

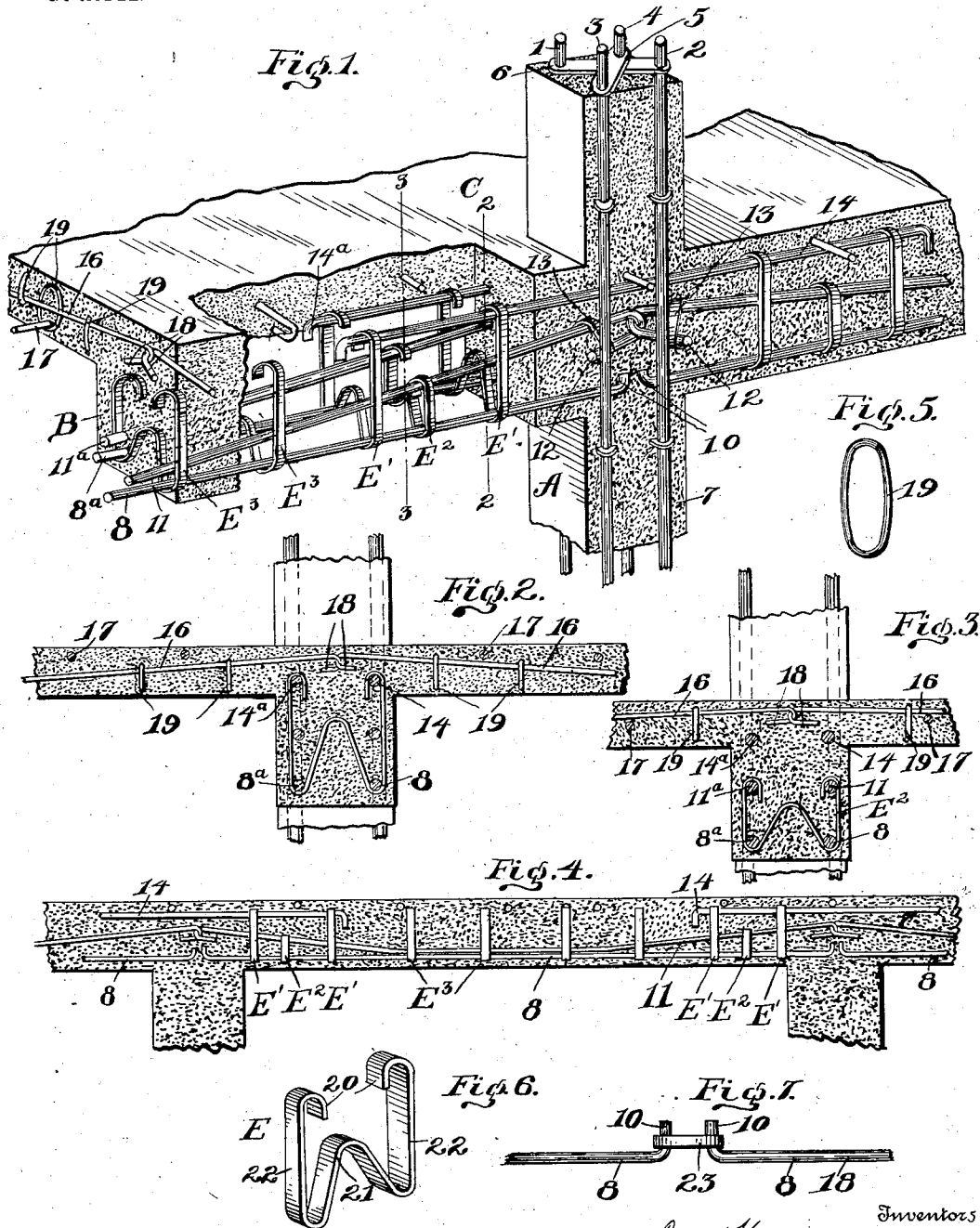
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FIREPROOF BUILDING STRUCTURE.

APPLICATION FILED JAN. 5, 1903.

NO MODEL.



Witnesses

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FIREPROOF BUILDING STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 729,299, dated May 26, 1903.

Application filed January 5, 1903. Serial No. 137,843. (No model.)

To all whom it may concern:

Be it known that we, CLARENCE M. ELLINGER and LEON KOPCZYNSKI, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Fireproof Building Structures, of which the following is a specification.

This invention comprises improvements in fireproof building structures composed entirely of concrete and metal rods embedded in the concrete and suitably arranged to enable the structure to resist uniformly the various forces tending to strain or break it. The main rods used in this structure are comparatively short, the length of each being substantially equal to the distance between the centers of two adjacent supports. This arrangement of short rods enables the construction to be carried on more readily than where long rods extending through the length or width of a building and over the entire series of supports are employed.

In the accompanying drawings, Figure 1 is a perspective view of a portion of a structure comprising a pillar, a beam, and the floor, the said parts being shown in vertical section to illustrate the arrangement of the metal rods. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a vertical longitudinal section through one of the beams, on a smaller scale, illustrating the arrangement of rods between two adjacent pillars or supports. Figs. 5 and 6 are views showing the ties which are used to connect the rods in one side of the structure with the rods or body of cement in the opposite side of the structure, and Fig. 7 is a detail showing a modification.

Referring to Fig. 1 of the drawings, A B C indicate parts of a column, a beam, and a floor, respectively, these elements of the structure being molded in one integral mass. The column, as shown, consists of the vertically-arranged rods 1 2 3 4, tied together at suitable intervals by plates 5 6, having openings at their ends through which the rods extend. The plates extend diagonally through the column, as shown, the plates 5 connecting the rods 3 4 and the plates 6 connecting the rods 1 2. These rods and plates are em-

bedded in the mass of concrete 7, which forms the body of the column. It will be noted that the vertical rods extend through the beam B, and the column above and below the beam 55 is continuous, the cement in the beam forming in reality a part of the column. Throughout the length of the beam in the lower part thereof is arranged a longitudinal series of tension-rods 8 and, according to the width of 60 the beam, one or more corresponding parallel series of tension-rods 8^a. Each of these rods, as shown, extends horizontally from a point above one column or support to a point above the next column or support, and the ends 10 65 of each of these tension-rods are bent upwardly, as shown. These rods give support to the structure in a vertical direction and also resist tension upon the beam between the columns. Above the tension-rods 8 8^a 70 are arranged a corresponding number of rods 11 11^a, which rest upon the rods 8 and 8^a in the central part of each span and adjacent to the columns or supports rise into the upper part of the structure. The ends 12 of 75 these rods, as shown, are bent into a hooked form, and the ends of adjacent rods are hooked together at the center line of the column. The hooked ends are preferably tied by loops of metal 13, passing around each rod 80 and its hooked end, as shown in Fig. 1. These rods 11 and 11^a resist tensile stress in the structure between the columns or supports and likewise strongly resist the shearing stress adjacent to the supports. 85

Above the inclined ends of the rods 11 11^a are arranged short horizontal rods 14 14^a, having their ends 15 turned downwardly. These rods 14 14^a extend through the line of 90 the column and to equal distances beyond the column and further strengthen the structure against shearing or breaking forces adjacent to the column. The bent ends of the various rods anchor the rods in the cement.

The floor C comprises a mass of cement 95 molded around a series of parallel rods 16, extending across each floor-span between adjacent beams or supports, and a similar parallel series of rods 17, extending through each span at right angles to the series 16. 100 Each rod in the floor has the same form as the rods 11 and 11^a in the beams, its central

portion lying in the lower part of the mass of cement composing the floor and its end portions rising gradually into the upper part of the structure adjacent to the beams or supports and having their ends 18 hooked to the rods in the adjacent floor-span centrally over the the beam. The rods are arranged at suitable distances apart to give the required rigidity to the floor and serve the same purpose in the floor as the rods 11 and 11^a serve in the beam. The portions of the rods lying in the lower part of the beam or floor are connected by suitable ties to the upper part of the structure, and the portions of the rods lying in the upper part of the structure are similarly tied to the lower part of the structure. Thus, as shown in the drawings, ties 19, consisting of metal loops, are passed around the rods 16 and 17 and extend through the mass of cement toward the opposite side of the structure from the portion of the rods around which they extend, the loops at the raised portion of the rods extending downwardly and those at the depressed portions of the rods extending upwardly. These ties, consisting of split rings of bar-iron, forming loops, as shown in Fig. 5, may be used throughout the structure wherever it is desirable to tie the rods. In the beams the rods are preferably tied into the mass of cement by ties E of the form shown in Fig. 6, consisting of a strip of flat metal having an outline more or less resembling a letter W. The upper ends of the tie are turned inwardly, forming hooks 20, and the central portion 21 of the tie is bent upwardly between the vertical sides 22 into the form of an inverted V. In the left-hand portion of Fig. 1 two of these ties E' are shown in full connecting the uppermost rods 14 14^a and the lowermost rods 11 11^a, and a tie E² is shown connecting rods 11 11^a and 8 8^a. As shown in Fig. 2, the upper ends of the ties E' are hooked over the rods 14 14^a, and the tie extends downwardly from said rods beneath the rods 8 8^a and thence convexly upward between said rods into the mass of concrete at the center of the beam. With this construction there is no possibility of movement or slippage between the ties and rods, and the beam cannot split vertically between the two vertical series of rods. The ties E², as shown in Figs. 1 and 3, are the same in form, but hook over the rods 11 11^a and pass under the rods 8 8^a, the convex central positions of the ties extending upwardly toward the central portion of the beam. Where the rods all lie in the lower part of the beam toward the middle of the span between adjacent columns, the ties E³ extend beneath the rods 8 8^a, and their upper hooked ends are embedded in the cement in the upper part of the beam. The rods in the lower part of the structure are thus tied into the cement in the upper part by the ties E³, while the ties E' tie the upper rods into the lower part of the structure and the lower rods into the upper part of the structure.

It will be understood that ties of the forms shown or other suitable ties will be placed in the structure wherever desired, their arrangement being varied to suit different conditions. While it is unnecessary to connect the ends of the tension-rods 8, extending through adjacent spans of the beam, we may, if desired, connect them in the manner shown in Fig. 7, placing a metal loop or collar 23 over the adjacent upturned ends 10.

It will be seen that the rods employed are not necessarily longer than the distance between the centers of two adjacent columns or supports and are therefore readily handled and placed in position.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A building structure, such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in the mass, said framework comprising a pair of rods extending in substantially the same vertical plane through the lower part of the mass at opposite sides of the support, thence rising gradually, adjacent to the support, into the upper part of the structure and having bent ends which are hooked together above the support.

2. A building structure, such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in the mass, said framework comprising a pair of rods extending through the lower part of the mass at opposite sides of the support, thence rising gradually adjacent to the support into the upper part of the structure and having bent ends which are hooked together above the support, and a metal tie extending around each rod and its bent-over end portion.

3. A building structure, such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in the mass, said framework comprising a pair of rods extending through the lower part of the mass at opposite sides of the support, thence rising gradually, adjacent to the support, into the upper part of the structure and having their ends secured together above the support, and metal ties extending around said bars and into the mass at the opposite side of the structure.

4. A building structure such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising metal tension-rods arranged horizontally in the lower part of the structure at opposite sides of the support and terminating over the support, and a pair of rods arranged above said tension-rods and extending through the lower part of the mass at op-

posite sides of the support, thence rising gradually adjacent to the support into the upper part of the structure and being secured together above the support.

5 5. A building structure, such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework
10 comprising metal tension-rods arranged horizontally in the lower part of the structure at opposite sides of the support and terminating over the support, and a pair of rods arranged above said tension-rods and extending
15 ing through the lower part of the mass at opposite sides of the support, thence rising gradually adjacent to the support into the upper part of the structure and having their ends bent over and hooked together above
20 the support.

6. A building structure, such as a floor or beam, having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal
25 rods embedded in said mass, said framework comprising metal tension-rods arranged horizontally in the lower part of the structure at opposite sides of the support and terminating over the support, and a pair of rods arranged
30 above said tension-rods and extending through the lower part of the mass at opposite sides of the support, thence rising gradually adjacent to the support into the upper part of the structure and having their
35 ends bent over and hooked together above the support, and metal ties extending around each of said latter rods and its bent-over end portion.

7. A building structure such as a beam,
40 having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising tension-rods arranged horizontally
45 in the lower part of the structure at opposite sides of the support and terminating over the support, a pair of rods arranged above said tension-rods and extending through the lower part of the mass at opposite
50 sides of the support, thence rising gradually adjacent to the support into the upper part of the structure and being secured together above the support, and a short rod horizontally arranged in the upper part of
55 the structure above the support and extending at each side of the support longitudinally of the beam.

8. A building structure such as a beam, having a support intermediate of its ends,
60 said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising tension-rods arranged horizontally in the lower part of the structure at opposite
65 sides of the support and terminating over the support, a pair of rods arranged above said tension-rods and extending

through the lower part of the mass at opposite sides of the support, thence rising gradually adjacent to the support into the upper
70 part of the structure and being secured together above the support, and a short rod horizontally arranged in the upper part of the structure above the support and extending at each side of the support longitudinally
75 of the beam, all of said rods having their ends bent out of line with the adjoining portions of the rods.

9. A building structure such as a beam, having a support intermediate of its ends, 80
said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising tension-rods arranged horizontally in the lower part of the structure at opposite
85 sides of the support and terminating over the support, a pair of rods arranged above said tension-rods and extending through the lower part of the mass at opposite sides of the support, thence rising gradually adjacent to the
90 support into the upper part of the structure and being secured together above the support, and a short rod horizontally arranged in the upper part of the structure above the support and extending at each side of the sup-
95 port longitudinally of the beam, and ties securing the rods in the lower part of the structure with the upper part of the structure and vice versa.

10. A building structure, such as a beam, 100
having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising parallel pairs of tension-rods arranged
105 horizontally in the lower part of the structure at opposite sides of the support, each pair terminating over the support, corresponding pairs of rods arranged above said tension-rods in substantially the same vertical plane,
110 and extending through the lower part of the mass at opposite sides of the support, each pair rising gradually adjacent to the support into the upper part of the structure and being secured above the support to the pair at
115 the opposite side of the support, short rods arranged above said pairs of rods and projecting at each side of the support, and ties connecting said rods with one another and the mass of cement. 120

11. A building structure, such as a beam, 125
having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in said mass, said framework comprising parallel pairs of tension-rods arranged
horizontally in the lower part of the structure at opposite sides of the support, each pair terminating over the support, corresponding
130 pairs of rods arranged above said tension-rods and in substantially the same vertical plane, and extending through the lower part of the mass at opposite sides of the support, each pair rising gradually adjacent to the

- support into the upper part of the structure and being secured above the support to the pair at the opposite side of the support, short rods arranged above said pairs of rods and projecting at each side of the support, and ties having end portions hooked over said short rods and passing beneath the tension-rods and thence upwardly between the rods toward the center of the beam.
- 10 12. In a fireproof structure consisting of a mass of cement and a framework of metal rods, a tie for binding said rods and cement together comprising a metal strip having the upright side portions 22 and the central portion 21 bent inwardly between said side portions.
- 15 13. In a fireproof structure consisting of a mass of cement and a framework of metal rods, the tie for connecting said rods with one another and with the mass of cement consisting of a metal strip having the vertical side portions 22, the overturned end portions and the convex central portion 21.
- 20 14. A building structure, such as a beam having a support intermediate of its ends, said structure consisting of a mass of cemented material and a framework of metal rods embedded in the mass, said framework comprising a pair of straight tension-rods extending through the lower part of the mass at opposite sides of the support in substantially the same vertical plane, and having their adjacent ends bent out of line with the axes of the rods, and a metal band or tie connecting said bent end portions.
- 25 30 35
- In testimony whereof we affix our signatures in presence of two witnesses.
- CLARENCE M. ELLINGER.
LEON KOPCZYNSKI.
- Witnesses:
WM. PENN LEWIS,
SAM. C. HOULTON.