Feb. 17, 1942. F. T. FENTON 2,273,699

CONCRETE WALL CONSTRUCTION

Filed Aug. 16, 1939 3 Sheets-Sheet 1

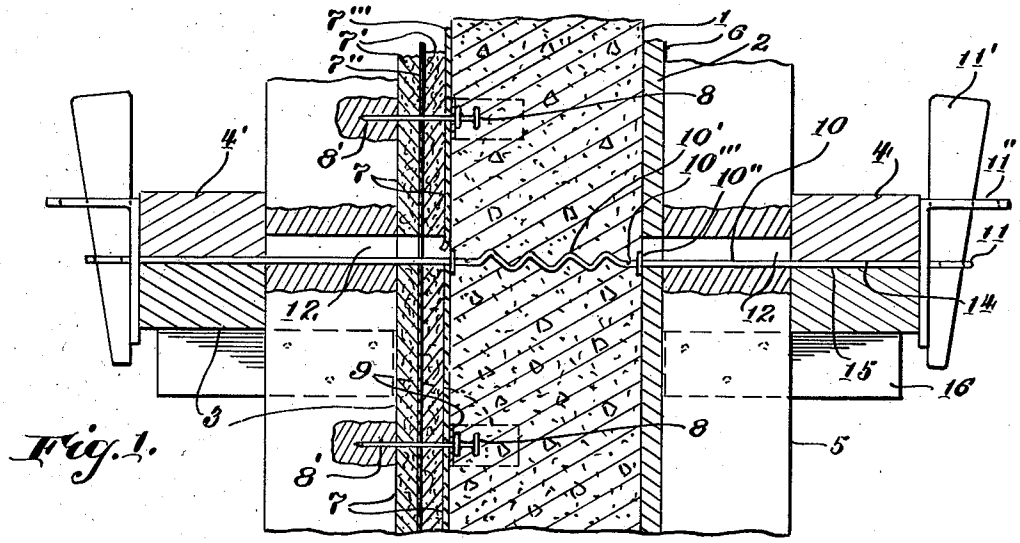
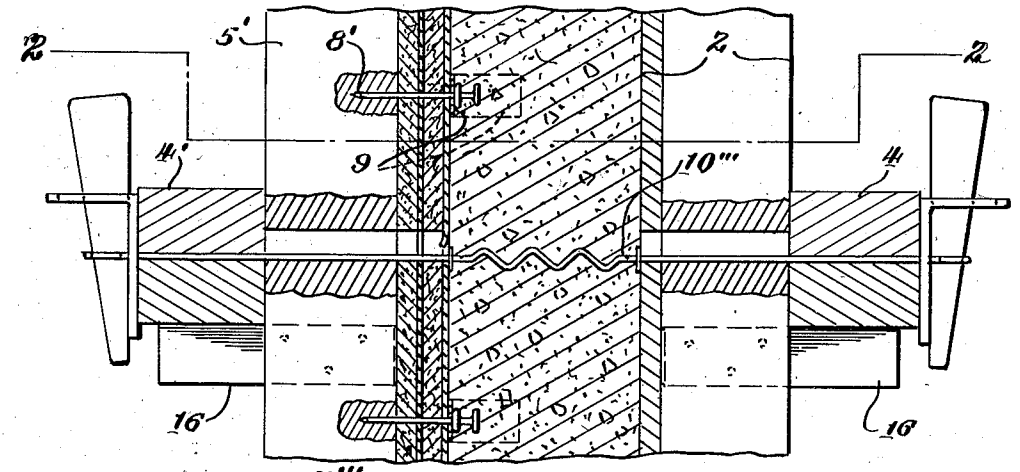


Fig. 1.



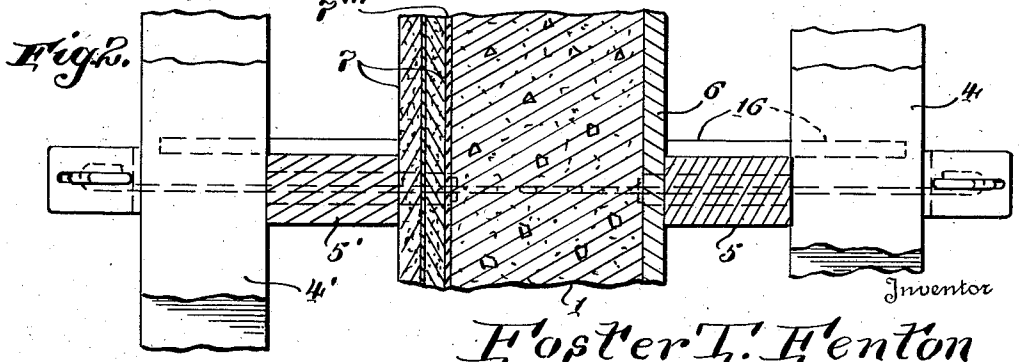


Fig. 2.

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CONCRETE WALL CONSTRUCTION

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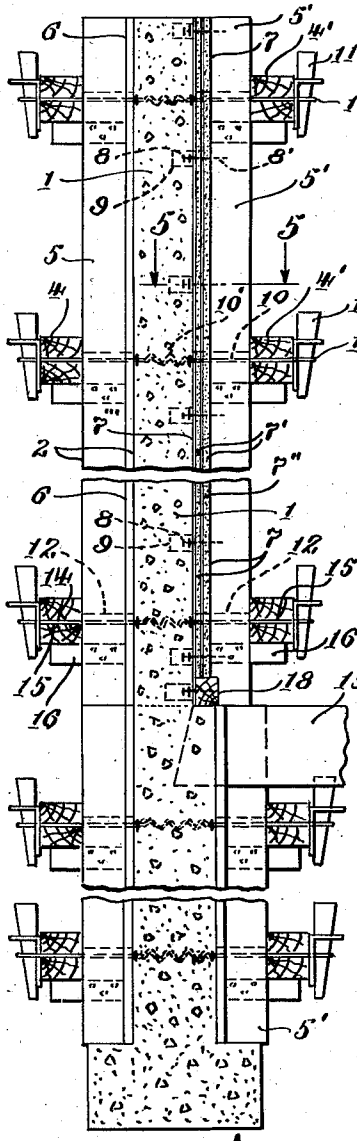


Fig. 3.

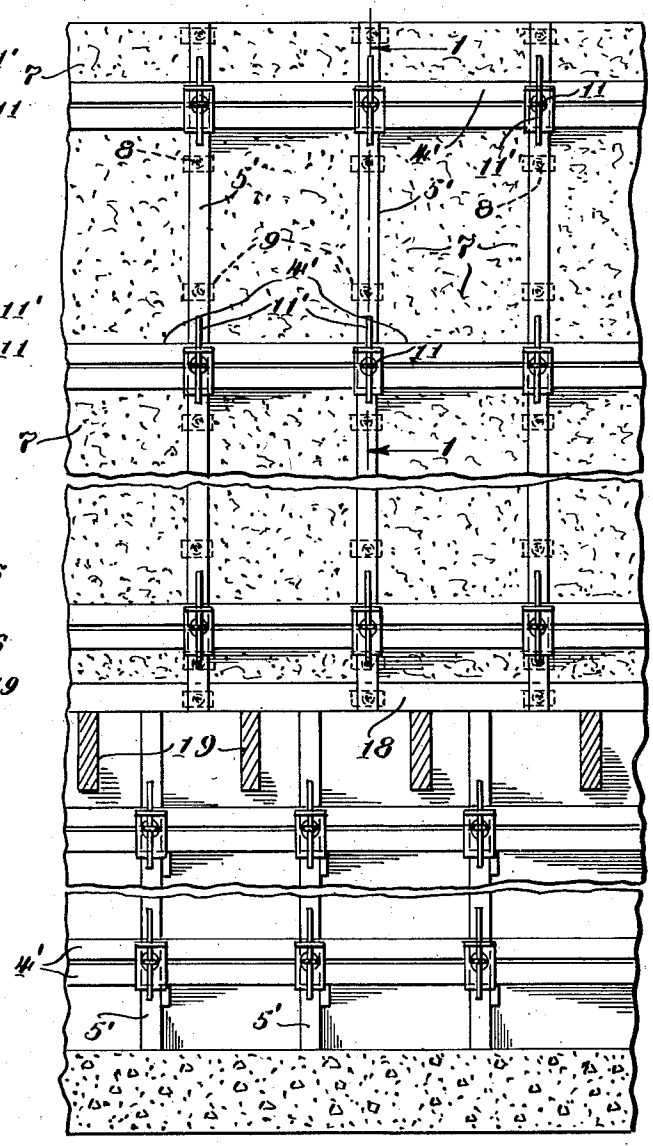


Fig. 4.

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CONCRETE WALL CONSTRUCTION

Filed Aug. 16, 1939 3 Sheets-Sheet 3

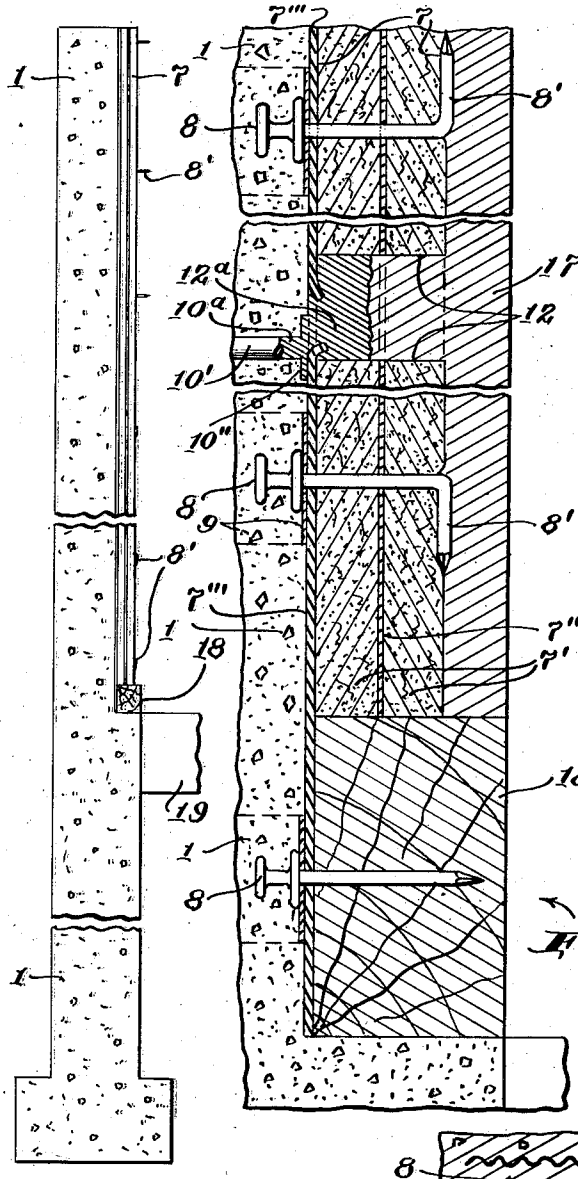


Fig. 6.

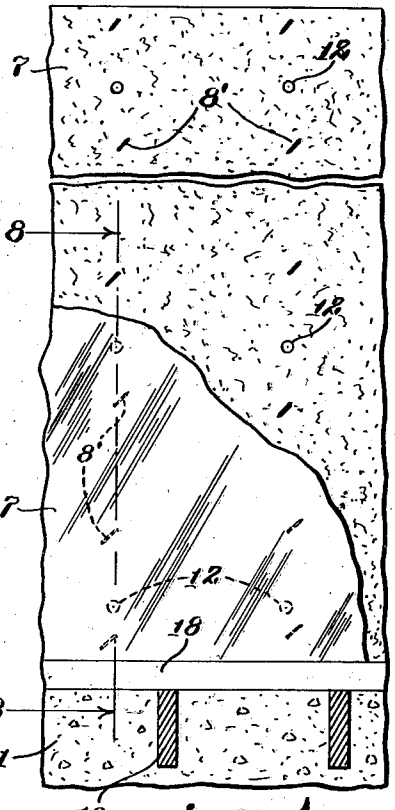


Fig. 7.

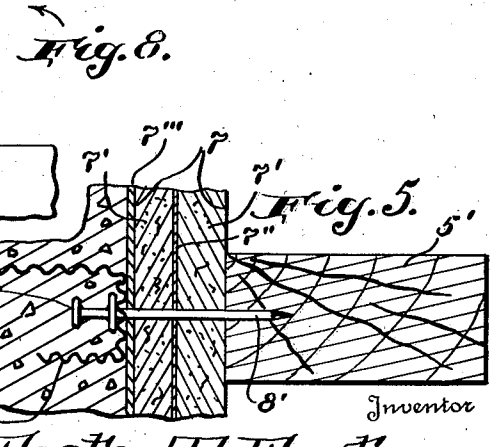


Fig. 5.

Fig. 8.

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Patented Feb. 17, 1942 2,273,699

UNITED STATES PATENT OFFICE

2,273,699

CONCRETE WALL CONSTRUCTION

Foster T. Fenton, Baltimore County, Md.

Application August 16, 1939, Serial No. 290,340

4 Claims. (Cl. 72—16)

The difficulty incident to the plastering of concrete walls with calcium and similar plasters so as to make buildings having solid concrete walls, as distinguished stuccoed walls or those having a concrete veneer which will prove satisfactory for residential and similar purposes, is one which has presented unsurmountable difficulties and the fact that solid concrete construction is almost unknown in calcium plastered residential and similar buildings indicates that there has never been a practical solution of this problem.

Some of the known obstacles to the previous utilization of concrete in this way are, (1) the difficulty incident to attaching the plaster or any suitable plaster base to the wall, and (2) the well known hydroscopic quality of concrete which causes a deposit of moisture on the inner surface of the concrete due to condensation and penetration and interferes with the satisfactory attachment of plaster thereto or laying of plaster thereon, and (3) that the moisture accumulated in this way tends to discolor the plaster when applied and causes it to loosen and fall, and, (4) that such buildings when and if constructed would be unsatisfactory in the average climate of the United States and Europe.

While it is obvious the inner surface of the concrete may be covered with a waterproof material, and, at considerable expense, a plaster base may be attached which thereafter provides for plastering, the expense of concrete construction provided in this way is so greatly in excess of wood or of brick or concrete veneer, the latter being otherwise known as stucco, that the calcium plastered concrete construction referred to is practically unheard of and nonexistent.

The present invention is believed to completely overcome the difficulties mentioned, providing a new type of plastered concrete wall and a method of construction, in accordance with which a plaster base which may be of, or include both waterproof and temperature insulating material forms the inner side of the mold or form so that as soon as the inner supports are removed, the wall is ready for plastering.

This construction and method have the advantages (1) that the expense of the inner form or wall of the mold is saved, (2) the expense of removing the inner mold wall or form is saved, and, (3) a further saving which comprises an important item which is the cost of attaching the plaster base to the concrete, (4) the resulting wall is insulated and waterproof and condensation is prevented.

While various attempts have been made to exclude moisture from concrete buildings by thickening the walls, thereby greatly increasing the expense, a foot or more having been tried, without complete satisfaction, it is found that with the construction herein described and which is the subject of this invention, satisfactory residence buildings and the like of two, three or four stories in height with little, if any, reinforcement, though metallic reinforcement is not objectionable, may be constructed with the concrete portion of the walls as thin as six or even four inches, the latter for small one or two story buildings.

In the accompanying drawings, I have illustrated improved concrete wall and the method of construction of the same:

In the drawings:

Fig. 1 is a fragmentary vertical transverse section on the line 1—1 of Fig. 4, through the wall, immediately after pouring; the concrete may or may not be considered to have set, the forms still being in place.

Fig. 2 is a section on line 2—2 in Fig. 1.

Fig. 3 is a vertical section on a reduced scale of an entire wall of two stories height and cellar.

Fig. 4 is an elevation of the same looking from the right.

Fig. 5 is a section on the line 5—5 in Fig. 3.

Fig. 6 is a section on a reduced scale like Figs. 3 and 4, with the form removed ready to plaster.

Fig. 7 is an inside fragmentary elevation on a similar scale to Fig. 6, showing the wall partly plastered.

Fig. 8 is an enlarged section on the line 8—8 in Fig. 7.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, and having particular reference to Fig. 1, the concrete wall 1, which may or may not have set, the question of setting being immaterial in this illustration, is shown as enclosed between the outer form 2 and the inner form 3.

The outer form 2 consists of 2" x 4" horizontal members or walers 4, which may be of any suitable dimensions, and 2" x 4" studs 5, which in turn overlie the outer form boards 6 for which purpose in accord with this practice ply-wood is preferably used as it is easier to handle and gives a smooth surface on the finished concrete.

The inner form 3 comprises walers 4' and upright studs 5', and in place of the usual inner form boards which are very difficult to remove as they become wedged in the concrete and are

often destroyed in removing, the present construction includes a plaster base 7, which is essentially impervious to concrete and takes the place of the inner form boards now used in making concrete foundations, cellars and walls for other purposes. The method of application of this material to the concrete wall and the form adapted to this purpose and also the wall with the plaster base thus affixed are the important features of this invention.

In the tests which have so far been conducted, the material known by the trade name Celotex has been used, though this is only one of several materials adapted to this purpose. It is of importance that this material must have sufficient rigidity to support the concrete between the studs, should have waterproofing and heat insulating properties sufficient to regulate the temperature and keep moisture which comes through the concrete from attacking the plaster and also to keep the interior of the building dry by preventing condensation. The material shown has two layers 7' of cellular material between which is a waterproofing sealing sheet 7''. The improved construction in the preferred form also includes on the inner surface of the mold next to the concrete a sheet of water proof paper 7''', a product sold under the trade name "Iceberg Fibre" being satisfactory for this purpose.

In the form of the invention shown which is the preferred construction, so far devised, the plaster base 7, and the waterproofing material 7''' are secured to the studs or uprights 5' by means of double headed nails or other suitable tie rods as tie members 8, which are driven through the material 7''' and the plaster base 7 for which purpose, in this instance, Celotex is used and into the studs as shown in Fig. 1 and it may be considered desirable to drive the double headed nails or tie rods 8 through anchor strips 9, to improve the seating of the nails or tie rods in the concrete.

When the concrete is set, the outer form 2, is removed, without great difficulty.

The removal of the inner form, so far as it is intended to be removed, which removable portion consists of the supporting structure, is greatly simplified by the substitution of the plaster base for the inner form board previously used.

According to the present invention, all that is removed of the inner form is the walers 4' and the studs 5', which, after the removal of the walers 4' are pulled off from the projecting ends 8' of the double headed nails 8, leaving these ends 8' projecting. The ends 8' are then bent over on the outside of the plaster base or Celotex 7 on the inside of the room as in Figs. 7 and 8, so that they serve to hold this plaster base material tightly in place.

Thereafter the inner surface of the concrete wall 1, is plastered in the well known manner, Celotex and other materials which will support the concrete and serve as plaster bases being satisfactory. It is of importance to note that the anchor nails or double headed nails 8 may be of any suitable type adapted to hold the plaster base firmly in position if desired metal lath or any suitable lath material may be attached over the plaster base 7 by fastening it on the Celotex or equivalent material and passing the ends 8' of the nails through it and turning them over as shown in Fig. 8.

In the practice of my method, in the preferred form, the walers 4' and studs 5' are first set up, the plaster base 7 being attached preferably with the waterproof sheet 7''' overlying the base 7, the double headed nails 8 or other suitable fastenings which may have the anchor members 9 attached as illustrated are thus driven through the sheet 7''' and through base 7 into uprights 5', the sheet 7''' being, if desired, omitted though it adds materially to the moisture proofness and preserves the base. The outer form 2 is then set up in the usual manner, after which the concrete is then poured and permitted to set. The outer form 2 is next removed. At any suitable time which may be convenient before plastering, the walers 4' are removed. After which the upright studs 5' are withdrawn from the ends 8' of the nails or anchor members 8 which are turned over or utilized in any effective manner, and plastering is proceeded with in the usual manner, no additional plaster base being ordinarily essential or desirable.

It is of interest that while the twister ties 10 are well known, the manner of applying them herein illustrated is new and is helpful in and to the satisfactory practice of this invention and of importance wherever thin form boards are used making it feasible to use less substantial form boards than previously was practicable.

These tie rods are of heavy wire formed intermediately at 10' into a coil portion. On each side of the coil buttons 10'' are permanently secured to the wire and adjacent the buttons are weakened points 10'''.

The twister ties 10 are looped at their ends at 11 and these loops are engaged in the set up condition of the form by take up wedges 11' supported in the twister brackets 11''. The purpose of the twister ties 11 is to space the form boards or mold boards 6 and 7 which are contacted on the inside of the molds by buttons 10'' and to hold them in contact with the uprights 5 and 5'. In the previous practice, the twisters 10 have been placed at convenient points along the walers 4, 4' but have not been passed through the uprights 5, 5'. The tension applied to twisters 10 by wedges 11', according to the former practice would with the relatively thin material used as mold boards at 6 and 7 herein, deflect the thin materials used at 6 and 7 causing irregularities, particularly bulging, in the wall surface as finished. To avoid bulging of the wall surface which would be most objectionable in the practice of the invention, the holes 12 of relatively large size are bored in the uprights 5 and 5' in registration as shown and, if desired, these holes may be also formed in mold boards 6 and 7. The twister ties 10 are placed in the partly completed mold, i. e., are inserted after the mold board 7, 7', 7'', etc., has been set up being passed outwardly through holes 14 in the walers 5' and through the members 5 and 4, the latter having holes 14 for this purpose, and the twisters 10 are dropped to the bottoms of holes 12 to cause buttons 10'' to engage the mold boards 6 and 7 adjacent the holes. The loops 11 are formed after assembling and the wedges 11' provide sufficient tension to secure the boards directly to its uprights without bending. At the end of the operation when the mold is knocked down, the members 10 are broken at 10''' by twisting the loops and the end portions 15 beyond buttons 10'' are removed through holes 12, being taken off with the walers and later removed therefrom. The button cavities and holes 12 are sealed with asphalt 10—*a* and 12—*a*.

The walers are positioned or supported in any

suitable manner by struts or brackets 16 on the uprights 5 and 5'. Figs. 7 and 8 show the plaster 17 in position, supported at the bottom by a wood timber known as a plaster ground 18. The floor joists 19 are seated at their ends in the concrete 1 being assembled with the forms prior to pouring. The space between these forms which receives the concrete is referred to as the form cavity.

As already pointed out, an important saving is accomplished by avoiding the expense of inner form boards and also by avoiding the expense incident to applying and removing the inner form boards or it may be considered that the plaster base is installed and attached to the wall at little or no extra expense because it serves as an essential part of the form, the expense of installation of the same being little or no greater than the original cost plus the cost of installation of the form boards, further the cost of the removal of the form boards is a complete saving, and finished the plastered concrete wall which results is not only a moisture proof and well insulated wall which is proof against condensation but the plaster is permanently attached and there is no tendency for it to become discolored and detached on account of attack by moisture.

I have thus described specifically and in detail a preferred form of the invention and the method of applying the same, the description being specific and in detail in order that the manner of constructing, operating and using the invention may be fully understood, however, the details of construction described are capable of wide variation, the specific terms being used in a descriptive rather than in a limiting sense and the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. The method of molding and covering the inner surface, of a concrete wall for buildings and similar enclosures which consists in constructing an inner mold by affixing a sheet of material, which is approximately impervious to the plastic concrete and is also adapted to act as a plaster base, to spaced inner frame members used to support the inner mold and located inside said enclosure, employing as securing means, anchoring devices projecting into the mold cavity and also extending through said sheet material and having a separable engagement with said inner frame members, an outer mold being located in suitably spaced relation to the inner mold, pouring the concrete into the mold cavity between said molds and permitting the concrete to set whereby the anchoring devices are secured in and to the concrete, removing the inner frame members and thus separating them from the anchoring devices leaving the sheet material and anchoring devices affixed to the concrete and applying a plaster like coating to the sheet metal.

2. The method of molding, and covering the inner surface of a concrete wall for buildings and similar inclosures which consists in constructing an inner mold by affixing a sheet of material, which is approximately impervious to the plastic concrete and is also adapted to act as a plaster base and to support the surface of the concrete in plastic condition, to upright frame members located within said inclosure, employing as the securing means anchoring devices projecting into the mold cavity extending through said sheet material and inserted in the removable frame members, an outer mold being located in suitably spaced relation to the inner mold, pouring the concrete and permitting it to set whereby the anchoring devices are secured in and to the concrete, removing the inner frame members and thereby withdrawing the anchoring devices from the said frame members leaving the anchoring devices and said sheet material affixed to the concrete, deflecting the portions of said anchoring devices formerly inserted in said frame members and applying a plaster like coating to the sheet material.

3. The method of molding and covering the inner surface of a concrete wall for buildings and similar inclosures which consists in providing an inner mold by affixing a sheet of material, which is approximately impervious to the plastic concrete and is also adapted to act as a plaster base and to support a surface of plastic concrete, to suitably spaced inner removable frame members, located within the inclosure and adapted to support the inner mold, employing as the securing means nails having double heads projecting into the mold cavity and having shanks extending oppositely to said heads through said sheet material and into said frame members, an outer mold being located in suitably spaced relation to the inner mold, pouring the concrete and permitting it to set whereby the anchor heads are secured in and to the concrete, removing the inner frame members whereby said shanks are withdrawn from the frame members leaving the sheet material and the anchoring members affixed to the concrete, deflecting said shanks and applying a plaster like coating to the sheet material.

4. The method of molding, and of covering the inner surface of concrete walls, of a building or similar inclosure which consists in providing an inner mold wall by affixing a sheet of material, which is approximately impervious to the plastic concrete and adapted to support a surface of the same, and is also adapted to act as a plaster base, to removable inner frame members, located within said inclosure, employing as securing means nail-like members, having heads and other anchoring means within the mold space, and shanks extending through said sheet material into said removable frame members, an outer mold being located in suitable spaced relation to the inner mold, pouring the concrete into the mold cavity and permitting it to set, whereby the anchoring devices are secured in and to the concrete, and the sheet material is secured t othe concrete, removing the inner frame members thereby withdrawing the anchoring means therefrom and separating the frame members from the sheet material which remains affixed to the inner surface of the concrete and applying a plastic coating to the sheet material.

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