May 22, 1928. 1,670,557

K. WETTSTEIN

REENFORCED BUILDING ELEMENT

Filed March 28, 1927

Fig. 1

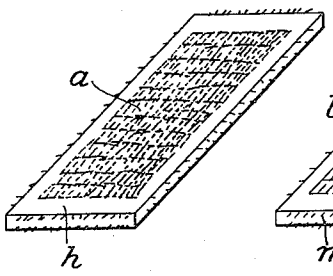


Fig. 2

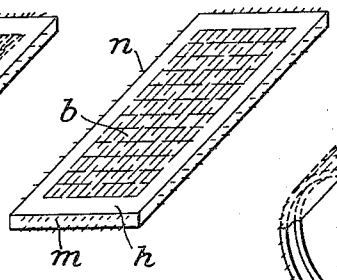


Fig. 3

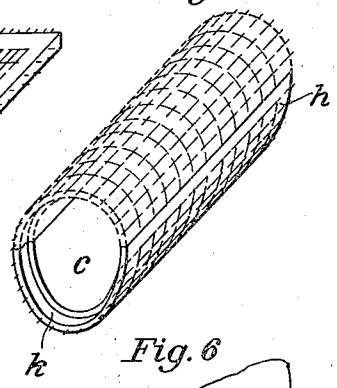


Fig. 4

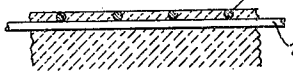


Fig. 5

Fig. 6

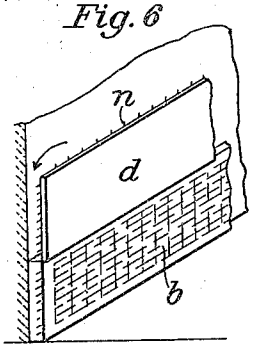


Fig. 7

Fig. 8

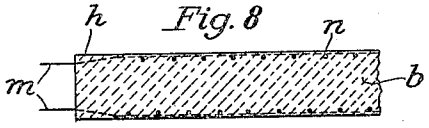


Fig. 9

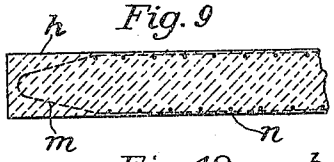


Fig. 10

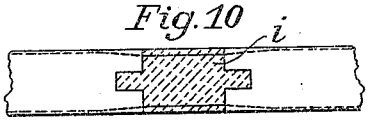


Fig. 12

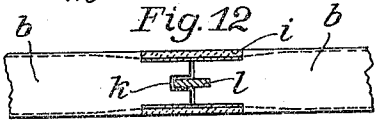


Fig. 11

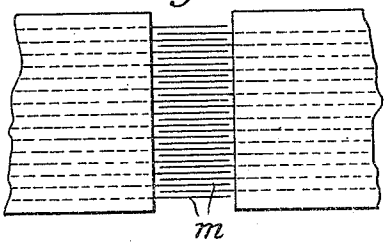
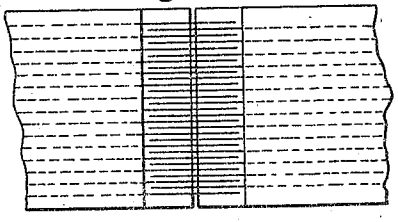


Fig. 13



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By [signature]
Atty.

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UNITED STATES PATENT OFFICE.

KARL WETTSTEIN, OF BRUX, CZECHOSLOVAKIA.

REENFORCED BUILDING ELEMENT.

Original application filed July 18, 1924, Serial No. 726,797, and in Germany January 27, 1923. Divided and this application filed March 28, 1927. Serial No. 178,999.

My invention relates to flat and curved building elements having a surface to which plaster and other finishing materials adhere with great security, and these elements are made of a cementitious material, such for example, a hydraulic cement or other hardening material. The elements are intended primarily for building construction, such as plates, slabs, laths, boards, gutters, pipes and the like.

My invention consists of a reenforced element having fine reenforcements exposed, or substantially exposed, at the surface of the element, which reenforcements serve also to more securely retain any plastic material applied thereto, and with very thin elements such as plates and gutters I make the reenforcements lie in the most advantageous zone, the surface or surfaces of the slabs that is to say the reenforcements lie on the surface or surfaces of the slabs.

I use fine filamentous reenforcements, readily bent, such as fine wire, textile threads, either densely applied lengthwise, with or without similar filaments extending transversely or as net, as well as inexpensive fibres, as bast, hemp, hair and the like, such building elements reenforced with fibres at the surface being absolutely novel.

These reenforcements I dispose unfabricated and close to one another at the surface of the slab or other element, being only partly embedded therein, and their ends are preferably, but not necessarily, depressed within the body of the element to protect them against being readily loosened during handling and shipping.

I am aware that slabs and other flat or curved building elements with reenforcements have been made especially to form walls or ceilings by blocks, or sheets of cement for cornices, with metallic lathing embedded in the middle of the elements, or elements with single wires or bars at the surface, and were not in the nature of fibres, or such fine wire corresponding thereto.

In using densely disposed thin wire filaments placed substantially at the surface there results difficulty to prevent the projecting ends of the reenforcements coming loose and the margins of the elements from scaling.

According to the present invention I depress the filamentous reenforcements when necessary at the margins of the elements and allow their ends to project from the edges of the element, such projecting portions being used to form a secure joint by the application therein of a plastic material, the projecting portions reenforcing the material of the joint as will be later described.

Such elements when they are reenforced on both sides with wire, thin plates or slabs utilize static forces to their fullest extent and their whole outer surface of reenforcement give them exceptional strength and flexibility. The densely applied fine wires give a very large and excellent holding surface of good homogeneity that appears as though they had a kind of metal coating. Assembling such elements with the both sides projecting wire ends and coating by cement gives an excellent resisting joint as the ends extend into the joint and fold therein.

When using wire reenforcements they shall be of such diameter that they can be readily bent around the edges of mold forms with the hands, preferably about 0.30 mm. diameter, or about one seventy-fifth of an inch, and preferably not to exceed one-sixteenth of an inch, and when covering the whole surface of the element by fine steel wire reenforcements I use such of a diameter about 1/12 to 1/24 inch.

The body of the elements can well be made of very light material, cork board, magnesite, plaster of Paris, etc. and short fibre reenforcements; while with cement wire is used, especially steel wire under tension.

If it be desired that the reenforcements be depressed below the surface at their ends the stiff or flexible form sheets will have to be provided with marginal strips that deflect these ends, as described in my aforesaid application. The art of applying reenforcements at the form sheet will depend upon the nature of them. When using long filamentous reenforcements, as wire, or threads, forms are wound with them, and the building elements cast there against, so that the reenforcements lie in the surface of the element, while their ends at the margin of the element are depressed or bent toward the interior of the mold, so that their ends lie below the surfaces of the coating and are embedded therein to prevent the reenforcements from being readily torn off during shipping and handling. When using a net or wire work, especially a dress work of longitudinal and transversal wires the ends

of them projecting, the net will be stretched over the mold sheets before using as a mold. Using fibrous reenforcements these are applied to the form sheets as a thin layer mixed with a suitable medium.

The building elements can well be used for floors, walls, ceilings or roofs or single plates and the curved form for gutters and pipes.

They may be made at a special plant, the elements with only one side having filamentous reenforcements are made in a special manner also on the job as elected, and used as facing, for strengthening or insulating walls, ceilings or floors, forming one piece with it after setting material. Such elements represent an important part of my invention.

A further object of my invention relates to half cylindrical or curved elements having filamentous reenforcements at the exterior face, the ends of the reenforcement projecting and having preferably tongued and grooved parts joined to gutters, pipes or conduits. The reenforcements may cover the whole surface or their ends may be depressed at the margins of the element.

The double wire reenforced slabs form an excellent substitute for slate, tarred paper or corrugated iron for roofs. They do not scale off and serve both as construction elements and roof covering supports, in place of sheathing, and by reason of their large size do not require so much support. When curved they may form curved roofs of small weight, and water and fire-proof.

The thickness of these elements may be as little as three-eighths of an inch, and they are readily cut with an emery disc or with a cold chisel.

Referring to the drawing, in which like parts are similarly designated—

Figure 1 is a perspective view of a plate or slab reenforced at both surfaces with fibrous material.

Fig. 2 is a similar view of like building element reenforced on opposite faces with fine wire.

Fig. 3 is a perspective view of a half cylinder, or gutter, reenforced only at the exterior face, showing in dotted lines a similar cover, to form a pipe.

Fig. 4 is a cross section on a very much enlarged scale, showing how the reenforcements are exposed at the surface.

Fig. 5 is a perspective view of the manner of making a conduit out of half cylindrical reenforced elements by breaking the joints.

Fig. 6 shows the manner of making the reenforced wall in place.

Fig. 7 shows a longitudinal section of a slab natural size, about one-half inch thick reenforced on both faces with fine wire.

Fig. 8 is a cross-section of Fig. 7.

Fig. 9 is a cross-section of a similar element when the reenforcements do not project beyond the edges but are depressed below the faces at the margins of the element.

Fig. 10 is a section and Fig. 11 is a plant showing the manner of making a joint between two elements.

Fig. 12 is a sectional view, and Fig. 13 is a plane showing another form of joint, employing a tenon.

The element *a* has one or both faces furnished with a fibre reenforcement, and preferably this reenforcing material is depressed below the faces at the margins *h* to project from the edges, Fig. 1.

In Fig. 2 a slab *b* having either thread or fine wire longitudinal reenforcements *m* and transverse reenforcements *n* on either one or both faces is shown. The longitudinal reenforcements being close together and under tension and both being depressed below the faces at their margins and projecting from the edges. It is, of course, obvious that one set of reenforcements on a face may be omitted, and that they may be of different material if so desired.

With curved elements such as *c* the reenforcements are preferably on one face, the exterior face, and either fine wire, net or fibre may be used, a second reenforcement layer may be embedded in the body moreover.

The ends of the reenforcements may or may not be depressed from the faces at the margins *h* and extend through the edges.

In laying semi-cylindrical elements as in Fig. 5, the ends may interfit by mitre joints as at *k*, or by tongue and groove, the projecting ends of the reenforcements being covered with cement in the customary manner by laying the half cylinders in broken joints a strong pipe of any length desired can be made, as illustrated in Figure 5.

Inasmuch as I make the elements with a thin cement mixture and the mold is shaken or jarred during filling the cement very lightly coats the exposed faces of the reenforcements and protects them against rusting.

While the metal does not show, its presence is noticeable from the form, and a weather-proof coating is not necessary, but may be applied, if desired.

In Fig. 6 I have illustrated the manner of covering or projecting walls on their inner or outer side. The wall itself forms one face of the mold. The opposite face is formed by a mold board *d* the side of which adjacent the wall is provided with filamentous reenforcements, preferably fine wire, or mesh, or if it be desired this face of the board may be provided with fibres caused to adhere thereto by a cement or other binder until the form is poured, after which the reenforcements adhere to the casting as shown in the lower part of Figure 6.

These elements may have placed the reenforcements at the whole surface or de-

pressed below the surface at their ends and joined to the adjoining parts by the projecting ends of the reenforcements in a known manner. It is obvious such wall-boards may be composed of flat or curved elements.

In Figures 10–13 I have shown two different joints for building elements having fine wire reenforcements on both faces, and the reenforcements of both elements to be joined extend across the joint. The elements are spaced from one another a distance equal to the length of the projecting wires, the projecting wires of one element overlapping those of the adjoining element at both faces and the space filled with cement alone, as in Fig. 10, to form a tongue and groove connection.

In Fig. 12 the bodies of the elements abut directly, one having a groove *k* and the other an inserted feather *l* projecting therefrom and entering the groove *k*, the portions *l* and the projecting overlapping wires being cemented. This makes a very strong and fully resistable joint, so that when such slabs are used for roofs, the rafters need not be placed so close together. The fine wires preferably project into a depression or rabbet, as at *i* so that they can be readily covered with cement.

I have succeeded by my invention in making very thin, light elements, as thin as one-quarter of an inch, suitable for use as wall board, and having a surface dimension of 3 x 6 feet, though with thicker slabs they may have a larger area.

I claim—

1. A building element, comprising a hardening, cementitious body and individual filamentous reenforcements close together on a face thereof whose ends at the margins of the elements are submerged in the cementitious body.

2. A building element, comprising a hardening, cementitious body and individual filamentous reenforcements on a face thereof whose ends at the margins of the elements are submerged in the cementitious body and project from the edges of the elements.

3. Flat building elements, comprising a hardening, cementitious body and separate filamentous reenforcements on both faces thereof whose ends at the margins of the elements are submerged in the cementitious body.

4. A building element, comprising a hardening, cementitious material and separate fine wire surface reenforcements on the faces thereof whose ends are submerged below the surface at the margins of the elements.

5. A building element, comprising a hardening cementitious material and separate fine wire surface reenforcements on the faces thereof whose ends are submerged below the surface at the margins of the elements and project from the edges of the elements.

6. A building element comprising a hardened cementitious body and independent longitudinal and transverse reenforcements on a face thereof whose ends are submerged below the face of the elements at their margins.

7. A building element, comprising a hardened, cementitious body and longitudinal and transverse fine wire reenforcements on a face thereof whose ends are submerged below the face of the elements at their margins and project from the edges.

8. A building element, having filamentous surface reenforcements submerged at and extending beyond the edges and whose edges are grooved for the reception of a bond.

9. A building element having fine wire surface reenforcements whose ends are depressed toward the centre of the elements and project from the edges thereof, the edges of the elements being grooved between the reenforcements of the faces for the reception of jointing bond.

10. A building element of cementitious material having surface filamentous reenforcements whose ends are depressed at the margins of the elements and submerged in the material, and having grooves in their edges and a feather secured in a groove for entering the groove of an adjoining element

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

KARL WETTSTEIN.