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No. 866,715.

PATENTED SEPT. 24, 1907.

H. F. COBB.
REINFORCED CONCRETE STRUCTURE.
APPLICATION FILED FEB. 18, 1907.

Fig. 1

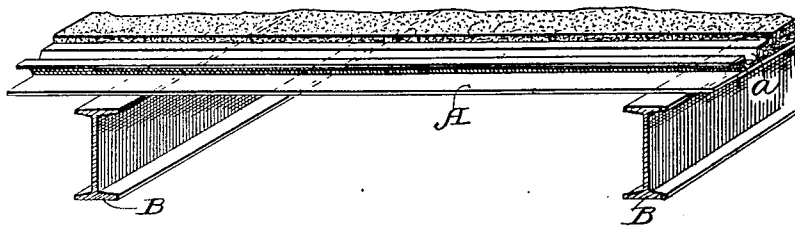


Fig. 2

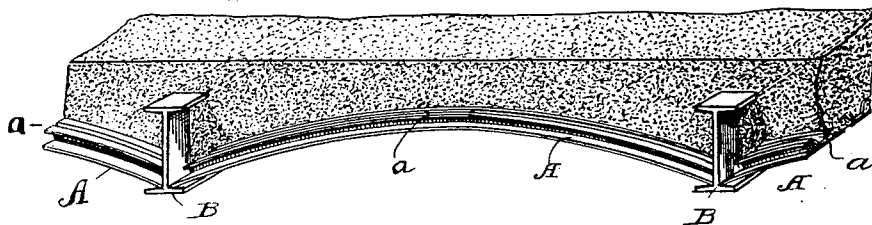
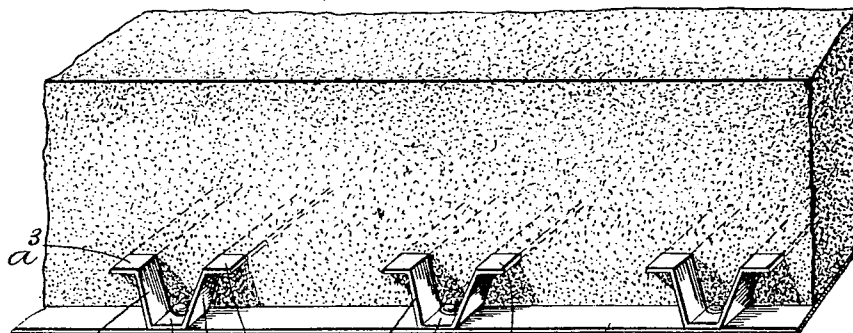


Fig. 3



Witnesses.
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UNITED STATES PATENT OFFICE.

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REINFORCED CONCRETE STRUCTURE.

No. 866,715.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed February 18, 1907. Serial No. 357,800.

To all whom it may concern:

Be it known that I, HERBERT F. COBB, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Reinforced Concrete Structures, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to structures of concrete, and particularly to the construction of concrete roofs, floors, stairways, sidewalks, and the like.

The object of the invention is the provision for use in combination with the cement filling entering into such construction of an improved type of combined centering and reinforcement.

This present application relates more especially to a specific form of such invention, the latter being more generally presented in a separate application, Serial No. 357,799, filed even date herewith.

Said invention, then, consists of means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail a certain construction embodying the invention, such disclosed construction, however, constituting but one of various forms in which the principle of the invention may be used.

In said annexed drawing: Figure 1 represents in perspective a section of a flat structure, as of a roof, floor, or the like, in which is incorporated my improved centering and reinforcement; Fig. 2 is a similar view in perspective of a floor, roof, or the like of arched construction, showing the adaptation of my invention to use in this connection; and Fig. 3 is an enlarged view, taken end on, of a section of a concrete structure embodying such combined centering and reinforcement.

The most common of the methods at present prevailing in the erection of concrete structures of the kind first enumerated involves putting a continuous wooden platform, called "centering", across the space between the roof or floor supports at the level desired for the lower surface of the finished concrete structure. The next step is to lay reinforcing rods or netting on top of this centering and to thoroughly embed them in the layer of concrete which is thereupon applied on the upper surface of the centering. When the concrete has set the centering is, of course, torn down. In place of wooden platforms, metallic forms have also been used where practicable. The cost of putting up and taking down this centering is very large, and has led to the use of wire netting or metallic sheets, either plain or corrugated, as a substitute for the removable platforms, such netting or sheets being left permanently in place. A further advance in the art has consisted in so forming

metallic centering, of the permanent character last referred to, that the concrete bonds securely to it, and thereby transmits to it a portion of the stresses which it would otherwise have to carry alone. In the present development of this form of metallic centering, such centerings, although adapted thus to act as reinforcements for the concrete, have been of such a form that the under surface must be plastered in order to permanently protect it from corrosion. Otherwise it will become thinner and thinner until eventually there will be little or no reinforcement left for the concrete. The necessity for plastering, thus present in the use of this type of centering, adds very greatly to the expense of construction.

By my invention I propose to so form and employ metallic sheets that they will act both as centering and reinforcement for concrete structures, and will not require plastering on the under side in order to insure the permanence of such reinforcement. This I accomplish by the provision of ribs on the upper side of the sheets, such ribs being adapted initially to stiffen the sheet so as to enable it to support the concrete when setting, as also subsequently to enter into, and reinforce the solidified concrete as thoroughly and permanently as where reinforcing material, entirely independent of the centering, is employed. In other words, such ribs, while connected with the sheet to sustain the latter as described, are of such a form that they will be almost entirely enveloped by the concrete and so be effectually protected from corrosion. The sheets may hence be made of minimum thickness and weight and the strength and durability of the completed structure will be only very slightly impaired, indeed, by the total subsequent destruction of the same.

In the form of my invention forming the subject matter of present interests, I propose to utilize as the basis of the structure continuous sheets A of metal, which sheets may be either flat or arched, depending upon the nature of the supports available and the character of under-surface preferred. For that matter, where desired, ornamental designs may be stamped into the sheet. The dimensions of the individual sheets will, of course, be varied to suit the relative proximity and positions of the aforesaid supports. As reinforcing members proper ribs *a* of trough-like or channel cross-section are employed, being spaced at suitable intervals apart on the upper face of the sheet and being riveted or otherwise suitably secured thereto. These ribs, in the specific form illustrated, each include an intermediate portion, or bottom, *a'*, adapted to lie close against the surface of the sheet A, and two laterally flaring or divergent portions *a''* corresponding to the sides of the trough. These latter terminate in a flange *a'''* turned outwardly so as to lie substantially parallel with the surface of the sheet.

Other forms of rib than that illustrated will, of course, suggest themselves, whereby the two functions, initial stiffening of the sheet and subsequent reinforcement of the concrete, may be effectually attained. In order to enable them, however, most perfectly to perform the latter function, they are desirably made with outer portions bent away from a plane which is perpendicular to the surface of the sheet at line of attachment of the rib thereto. The particular method of riveting illustrated need not be exclusively employed; various familiar equivalent methods of securing the bars or ribs, whatever their form, to the sheet will suggest themselves to those familiar with the art to which this invention pertains.

In the utilization of my improved combined centering and reinforcement in actual construction, the sheets are laid upon the beams B or equivalent supports provided as a foundation for the structure, so as to dispose the corrugations or strengthening ribs transversely of such beams. Where the structure is to be made flat on the under side, the sheets are preferably placed directly upon the upper surfaces of the beams and extend straight across from one to the other as shown in Fig. 1. In erecting arched structures, the sheets are still disposed to bring the corrugations transversely with respect to the beams, the ends of the sheets resting on the lower horizontal flanges of the beams, Fig. 2. A layer of concrete to the desired thickness is then spread upon the upper ribbed face of the sheet, care being taken that such upwardly-projecting ribs be thoroughly embedded therein. Whatever the type of the structure in which my invention is thus employed, it will be seen that the sheet can be made very light since it is strengthened to sustain the load of the concrete before the latter sets by the same ribs or corrugations that, after such setting, serve to reinforce the concrete almost entirely independently of the sheet. Hence, should the exposed sheet metal on the under side be entirely eaten away, due to corrosion, the concrete will still be properly reinforced by the rib portions which are inclosed and protected against rusting. Plastering and painting of the under side of the sheet may both be omitted, where not desired for ornamental

reasons, without endangering in the slightest the permanence of the structure.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the construction herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In concrete structures of the class described, the combination with supporting beams or walls; of a cement filling and a combined centering and reinforcement for such filling comprising a centering sheet and a plurality of independent members arranged transversely of said supporting beams or walls and adapted to serve as reinforcing members in the completed structure, said members being directly attached to the upper face of said sheet so as to thereby assist the latter in initially sustaining said cement filling while wet.
2. In concrete structures of the class described, the combination with supporting beams or walls; of a cement filling and a combined centering and reinforcement for such filling comprising a metallic centering sheet and a plurality of independent bars arranged transversely of said supporting beams or walls, said bars being formed with continuous outer laterally divergent portions whereby they are adapted to serve as reinforcing members in the completed structure, and having their lower portions directly attached to the upper face of said sheet so as to thereby assist the latter in initially sustaining said cement filling while wet.
3. In concrete structures of the class described, the combination with supporting beams or walls; of a cement filling and a combined centering and reinforcement for such filling comprising a metallic centering sheet and a plurality of independent bars arranged transversely of said supporting beams or walls, said bars having their outer portions continuously bent away from a plane perpendicular to the surface of the sheet whereby they are adapted to serve as reinforcing members in the completed structure, and having their lower portions directly attached to said sheet so as to thereby assist the latter in initially sustaining said cement filling while wet.

Signed by me, this 13th day of February, 1907.

HERBERT F. COBB.

Attested by:

D. T. DAVIES,
JNO. F. OBERLIN.