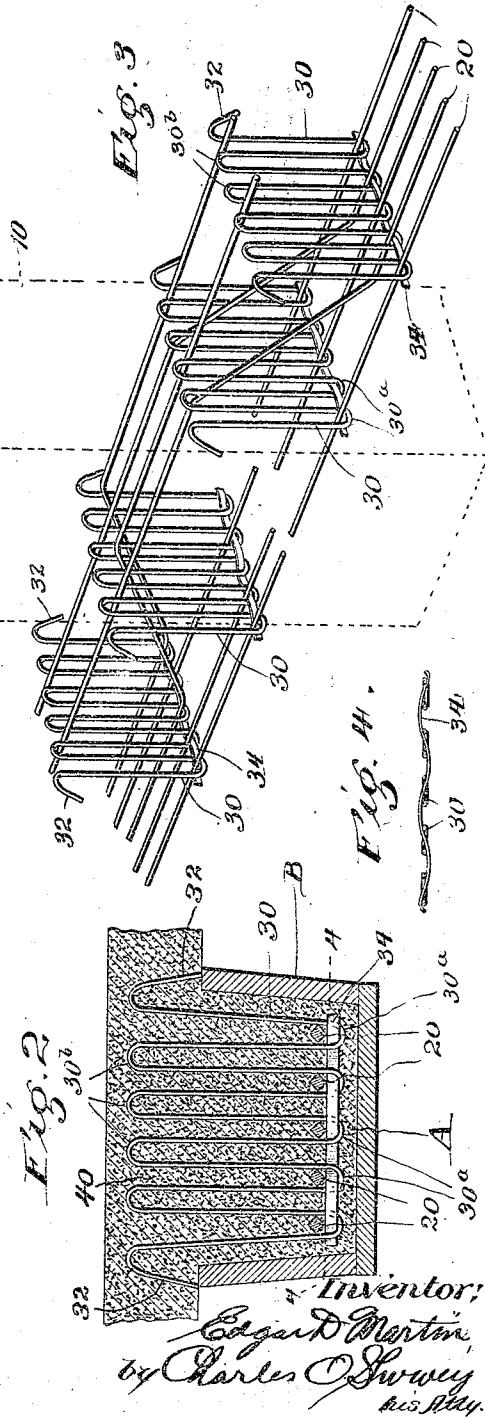
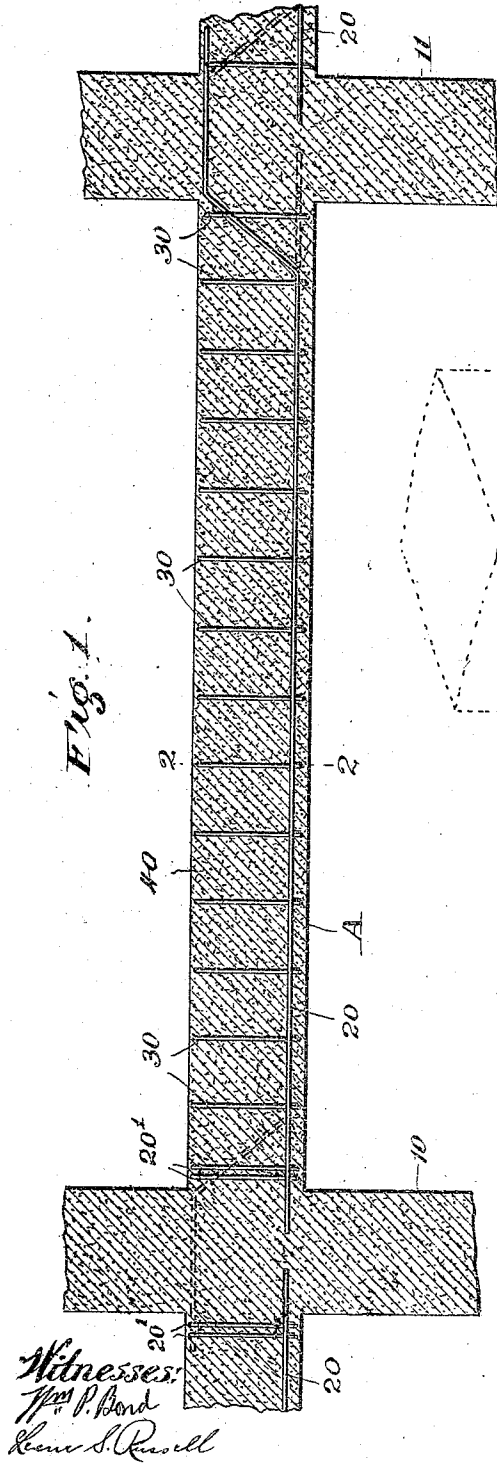


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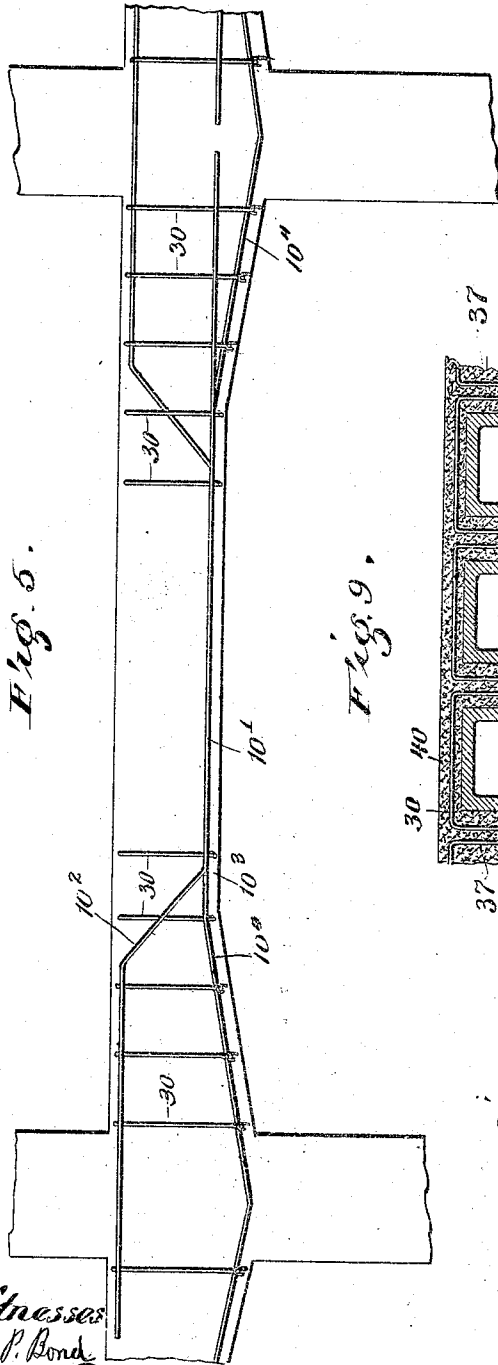
Patented Aug. 24, 1909.

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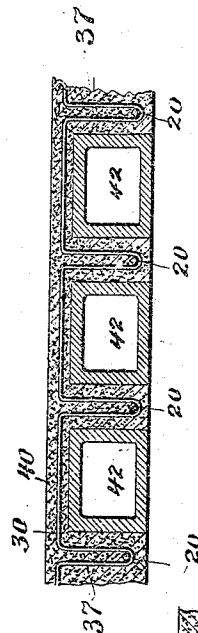


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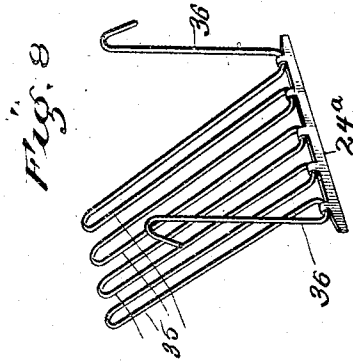
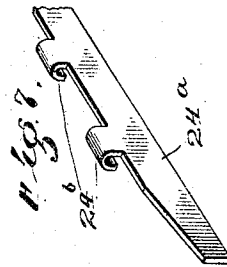
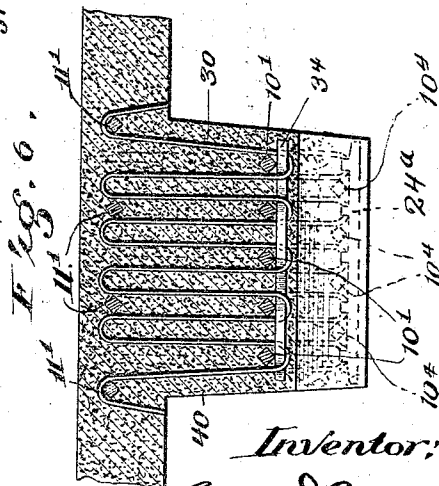


Fig. 3



11-10-8



Feb. 6

Witnesses
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his Atty.

UNITED STATES PATENT OFFICE.

EDGAR D. MARTIN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FRANKLIN P. SMITH, OF CHICAGO, ILLINOIS.

BUILDING CONSTRUCTION.

931,943.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed December 20, 1906. Serial No. 348,719.

To all whom it may concern:

Be it known that I, EDGAR D. MARTIN, a citizen of the United States, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Building Construction, of which the following is a full, clear, and exact description.

My invention relates to certain new and useful improvements in building constructions, and more particularly to improvements in the construction of concrete girders composed of concrete and reinforcing metal, the object of the invention being to provide a construction, capable of sustaining heavy loads, without the use of an excessive amount of metal in the construction, and to provide means for facilitating the construction of the girders.

In concrete girder construction it is customary to combine with the body of concrete, a series of longitudinal rods or bars, and a number of vertical metal members to strengthen and reinforce the concrete. Much difficulty has been encountered in assembling the metal parts of the girder, that is, while in the course of construction and more difficulty has been found in properly spacing the various rods and other metal parts, it being essential that the metal parts which comprise the frame be completely surrounded by the concrete.

One of the objects of my invention is to provide a series of stirrups or braces, the construction of which enables the longitudinal rods to be readily laid in place while the girder is being formed.

To such end the invention consists in certain novel features of construction and arrangement, a description of which will appear in the following specification and the essential parts of which will be definitely pointed out in the appended claims.

The invention is clearly shown in the drawings accompanying this specification in which—

Figure 1 is a longitudinal section through a girder, made in accordance with my preferred form of construction. Fig. 2 is a cross section taken on the line 2—2 Fig. 1 and showing in addition thereto a trough or mold in which the girder is formed. Fig. 3 is a fragmental perspective view of the metal frame work of the girder. Fig. 4 is

a horizontal section of one of the stirrups, the line of section being indicated at 4—4 Fig. 2. Fig. 5 is a side view of a modified form of metal frame. Fig. 6 is a cross section thereof. Fig. 7 is a perspective view of a spacing bar used in connection therewith. Fig. 8 is a perspective view of a modified form of stirrup and Fig. 9 is a sectional view of a modified form of construction.

Referring to Figs. 1 to 4 inclusive, 10—11 represent two columns of suitable construction upon which the girder is to be supported. These columns are preferably constructed of some form of concrete construction, but for the purpose of this specification require no especial description. The girder is shown at A, and contains a plurality of longitudinal rods 20, which extend from column to column, and a series of vertical stirrups 30 which connect and space the rods apart and form the shear reinforcements. It is preferable to offset certain of the longitudinal rods near the columns and to continue them on near the upper edge of the girder, so that where the rods pass through the columns, part of them will extend along the lower and part along the upper edge of the girder. The stirrups consist preferably of a wire bent into a serpentine form having a plurality of upright and inverted U shape strands, 30^a, 30^b (see Fig. 2) the end ones of which terminate in arms 32, whose function will be fully set forth later on in this specification. The lower bends of the upright U's are connected by a spacing band 34 which as shown is woven in and out through and between bends of the U strands. The spacing band is first crimped into shape to suitably space the strands and slipped over the upper bends of the inverted U's and crowded down upon the bends of the upright U's at their lower ends. This spacing band serves the purpose of holding the lower ends of the strands in position to properly space the longitudinal rods. Wherever it is anticipated that the load will be placed in the middle of the span, the stirrups are preferably continued across the entire span, but when the load is distributed over the entire surface the middle stirrups may be omitted and as many stirrups used adjacent to the columns as will make the construction safe.

In assembling the parts, a trough B, is first

supported in place at the point where the girder is to be laid, and the stirrups suspended therein, their arms 32 resting upon the upper ends of the side boards of the trough thus holding the lower ends of the stirrups at a slight distance above the bottom thereof. The longitudinal rods 20 are then slipped in between the bends of the inverted U's of the stirrups and laid upon the spacing strips, or if desired the rods may be slipped in first and the spacing strips put in afterward. With the use of the spacing strips it is obvious that the stirrup will hold its shape and that the rods will be properly spaced. After the metal parts have been laid in place, the trough is filled with concrete 40, all of the metal parts being completely embedded therein. When the concrete has set, the trough is removed, and the girder is complete. A more satisfactory construction is thus obtained because of the fact that the rods are properly spaced, and the concrete can surround each rod. In certain classes of work it is desirable to increase the amount of metal, and in Fig. 1 two of the stirrups are placed quite close together as shown at 20¹ and wired together. This gives added strength at the points where such strength is required. In the modified form shown in Figs. 5 and 6 the middle struts are omitted and only as many employed as is deemed necessary to carry the load. In this form, the girder is made somewhat heavier at its points of juncture with the columns, the stirrups nearer the columns, consequently being made longer than those farther away. In this form some of the longitudinal rods 10¹ are bent diagonally at 10² to bring their end portions near the upper edge of the girder, and some of the rods stop at the point 10³ where V shaped rods 10⁴ extend therefrom and rest in the stirrups. If desired, other reinforcing bars 11¹, may be slipped in between the bends of the stirrups, to give added strength to the structure.

A modified form of spacing strip is shown in Figs. 6 and 7, the same consisting of a flat strip 24^a, having hooks 24^b that are properly spaced apart and arranged to hook into the lower bends of the U's of the stirrups. This strip provides means for supporting the rods 10⁴ between the upright U strands, and when this form is used the spacing strip is first laid in its form or mold, the V rods laid upon them, the stirrups put in place and the spacing strips hooked upon the latter. The other longitudinal rods may then be laid in between the inverted U strands as before.

Fig. 8 shows a stirrup constructed on the general plan as the stirrups shown in the previously described figures with the exception that the U's 35, between the ends 36, extend at an angle with respect thereto, the

object being to strengthen the concrete mass with diagonal struts as well as with vertical ones.

Fig. 9 shows a stirrup, the U's 37 of which are somewhat separated and the spaces between the same filled with tile 42 and concrete, 40. This form provides a series of closely situated girders, forming a flat ceiling without any ribs therein such as are usually caused by the ordinary heavier girders.

One of the advantages of the construction shown and described in the specification is the fact that the stirrup serves the function of properly spacing the rods, during the course of construction and acts as a shear reinforcement to the girder when in use. Thus a combined shear reinforcement device and rod spacing device is provided by the stirrup, whereby a great deal of labor and time is saved in the construction of the girder and a less amount of metal is used, without endangering the girder.

I am aware that other modifications and alterations of the construction are possible and I do not desire therefore to limit myself to their exact construction, except as pointed out in the following claims.

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

1. In a building construction, the combination with a series of longitudinally extending bars or rods, of stirrups for rigidly spacing the rods or bars apart, each stirrup comprising a single piece of wire or rod bent into serpentine form, having connected, upright and inverted U shaped bends and a spacing member for rigidly connecting each U bend on one end of the stirrup with its adjacent one, to rigidly space said bends.

2. In a building construction the combination with a series of longitudinally extending bars or rods, of stirrups arranged to rigidly space the bars or rods apart, each stirrup comprising a single piece of wire or rod bent into serpentine form and a metal spacing strip woven in and out between the lower bends thereof, to rigidly space the bends apart, said bars or rods resting in said lower bends, and a body of concrete in which said rods or bars and stirrups are wholly embedded.

3. In a building construction, the combination with a series of longitudinally extending bars or rods, certain of which are offset at their ends, of a series of transversely extending stirrups supporting said bars or rods, each of which comprises a single piece of wire bent into serpentine form, and a spacing strip woven in and out between the lower bends thereof and adapted to rigidly space apart said lower bends, and a body of concrete in which the bars or rods and stirrups are wholly embedded.

4. In a girder the combination with stirrups comprising upright and inverted U-

shaped strands, and a spacing strip woven in and out between the lower bends and arranged to rigidly space the same apart, of longitudinal rods resting upon said spacing strip in the upright U-strands, said stirrups forming the combined rod spacing means and the shear reinforcements for the girder, and a body of concrete in which the stirrups and rods are wholly embedded.

10 5. In a building construction, a spacing stirrup comprising a single piece of wire or rod, bent into serpentine form, the two end members of which extend upward and are bent outward and downward to form
15 temporary supporting arms that are adapted

to rest upon a suitable mold or trough, so as to carry the stirrup from above and thereby maintain its lower edge above the bottom of the trough, and a spacing strip connecting each individual lower bend and rigidly spacing the same apart.

In witness whereof I have executed the above application for Letters Patent of the United States, at Chicago, county of Cook and State of Illinois, this 10th day of December 1906.

EDGAR D. MARTIN.

Witnesses:

S. G. HOBERT,

CHAS. O. SHERVEY.