April 17, 1934. J. H. DE W. WALLER 1,955,716

METHOD OF BUILDING WITH CEMENTITIOUS MATERIAL APPLIED TO VEGETABLE FABRICS

Filed March 9, 1932 2 Sheets-Sheet 1

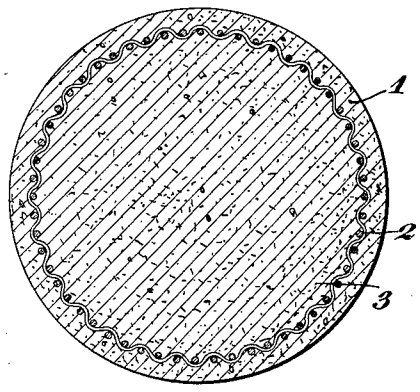


Fig. 1.

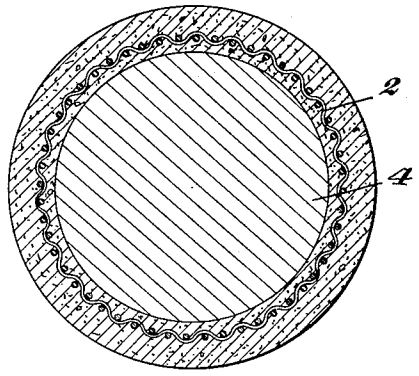


Fig. 2.

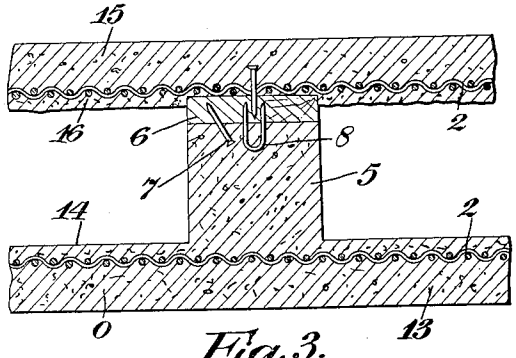


Fig. 3.

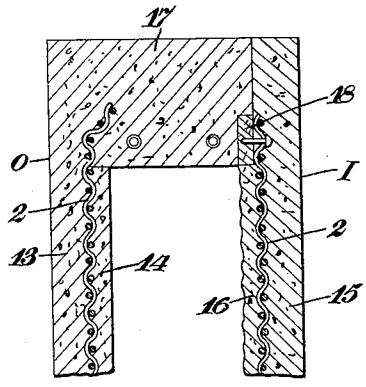


Fig. 4.

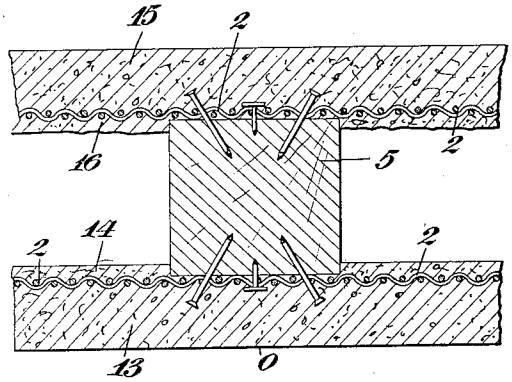


Fig. 5.

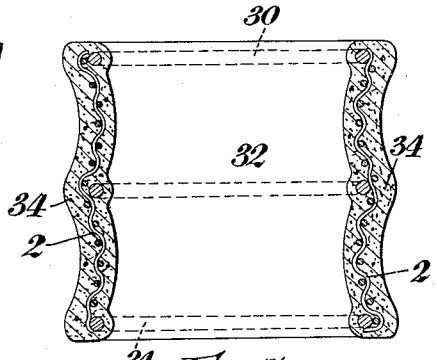


Fig. 7.

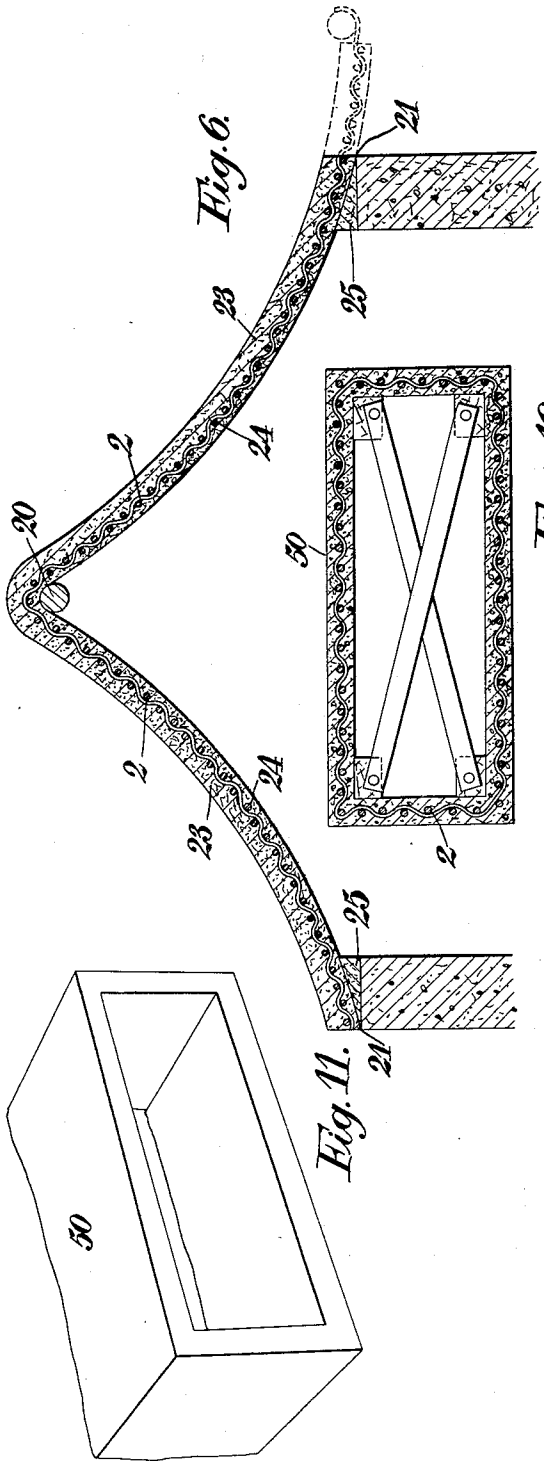
J. H. de W. Waller
INVENTOR

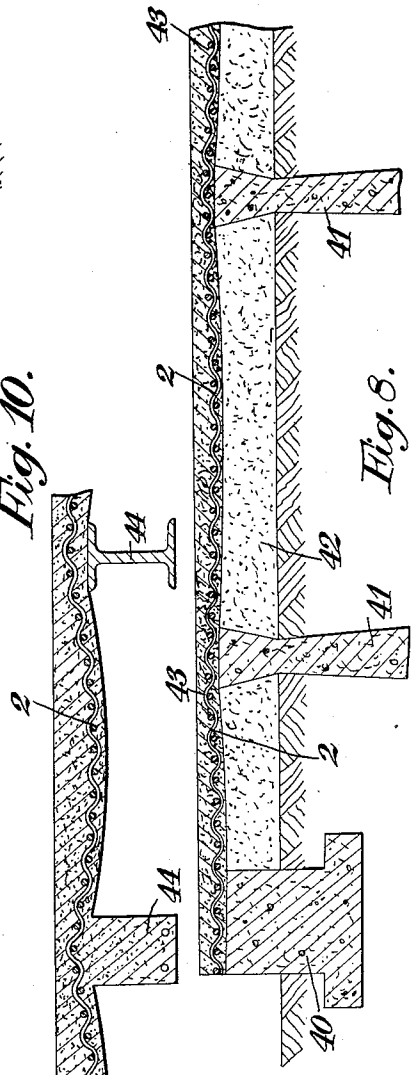
By: Marks & Clerk
Attys.

April 17, 1934. J. H. DE W. WALLER 1,955,716

METHOD OF BUILDING WITH CEMENTITIOUS MATERIAL APPLIED TO VEGETABLE FABRICS

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UNITED STATES PATENT OFFICE

1,955,716

METHOD OF BUILDING WITH CEMENTITIOUS MATERIAL APPLIED TO VEGETABLE FABRICS

James Hardress de Warrenne Waller, Dublin, Irish Free State, assignor to Nofrango Limited, Dublin, Irish Free State

Application March 9, 1932, Serial No. 597,838
In Great Britain March 28, 1931

4 Claims. (Cl. 72—1)

This invention relates to a method of building with cementitious materials reinforced with woven vegetable fabrics.

One of the objects of the invention is to devise means for building structures which will be cheap and economical. Another object of the invention is to build structures which have great strength but at the same time are very light. A further object of the invention is to avoid the use of moulds or shuttering when building such structures. In order that the invention may be clearly understood reference will be made to the accompanying drawings which give some examples of its various applications and in which:—

Figure 1 shows a cross-section of a pillar or support.

Figure 2 shows a cross-section of a pipe.

Figure 3 shows a horizontal section of a portion of a double wall.

Figure 4 shows a vertical section through a wall plate.

Figure 5 shows a vertical section of a portion of a double wall.

Figure 6 shows a vertical section through a roof.

Figure 7 shows a section of a barrel.

Figure 8 shows a vertical section of part of a floor laid on the ground.

Figure 9 shows a vertical section of part of a floor supported on walls, and

Figures 10 and 11 show tubular building members.

Pillars or posts may be made as shown in Figure 1 by forming a tube 1 having the required diameter of Hessian 2 or other flexible material with a fairly coarse or open mesh and suspending this by any suitable means. Fluid material 3 such as concrete, cement, plaster, or the like is then poured into the tube which has preferably been wetted beforehand. The initial tensile stress is given to the Hessian by the weight of the fluid material and the shrinkage. The finer parts of the material 3 such as the sand and cement will ooze out of the small holes until the Hessian is completely encased in material. Additional cement, plaster, or the like may be added to the outside if required and any desired finish or colouring effect may be given to this. Metal reinforcing such as wires, rods or the like may be placed in or around the Hessian tube before filling with material where extra strength is necessary. The setting of the cement maintains the initial tensile stress in the flexible material.

Pipes can be made as shown in Figure 2 in which the Hessian 2 in the form of a long strip is wound helically as tightly as possible upon a collapsible mandrel or core 4. It is then preferably wetted and coated with a slurry or paste of cement, concrete, or the like. After this coating is dry a further layer in the form of a paste or mortar of any suitable material is added. The mandrel 4 is then removed and the inside surface may be coated if desired with a layer of cement, concrete, plaster, or the like by any suitable means. The shrinkage and the initial tension produce the permanent tension in the reinforcement of the finished pipe.

Walls may be made as illustrated in Figure 3 which shows one of the supports 5 to which the Hessian is fastened, the other ends of the Hessian being stretched and fastened to one or more other supports according to the length of the wall. The Hessian 2 is secured by incorporation in the concrete pillar or support 5 by being enclosed within the wooden shuttering when casting the pillar. The opposite side of the pillar is provided with a timber insulating and fixing strip 6 which is secured to the pillar 5 by means of nails 7 and staples 8 or any other suitable means. The Hessian 2 is preferably wetted and then covered with a thin paste or slurry of concrete or cement and when dry is covered over with a layer 13 on the outside of concrete or cement to form the outside wall O. A thin layer 14 of concrete or cement is then covered over the inner side of the Hessian 2. If it is desired to form a double wall another length of Hessian 2 is secured to the strip 6 by suitable nails or the like (the heads of which are left projecting) and the Hessian is covered over with a rendering of plaster or the like 15 which is pressed through the open meshes of the Hessian to form an inner coating 16.

The top of the Hessian 2 of the outside wall O is cast into the wall plate 17 as shown in Figure 4 while the Hessian of the inner wall I is secured to a timber rail 18 cast into the top rail. The bottom of the Hessian may be secured in a similar manner. The Hessian is stretched as tightly as possible over the framing to produce an initial tension which is considerably increased by the shrinkage produced by the application of water or by the wet concrete or cement and is maintained in the material by the setting of the concrete, cement, or the like.

If desired the timber insulating and fixing strip 6 may be made with taper sides and then surrounded upon three sides with the concrete. Instead of making the pillars or supports of concrete these may be made of timber as shown in

Figure 6, the Hessian being nailed thereto and suitable nails or spikes being driven in to provide an anchorage for the layers 13 and 15 of concrete, plaster, or the like.

A covering of cement or plaster from one quarter to one half inch thick either on one or both sides of the Hessian forms a very substantial wall.

When windows or other openings are required it is only necessary to refrain from plastering over this space by placing a wooden frame or board in the required position. When the plastering is set the frame or board is removed and the Hessian can be cut out or burnt away thus leaving the required opening.

Roofs can be very simply and easily made according to my invention. A ridge-post 20 or the like as shown in Figure 6 is mounted in the required position and dry Hessian 2 of the desired length and width is then draped over the ridge-pole and brought down and secured over the walls at 21 and continued if desired as shown in dotted lines to form the eaves where it is attached to suitable poles or the like to keep it stretched out to the desired curve. If required wire netting or other metal reinforcement may be placed under the Hessian to prevent it sagging too much. A layer of cement or concrete plaster 23 is then placed over the whole of the outside of the Hessian 2 which acts as the reinforcing means and also the supporting means. When this outer layer is sufficiently set a layer of cement or other plaster 24 is placed upon the underside of the Hessian to enclose completely the Hessian and wire netting, if such is used. The space between the wall plate and the Hessian is preferably filled with concrete 25 to assist in securing the roof to the wall. The poles are then removed and a monolithic roof of great strength and lightness is produced.

In this case the Hessian shrinks as before and the tension is provided by the weight of the fluid material placed upon it.

The gables at each end can be made by plastering a piece of Hessian of the required shape placed and shrunk in position either before or after the plastering of the roof.

According to another application of the invention I can form barrels as shown in Figure 7 by fastening the dry Hessian to two hoops 30, 31 which can be kept apart by suitable members so as to hold the Hessian taut. If desired further intermediate hoops 32 may be employed at different points to keep the Hessian stretched in a circumferential direction. The Hessian 2 is preferably shrunk with water and then covered with a paste or slurry of concrete, cement, or the like by means of a brush to set the material with an initial tensile stress which is obtained by the shrinkage. It is then plastered with a layer 34 of the concrete, cement, or the like.

According to another application of the invention, as shown in Figure 8 floors can be very easily made upon ground which is levelled and prepared for the purpose. The usual footing 40 is provided and holes are made in the ground at regular intervals by means of a crowbar or the like and these are filled with concrete up to the level of the footing 40 to form supports 41. A layer of sand 42 is then spread over the ground level with the supports and the Hessian 2 is laid on top of this and when stretched is securely fastened to the footing 40 all round the floor. Concrete 43 of fairly liquid consistency is then spread all over the Hessian 2 to a thickness of about one inch. If necessary a thin coating can be given first of all with a brush. The finest particles of this concrete will pass through the mesh of the Hessian and unite with the sand thus forming a complete casing enclosing the Hessian. The moisture and cement will shrink the Hessian and together with its weight give it the initial tensile stress. If desired a thin layer of concrete could be placed upon the ground first and then when dry the Hessian laid down upon it, secured to the frame, shrunk and covered with concrete. Or a second layer of Hessian 2 could be laid down so as to form a double reinforcement when extra strength is required.

In all applications of the invention the paste or slurry which is applied with a brush may be made of quick setting cement and the plastering done with ordinary cement.

Upper floors may be made as shown in Figure 9, the Hessian 2 being fixed to the top of the wall plate 17 and supported upon joists 44. The Hessian 2 is wetted and covered with a layer of concrete or the like the weight of which keeps the initial tension in the Hessian. A further coating of concrete 45 or the like may be added and levelled off.

Walls and floors may very conveniently be built of units as shown in Figures 10 and 11 which comprise hollow tubular members 50 of any suitable length say nine or ten feet long having a rectangular section of say twelve to eighteen inches by six inches. Four longitudinal members of timber are arranged in parallel at the four corners of a rectangle which is small compared with their length and are maintained in such parallel alignment by means of bracing or supports situated at the ends of said longitudinal members and at intermediate points if necessary. Such bracing or supports are secured in such a manner that they can be easily and quickly dismantled. Over the framework a piece of Hessian or other suitable material composed of vegetable fibres is wrapped and securely fastened so as to keep the whole material taut and in a state of tension.

This hollow rectangular tube of material is preferably shrunk with water and is then covered over with a slurry or paste of concrete, cement, plaster, or other suitable material and when this is set a further layer of concrete, cement, plaster, or the like is spread all over the exterior of the tube. When this is set the bracing or supports of the longitudinal members are dismantled and the longitudinal members removed leaving a tubular member of rectangular cross-section having a reinforcement of Hessian or other material composed of vegetable fibres. The bracing or supports may be of any suitable form.

The Hessian is of fairly open mesh so that the slurry or paste will penetrate through the material and form a protecting coating on the inside of the tube. If however a thicker coating is required a thin paste or slurry can be poured through the tube so as to run along the inside walls and this can be done one or more times to give whatever thickness is required. The inner coating may be applied by any other suitable means.

Alternatively the Hessian in the form of a narrow strip may be wound helically round the framework as tightly as possible so as to cover the whole, the overlapping of the strip being of any suitable amount. The concrete, cement or the like is applied to the Hessian as described above.

If desired the longitudinal members may be

of metal and may be permanently left in the member 50 or may be removed as required.

Such tubular members may be made of any desired length say about 10 feet or so and can be laid side by side upon the supporting walls to form the floors and ceilings of the upper stories of buildings. The joints can be grouted with cement mortar and the whole covered with a layer of concrete either reinforced or not as desired to form the floor while the underside may be plastered to form the ceiling in the usual manner. When desired a space may be left between any two tubular members (say four inches or so) and a reinforcing bar placed in this space which when filled with concrete will form a joist between the two members. Any number of joists may thus be formed. The floors may be covered with wood or any other suitable covering.

In order to build a wall such tubular members may be made of any length and may be laid horizontally or vertically and bonded together by cement mortar or the like and the outside and inside being then covered by a thin layer of concrete, cement, plaster, or the like.

Walls constructed in this manner are very suitable for domestic buildings since they are provided with hollow spaces and therefore will be warm in winter and cool in summer and at the same time are light in construction and cheap to manufacture.

Stairs, beams and innumerable other structures can be made according to my invention.

The initial tensile stress in the flexible material adds very materially to the strength of the reinforcement and further prevents cracking of the concrete at a later period.

It is to be understood that various other uses may be found for the invention and means, methods, and materials other than those described may be employed according to circumstances without departing from the scope of the invention.

I claim:

1. A method of building structures with cementitious material which subsequently sets hard consisting in first stretching a supporting and reinforcing flexible material composed solely of vegetable material between fixed supports so as to impart an initial tension thereto, thereafter wetting the fabric to cause it to shrink and thereby greatly increase the tension therein, applying cementitious material to the fabric when still wet so that particles of the cementitious material penetrate into the pores and interstices of the vegetable fabric and thereby maintain the increased tension in the fabric when the cementitious material sets hard.

2. A method of building structures with cementitious material which consists in first stretching a woven vegetable fabric between fixed supports, said fabric acting as the sole reinforcing means for the structure, thereafter applying thereto a coating of very wet cementitious material so that the moisture therein causes the fabric to shrink and thereby be placed under additional tension, fine particles of the cementitious material being carried into the pores and interstices of the fabric, and thereafter applying a further coating of cementitious material.

3. A method of building structures with cementitious material which consists in first stretching a woven vegetable fabric between fixed supports, said fabric acting as the sole reinforcing means for the structure, thereafter applying thereto a coating of very wet cementitious material so that the moisture therein causes the fabric to shrink and thereby be placed under additional tension, fine particles of the cementitious material being carried into the pores and interstices of the fabric, and maintaining the increased tension in the fabric when the cementitious material sets.

4. A method of building structures with cementitious material which consists in first stretching a woven vegetable fabric between fixed supports, thereafter applying thereto, by means of a brush, a thin coating of very wet cementitious material so that the moisture therein causes the fabric to shrink and thereby be placed under additional tension, fine particles of the cementitious material being carried into the pores and interstices of the fabric, and maintaining the increased tension in the fabric when the cementitious material sets, and finally applying at least one further coating of cementitious material thereto in the form of a plaster.

JAMES HARDRESS DE WARRENNE WALLER.