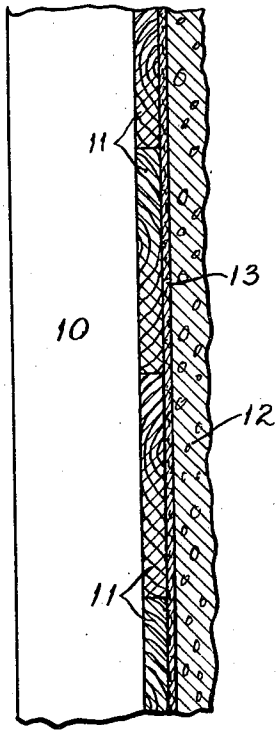


FIG 1.

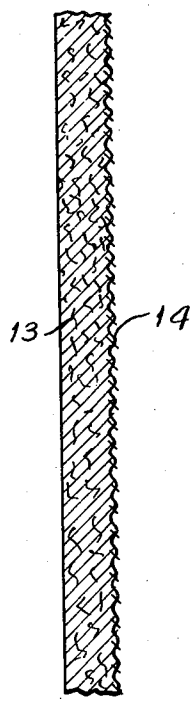


FIG. 2

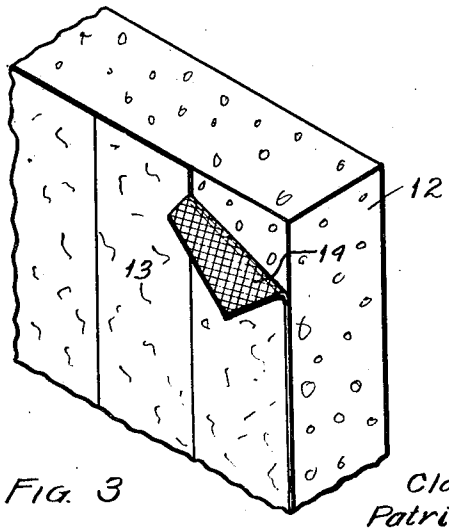


FIG. 3

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FORM LINER

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10 Claims. (Cl. 25—122)

This invention relates to the erection of concrete and similar structures, and more particularly to a method and means for improving the texture, quality, finish, and weathering characteristics of exposed concrete and like surfaces as an incident of conventional placement practice, and has as an object to provide an improved method of and product adaptable for the facing of conventional concrete forms.

A further object of the invention is to provide an improved absorptive, air-permeable liner for the facing of concrete forms.

A further object of the invention is to provide an improved concrete form liner productive in use of a surface on concrete placed by conventional methods which is substantially free from pits, cavities, holes, and spalling tendencies.

A further object of the invention is to provide an improved concrete form liner which may be readily stripped from the concrete surface without undesirable destruction of the liner.

A further object of the invention is to provide an improved concrete form liner which is free from tendency to bond undesirably with the concrete surface.

A further object of the invention is to provide an improved concrete form liner which facilitates proper curing of a concrete surface in contact with the liner.

A further object of the invention is to provide an improved concrete form liner which is conveniently adaptable to the facing of forms irrespective of form size and specific shape.

A further object of the invention is to provide an improved concrete form liner susceptible of convenient production from known and readily-available materials, which may be handled and applied with facility, which is economical and efficient in use, and which so improves a concrete surface formed thereagainst as to substantially minimize the necessity for other working of such surface.

Our invention consists in the improved method of surfacing poured concrete, and in the construction, arrangement, and combination of elements constituting a concrete form liner, all as hereinafter set forth, pointed out in the claims, and illustrated by the accompanying drawing in which—

Figure 1 is a fragmentary, detail section vertically through a conventional construction of a concrete retaining form wherewith the improved liner is associated in the manner contemplated by the improved method. Figure 2 is a fragmentary, detail section, on an enlarged scale, through and illustrating the construction of the improved liner. Figure 3 is a fragmentary, isometric view of a concrete mass from which the forms have been removed to leave the liner in place ready for stripping.

In concrete and like constructions wherein a semi-fluid material is deposited within or against temporary forms designed to hold the material until it has hardened in place, it has ever been a problem of major difficulty to construct forms having a face against which the concrete will mold to present a finished surface free from pits, cavities, pockets, and unevenness which necessitate a surface-finishing operation after the forms have been removed. Further, it is essential to a proper curing and finish of the concrete surface that provision should be made for the removal of excess moisture from the surface while maintaining the requisite amount of moisture for proper curing adjacent such surface to prevent unduly rapid drying thereof. To settle the semi-fluid material against the form face and to remove entrapped air which is productive of pockets and cavities, the material is frequently agitated by means of vibration or "spading," but such practices add expense and are frequently undesirable in that they tend to extract and bring to the concrete surface an undue proportion of the fine cementitious material which may run off to a considerable degree with the excess water and thereby be lost with a consequent weakening of the ultimate structure. Various expedients have been employed in an effort to obviate the disadvantages above noted and to provide a concrete surface developed as an incident of the molding operation which is smooth, uniform in texture and quality, and which requires no subsequent finishing, but such efforts have resulted in irregularities and markings on the finish surface, undesirable bonding of form or liner material to the concrete surface, or deficiencies which are reflected in the quality and texture of such surface, and it is hence to correct and obviate such disadvantages that the instant invention has been designed.

In the drawing, a portion of a conventional wooden concrete form is illustrated in Figure 1 as including the usual uprights or studding 10 commonly disposed in parallel relation at spaced intervals and to which lagging members 11 are suitably secured, as by means of nailing, to provide a substantially smooth, continuous face against which the concrete may be placed in its semi-fluid condition, said form face conforming in contour with the desired shape of the ulti-

mately solidified concrete. The form construction shown is primarily adapted for development through the use of wooden uprights and lagging, as is common practice, and the lagging members 11 are preferably fitted close together to minimize escape of concrete and water between their adjoining margins while still permitting escape of entrapped air and retention of moisture absorbed by the lagging surface adjacent the concrete surface. As will be readily apparent, air bubbles entrapped by the concrete against the face of a lagging 11 are held against escape from the forms unless the concrete mass is agitated to work such bubbles across one of the joints between the lagging, there being normally no path for air escape through the lagging other than the joints between its members. Where metal lagging or form facing is employed, or where the form face is covered by material impermeable to air, the difficulty of removing the air bubbles is accentuated and adherence of the concrete to the lagging face is augmented.

In giving effect to the principles of the instant invention, the form face against which the concrete is to be molded is lined and smoothly covered by a relatively-thin sheet of water-absorptive, air-permeable material having characteristics which minimize its tendency to bond with the concrete surface and permit of its ready removal from such surface after the concrete has cured. A sheet of such material is shown in its operative relation with the form construction and concrete mass 12 in Figure 1, and a section of such material enlarged to show its construction, is shown in Figure 2. Tests have established that the water-absorptive, air-permeable essential characteristics of the form liner may be obtained through the use of a relatively-thick sheet of fibrous material as the principal or body portion of the liner, a material particularly adapted for such use being available on the market in the form of commercial "wood pulp" now commonly utilized in the manufacture of paper. This "wood pulp" is simply finely divided and cleaned wood fibres which have been compacted into sheets of varying sizes, and is normally marketed in the form of rolls, though also available in the form of billets for subsequent forming into sheets. This material has high water-absorptive qualities, is fully air-permeable and is readily cut or formed to smoothly lie against and cover a form face, attachment of the material to the form being easily accomplished through the use of adhesives, clips of various types, tacks or nails, adhesive strips, and the like, as may prove best suited to a given situation. The "wood pulp" material has an inherent disadvantage for use as a form liner in its unmodified form in that the surface fibres of the material tend to bond firmly to the concrete surface as the latter cures, and in that the material has little cohesion and is hence difficult to strip from the concrete surface after it has bonded therewith. To overcome these disadvantages and to adapt the material for the use desired, one face of the "wood pulp" sheet is covered by and firmly secured in any desired manner to a coextensive sheet of fully flexible, foraminous or reticulate material to form a unitary assembly. In Figure 2, the "wood pulp" sheet is designated by the numeral 13 and the foraminous or reticulate backing sheet by the numeral 14, said latter being indicated in the drawing as a relatively coarse, woven fabric such as coarse muslin, cheese cloth, or the like, the latter material having proved to be adequate and satisfactory for the use specified.

The backing sheet 14 may be affixed to the pulp body or sheet 13 as an incident of the operation whereby said pulp body is formed into sheets, in which case it may prove feasible to secure a natural bond between the pulp and fabric sheets without the use of any other adhesive or binder for such purpose; however, it may prove desirable to attach the backing sheet 14 to the pulp body after the latter has been given its final sheet form, in which case the use of suitable binders or adhesives may be indicated to complete a permanent combination. It is in general desirable to avoid the use of sizing, binders, adhesives, and surface finishes in the construction of the liner assembly in order to minimize the possibility of adverse reaction between such agents and certain elements, notably water and cement, of the concrete, and it is particularly important that the air-permeable character and absorptive quality of the liner assembly be preserved and in no material sense destroyed or impaired by the use of bonding agents and surface finishes. The backing sheet 14 serves a dual function in that it provides a support for the pulp body 13 which permits handling and use of the pulp sheets without disintegration thereof, even when such sheets are substantially water-saturated, and in that said backing sheet minimizes the tendency of the pulp body to bond therethrough with the concrete surface, so that the liner may be readily stripped from the concrete after removal of the forms. The complete liner sheets are disposed smoothly against and in covering relation with the form face with the backing sheet 14 of the liner disposed for engagement against the concrete as the latter is placed within or against the forms, in which position the liner material acts to absorb water and air from the adjacent concrete surface, provides for the prompt and convenient escape of entrapped air through the forms for the elimination of cavities, pockets, and pits in the concrete face, tends through its absorptive property to draw to and hold on the concrete surface the quantity and proportion of finely-divided material necessary to provide a smooth, dense surface of desirable quality and texture, and holds against the concrete surface a protective layer of moisture which facilitates proper curing of the concrete. In addition, the liner provides convenient means wherethrough additional moisture may be supplied to the concrete surface during the curing process, whenever temperatures and climatic conditions indicate the advantage of such additional moisture. Under low temperature conditions, use of the liner is of protective advantage in that the liner material insulates the concrete surface from the low exterior temperature, to a degree, and likewise aids in retaining the heat generated during curing action of the concrete.

After the concrete has cured sufficiently to remain in place under the loads imposed thereon without supplementary support, the forms are removed, as is conventional practice, normally leaving the liner material adhering to the concrete surface. The liner material may be left on the concrete surface to further protect and assist in curing of said surface, if desired, and may be conveniently removed at any time after removal of the forms by simply peeling the liner sheets away from the concrete surface in the manner indicated in Figure 3, the backing sheet 14 separating readily from the concrete surface

and carrying with it the pulp body which has been prevented by said sheet from unduly bonding with the concrete. With reasonable care in the use and handling of the liner material, the liner sheets may be preserved intact for repetitious use.

Since many changes, variation, and modifications in the specific form, construction, character, and arrangement of the elements shown and described may be had without departing from the spirit of the invention, we wish to be understood as being limited solely by the scope of the appended claims, rather than by any details of the illustrative showing and foregoing description.

We claim as our invention:

1. A face liner for concrete and similar forms, comprising wood pulp in the form of water-absorptive, air-permeable sheets flexible to lie smoothly against and conform with the moulding face of a form, and a water-absorptive, air-permeable surface substantially non-adherent to concrete on one side of said sheets.

2. A face liner for concrete and similar forms, comprising a flexible sheet of water-absorptive, air-permeable material, a flexible foraminous sheet overlying one face of said water-absorptive sheet, and an air and water permeable bond uniting adjacent surfaces of said sheets.

3. A face liner for concrete and similar forms, comprising a flexible sheet of water-absorptive, air-permeable wood pulp, a flexible foraminous sheet substantially non-adherent to concrete overlying one face of said pulp sheet, and an air and water permeable bond uniting adjacent surfaces of said sheets.

4. A face liner for concrete and similar forms, comprising a flexible sheet of water-absorptive, air-permeable wood pulp, a reticulate, fabric sheet substantially non-adherent to concrete overlying one face of said pulp sheet, and a bond of interengaged fibers uniting adjacent surfaces of said sheets without material impairment of the air and water permeable characteristics of the assembly.

5. As a face liner for concrete and similar forms, the unitary combination with a flexible sheet of water-absorptive, air-permeable wood pulp, of a reticulate, fabric sheet substantially non-adherent to concrete bonded to one surface of said pulp sheet without material impairment of the air and water permeable characteristics of the assembly.

6. A lining for concrete moulds, and the like, comprising a layer of highly absorbent porous material, yieldingly resistant to flexure, a layer of porous fabric material, substantially non-adherent to concrete, and means for securing said layers together, said means being of such character that a comparatively strong union is formed between the layers without materially diminishing the porosity throughout the lining.

7. A lining for concrete moulds, and the like, comprising a layer of highly absorbent porous material, yieldingly resistant to flexure, a layer of porous fabric material, substantially non-adherent to concrete, and an adhesive means between said layers for securing said layers together, said adhesive means being of such character that a comparatively strong union is formed between the layers without materially diminishing the porosity throughout the lining.

8. A lining for concrete molds and the like, comprising a layer of highly absorbent porous material, a layer of porous fabric material, substantially non-adherent to concrete, and an adhesive means for securing said layers together, said adhesive means being of such character that a comparatively strong union is formed between the layers without materially diminishing the porosity throughout the lining.

9. A lining material for concrete forms and the like, comprising a backing of highly absorbent sheet material, a layer of fabric material secured to one face thereof, and an adhesive means uniting the backing and fabric material in a permanent somewhat flexible unitary structure, possessing such porosity that water may pass readily therethrough, said body layer serving to entrain and dispense water passing from and to the concrete through the fabric layer and adhesive means.

10. As a new article of manufacture, a lining for concrete forms and the like, comprising a body layer of highly absorbent material having a porous layer substantially nonadherent to concrete integrated with said body layer permanently in a unitary structural element designed to be stored, transported and applied as such.

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