R. B. HARTMAN.

REINFORCEMENT SYSTEM FOR CONCRETE COLUMNS.

APPLICATION FILED APR. 23, 1907.

1,091,218. Patented Mar. 24, 1914.

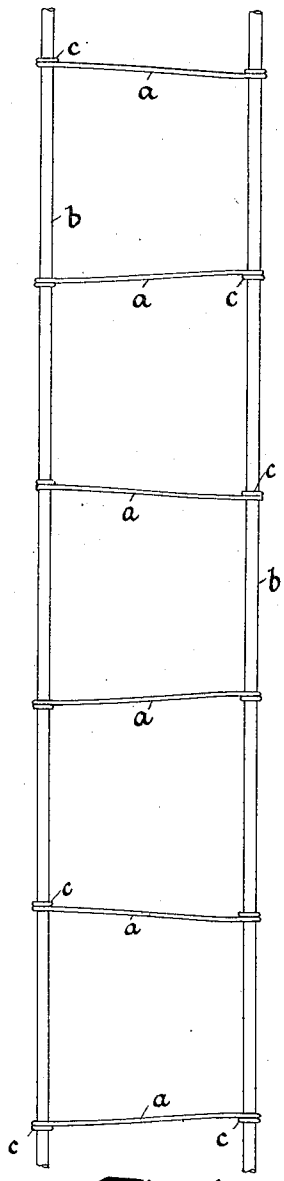


Fig. 1

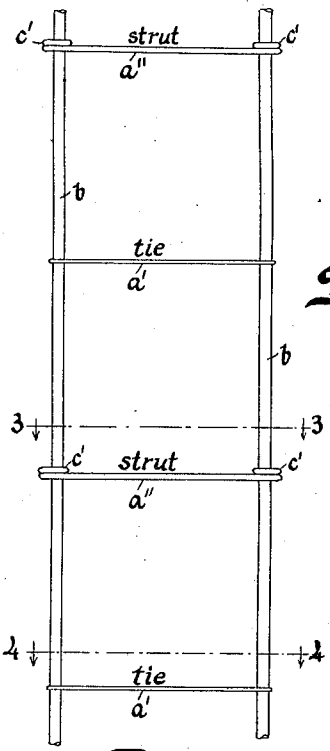


Fig. 2

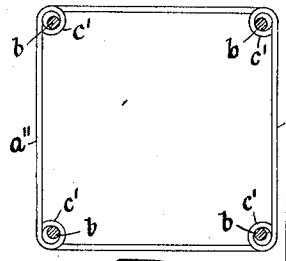


Fig. 3

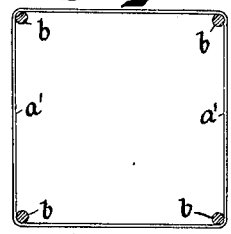


Fig. 4

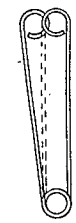


Fig. 5

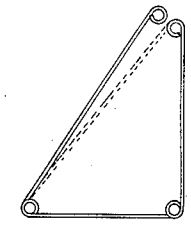


Fig. 6

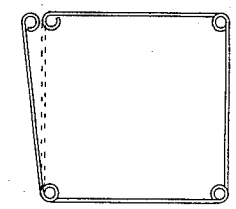


Fig. 7

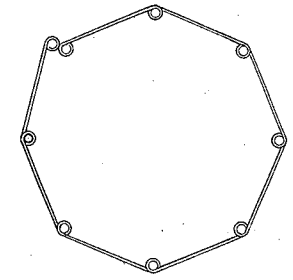


Fig. 8

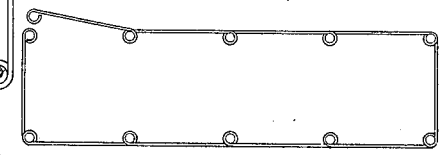


Fig. 9

Witnesses

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REINFORCEMENT SYSTEM FOR CONCRETE COLUMNS.

1,091,218. Specification of Letters Patent. Patented Mar. 24, 1914.

Application filed April 23, 1907. Serial No. 369,764.

To all whom it may concern:

Be it known that I, RUDOLPH B. HARTMAN, of Milwaukee, Wisconsin, have invented a Reinforcement System for Concrete Columns, of which the following is a specification.

My invention relates to structural concrete work, and has to do more particularly with that which is known as armored or reinforced concrete, in which metal and concrete are united together to form beams, slabs, columns, piers, chimneys, and other structural forms.

In my present invention I design to improve on former methods of reinforcing columns, by providing improved skeleton frame work for the columns.

My invention consists of the constructions and combinations which will be hereinafter explained in connection with the accompanying drawings, wherein—

Figure 1 is a side elevation of one form of skeleton structure according to my invention; Fig. 2 is a similar view of another form of skeleton structure; Fig. 3 is a plan-section on the plane 3 of Fig. 2, only the hoop nearest the plane of section being shown to avoid obscurity; Fig. 4 is a plan-section on the plane 4 of Fig. 2, only the hoop nearest the plane of section being shown to avoid obscurity; Figs. 5 to 9, inclusive, show various forms of reinforcing hoops for the skeleton-frames of differently shaped columns.

In these drawings every reference letter and numeral refers to the same part wherever used.

My improved construction consists, in general, in making a selfsustaining skeleton-frame whose parts are held in proper relation by friction only, thus avoiding the necessity of special devices for holding the frame together. In order to effect this, the reinforcing-girths or hoops which embrace the longitudinal rods are so constructed and arranged that they produce upon the said longitudinal rods slight bending forces alternately in opposite directions, said bending forces being of a resilient nature and producting a frictional pressure between the several pieces which is sufficient to hold them in place while the framework is being erected and to allow of its being handled and transported from place to place as a whole without disarrangement.

In Fig. 1 is shown one plan of producing aforesaid opposite slight bending-stresses upon the longitudinal rods; in this case the reinforcing girths a which embrace the longitudinal bars b are all alike, and they are provided with eyes c turned at the corners, through which the rods b pass, said eyes more or less closely embracing the rods b. When the girths a are in place, they are shifted or skewed alternately in opposite directions as shown, thus producing opposite slight flexural stresses in the longitudinals b which counterbalance each other. Of course, corresponding stresses which produce a greater amount of flexure are set up in the girths a, action and reaction being equal as in all cases. The longitudinals b, being in common practice much stouter than the girths a, their flexure would not be sensible to the eye so it is not shown on the drawing. It will be seen that the opposing flexural stresses in the members a and b can be made to produce considerable binding forces at the eyes c, that is to say, frictional contact between the members, which is amply sufficient to hold them in relative position.

Fig. 2 shows another method of producing the same result. In this case the flexural stresses in the longitudinals b are brought about by making the reinforcing girths alternately larger and smaller, so that the smaller ones act as ties to pull the rods b together, and the larger ones as struts to push them apart. The tie-girths a' do not require any eyes at the corners; these, therefore, are omitted. The strut-girths a'' necessarily have eyes, as shown in Fig. 3. These girths are shown in the drawing as of larger diameter than the girths a', merely to illustrate to the eye that they are struts and not ties; in actual practice they are of the same size, as the deflecting forces are too slight to bend them visibly. It will be seen that here, also, alternately opposite flexural stresses are produced in the longitudinals b, which by pressing frictionally against the corners of the ties a' and against the inner sides of the eyes c' of the girths a'', give a frictional contact sufficient to hold them in place.

As illustrated in Figs. 5 to 9, the column for which the skeleton-frame is prepared in accordance with my invention may be of any desired shape. Fig. 5 shows a girth adapted to a flat column having but two sets of longitudinal rods; Fig. 6, one for a

column of triangular section; Fig. 7 one for a square column; Fig. 8 one for an octagonal column; and Fig. 9 one for a large flat column or portion of a partition or dividing wall.

Of course it will be understood that the longitudinals shown as single rods in the drawing may each comprise several rods, as in actual practice is commonly the case; and other such variations embodying the same principle, which come properly within the scope of the appended claims, are intended to be included therein.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A skeleton framework for reinforced concrete structures, embodying a plurality of longitudinal members and a plurality of rigid transverse members, the latter being in the form of closed polygons having eyes at their angles through which said longitudinal members pass, successive transverse members of the frame work being skewed in opposite alternate directions, whereby they bind each and all of them in their properly spaced relation upon said longitudinal members.

2. A skeleton framework for reinforced concrete structures, comprising a plurality of longitudinal members and a plurality of transverse members each consisting of a rod bent in a closed figure encompassing said longitudinal members, said longitudinal members being deviated from their normal condition of straightness and frictionally, by their reaction, holding the transverse members in place.

3. A skeleton framework for reinforced concrete structures, embodying a plurality of longitudinal members possessing resiliency, and a plurality of transverse members each consisting of a rigid rod bent in the form of a closed figure encompassing said longitudinal members, alternate transverse members having eyes turned thereon through which said longitudinal members pass, said members having portions distorted to frictionally bind each other.

4. A skeleton framework for reinforced concrete structures, embodying a plurality of longitudinal members possessing some resiliency, and a plurality of transverse members each consisting of a rigid rod bent in the form of a closed figure encompassing said longitudinal members, alternate transverse members being provided with eyes through which said longitudinal members pass and said transverse members reactively distortionally holding the longitudinal members and being retained by them frictionally in place.

In witness whereof, I have hereunto set my hand this thirteenth day of April, 1907.

RUDOLPH B. HARTMAN.

In presence of—
Jos. M. Ginber,
Elsie M. Hotz.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."