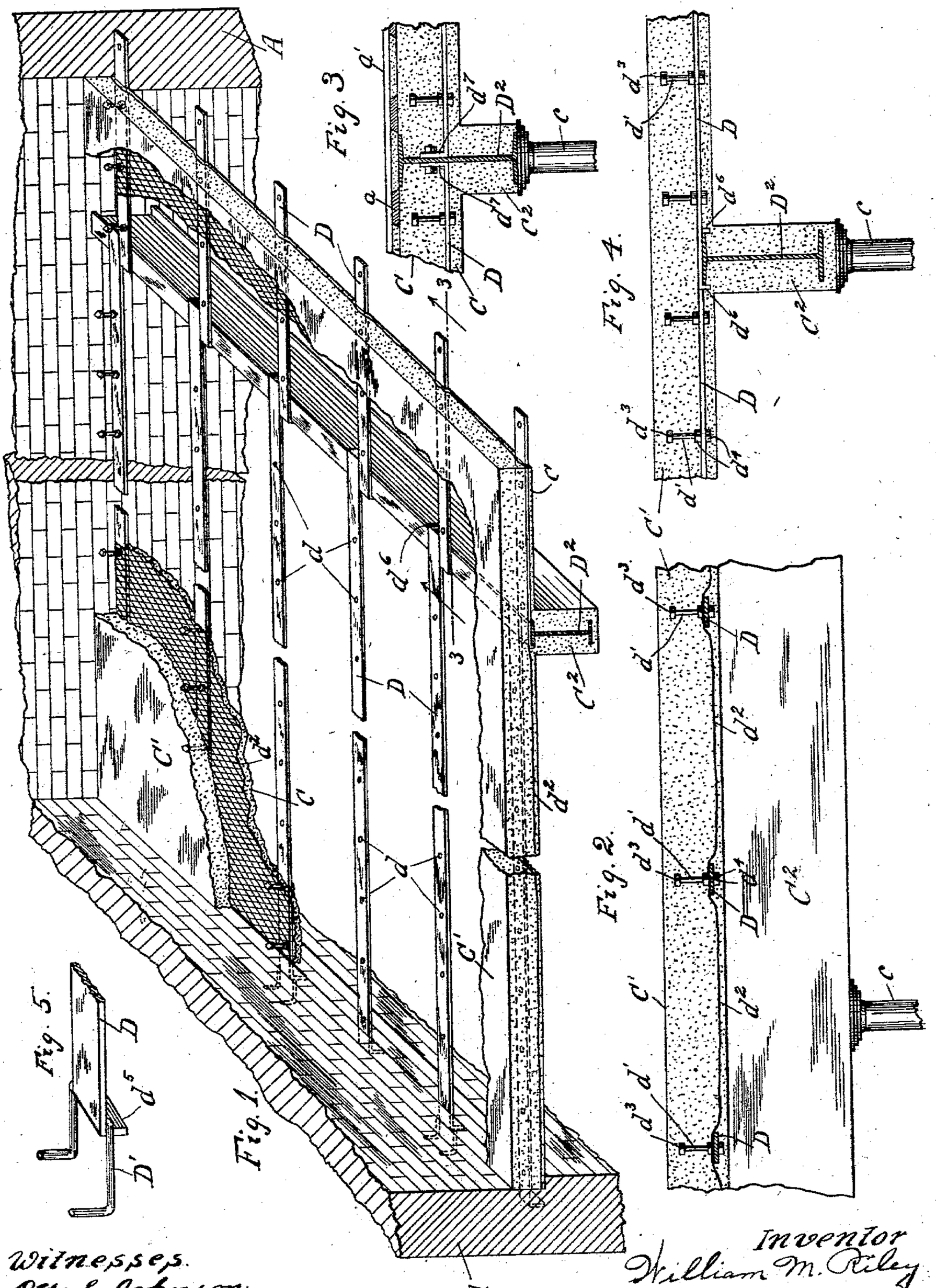
No. 704,933. Patented July 15, 1902.

W. M. RILEY.

BUILDING CONSTRUCTION.

(Application filed Dec. 30, 1901.)

(No Model.) 3 Sheets—Sheet 1



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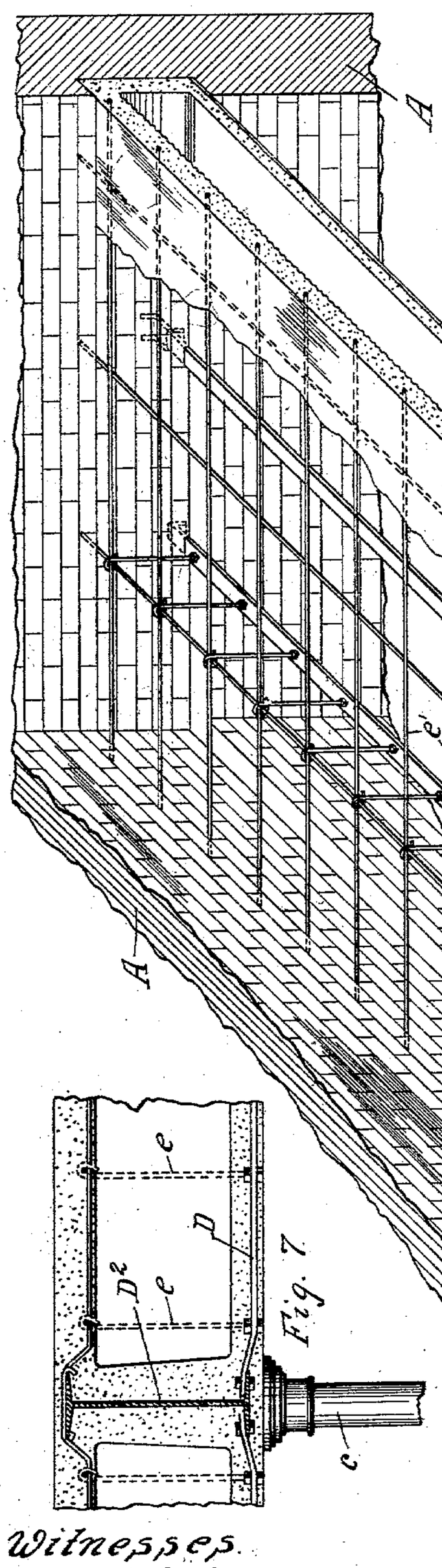

Fig. 6.

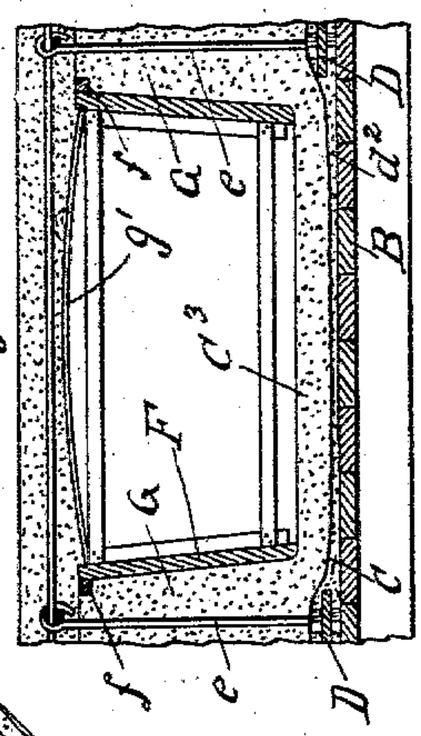

Fig. 8.

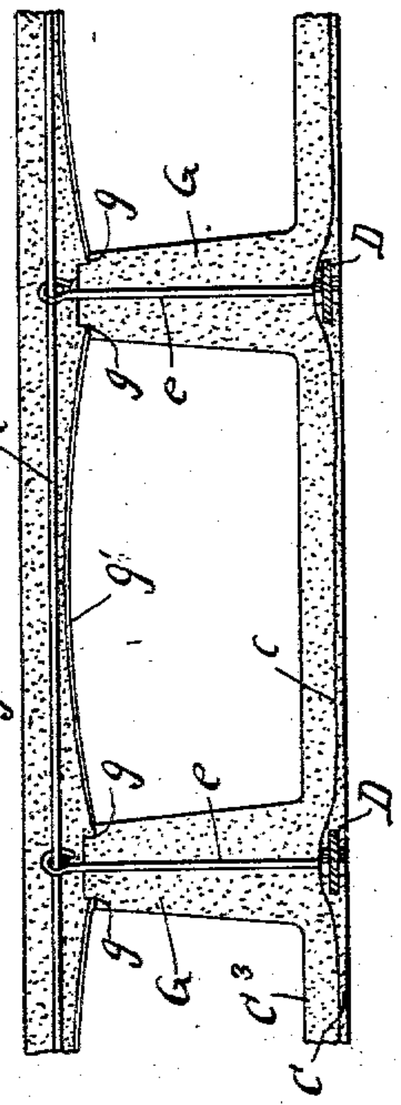

Fig. 9.

Fig. 7.

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(No Model.) 3 Sheets—Sheet 3.

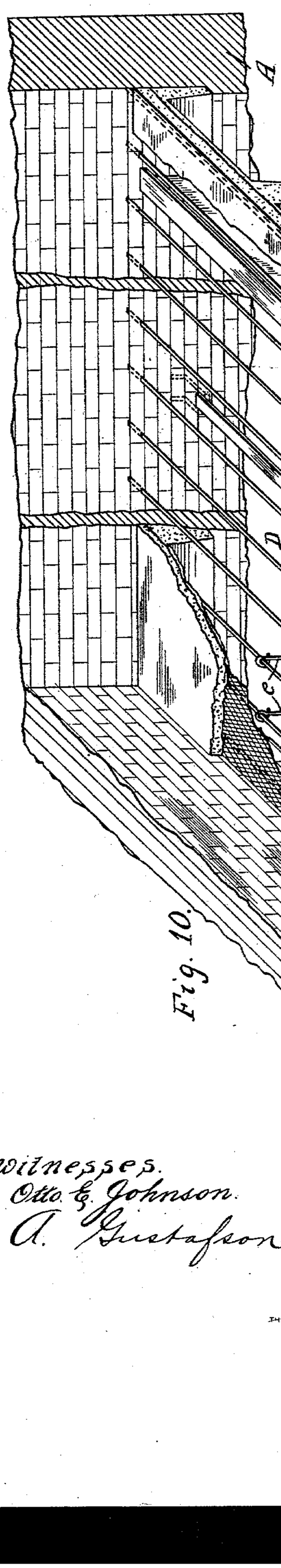

Fig. 10.

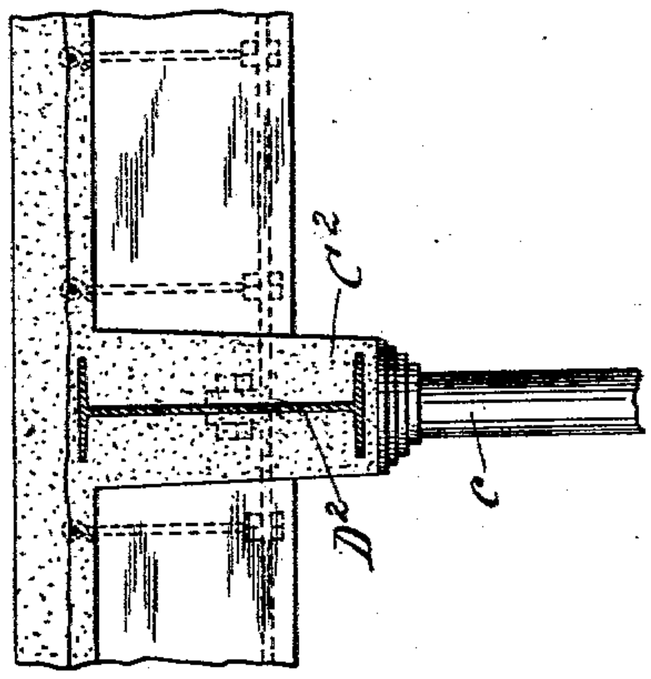

Fig. 12.

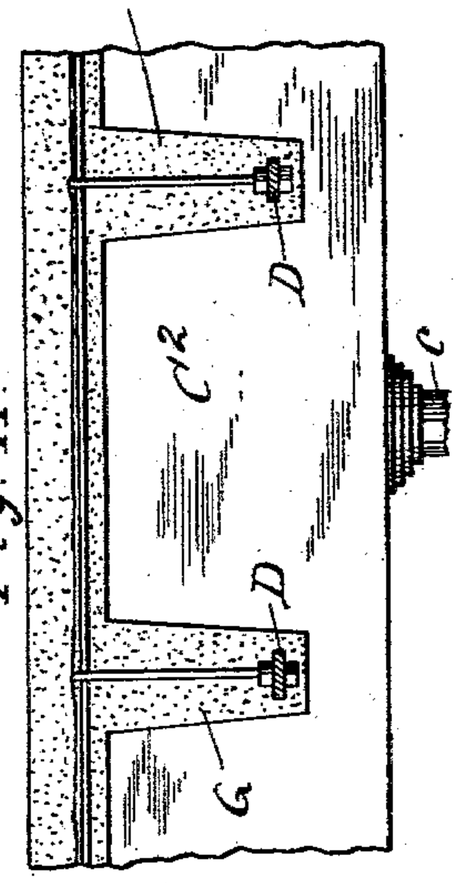

Fig. 11.

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UNITED STATES PATENT OFFICE.

WILLIAM M. RILEY, OF CHICAGO, ILLINOIS.

BUILDING CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 704,933, dated July 15, 1902.

Application filed December 30, 1901. Serial No. 87,758. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. RILEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Building Constructions, of which the following is a specification.

This invention relates to improvements in building constructions, and while it is more especially intended for use in the erection or construction of floors and ceilings of buildings, yet it is applicable to other structures, such as bridges, platforms, and the like; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal objects of my invention are to dispense with the heavy steel I-beams generally used between the girders and walls and to give an equally strong structure with a minimum amount of steel properly and scientifically placed in the concrete slab or ribs of the floor or structure and to provide a construction by means of which the weight thereof will be evenly or uniformly distributed from the tension-bars to the upper surface of the structure.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is an isometrical view of a portion of a building embodying one form of my invention. Fig. 2 is a view, partly in section and partly in elevation, of a portion of the floor and a part of one of the ribs thereof. Fig. 3 is a sectional view taken on line 3 3 of Fig. 1, but showing the anchors in position and the concrete slab provided with a floor or cover on its upper surface. Fig. 4 is a similar view taken on the same line as Fig. 3, but showing a modification in the manner of securing the tension-bars to the I-beam. Fig. 5 is a perspective view of a portion of one of the tension-bars, showing the means for securing it to the wall of the building. Fig. 6 is an isometrical view of a portion of a building, illustrating another form of my invention. Fig. 7 is a cross-sectional view through one of the I-beams or girders. Fig. 8 is a sectional view of a portion of the floor and ceiling, showing the means for constructing it with hollow chambers. Fig. 9 is a similar view of a like portion of the floor and ceiling with the wooden core and supporting-platform removed. Fig. 10 is an isometrical view showing still another form of my invention. Fig. 11 is a cross-sectional view through two of the ribs thereof, showing the girder in elevation; and Fig. 12 is a similar view taken at right angles to Fig. 11.

Similar letters refer to like parts throughout the different views of the drawings.

A represents portions of the walls of a building or other structure, which may be of any suitable material and of the ordinary or any preferred construction. To furnish these walls with a floor or ceiling or a floor and ceiling, I erect a flat centering B of sufficient strength to sustain the weight of the floor and to withstand ramming the concrete without sagging or springing from a true line. Over this centering is spread a quantity of Portland cement mortar C about three quarters ($\frac{3}{4}$) of an inch deep and not more than three (3) or four (4) feet wide at a time, which layer of cement should extend the entire length of the slab. On this layer of cement mortar is laid parallel with one another the flat tension-bars D, which are provided at suitable distances apart with openings d to receive anchors d' for the purposes to be presently explained. A sheet of wire-cloth d^2 is then laid over the bars D, as shown, and is then covered with a quantity of rich Portland cement concrete C′, which is well and thoroughly rammed to a compact base. The above operation is repeated until the floor or ceiling is completed. Before the concrete begins to take the initial "set" the top surface thereof may be finished smoothly with cement mortar or with wood strips a, embedded therein, to which wooden flooring a' may be nailed. Located in the openings d of the tension-bars D, about a foot apart, are a series of bolts or anchors d', each of which is provided on its upper end with a head d^3, which lies close to the upper surface of the floor or slab. The lower ends of these bolts or anchors are fas-

tened in place on the tension-bars D by means of nuts d^4, one above and one below said bars, as is clearly shown in the drawings. These anchors extending upwardly from the bars D will be firmly embedded in the concrete slab, and will thus prevent the said bars from slipping, and at the same time will distribute the weight of the concrete or floor in a uniform manner, as is apparent. As the tension-bars are thus held from longitudinal movement, it is unnecessary to secure the ends thereof except for the purpose of tying the walls of the building, and to accomplish this the ends of the bars are downturned, as at d^5, (see Fig. 5,) to engage iron loops D′, which are secured in the wall of the building, as is clearly shown in Fig. 1 of the drawings. The opposite ends of the bars D from those which engage the loops D′ may be downturned, as at d^6, to overlap the I-beam D^2, which may be embedded in a rib of concrete C^2 and supported by pillars or posts *c*, as shown in Figs. 3 and 4 of the drawings. Instead of turning the ends downwardly, as at d^6, to overlap the upper portion of the I-beams, as shown in Fig. 4, I may turn them upwardly, as at d^7, (see Fig. 3,) and secure them to the I-beam D^2 by means of bolts, as shown in Fig. 3.

In Figs. 6 to 9, inclusive, I have shown a combined floor and ceiling with air spaces or chambers therebetween and illustrated a modification in the construction thereof, which comprises, as before, a series of flat tension-bars D, provided with upwardly-extending bolts or anchors *e*, which are clenched at their upper ends to engage transverse steel rods *e′* in the upper portion or floor-slab. In building the construction now under consideration a flat centering support B is employed, as in the above-described construction, and a quantity of Portland cement mortar, about three-quarters ($\frac{3}{4}$) of an inch deep, is spread thereon over a space sufficient for two or three of the flat tension-bars, which bars are layed on the layer of cement mortar, after which the wire-cloth d^2 is placed on the top of the bars and mortar and a quantity of rich Portland concrete, about one and one-half ($1\frac{1}{2}$) inches thick, is placed thereon and well rammed. Upon this layer C^3, of concrete, is placed the wooden cores F to form the ribs G, which are located above and longitudinally with the tension-bars D, as is clearly shown in the drawings. The forms or cores F are provided at their upper outer perimeters with fillets *f* to form the offsets *g* on the upper ends of the concrete ribs G, which offsets are for the reception and retention of sheets *g′* of corrugated metal, on the top of which is spread a quantity of rich Portland cement concrete of the desired thickness.

By reference to Figs. 8 and 9 of the drawings it will be seen and understood that the anchors or bolts *e* extend somewhat above the top of the ribs G and engage the transverse steel rods *e′* in the upper or floor slab. After the concrete to form the ribs G has been placed between the cores or forms F and has taken the final set the said cores or forms are removed and the light-weight corrugated sheets of iron *g′* are sprung into place, so as to be arched. The steel rods *e′* and e^2 are then placed in position, the former being crosswise of the tension-bars D and the latter longitudinal therewith. The anchors or bolts *e* are then bent at their upper ends, so as to engage the said rods at their intersections, after which the Portland-cement concrete above referred to is spread over the corrugated-iron sheets and the tops of the ribs, after which it is well tamped around the steel rods and brought to a true surface and rolled with a heavy roller. This top surface may be finished with cement, tiling, mosaic, or otherwise.

In Figs. 10 to 12, inclusive, I have shown another form of my improved building construction, which is more especially adapted for use in mills or buildings of a similar character and which consists in employing a series of flat tension-bars D, provided with anchors or bolts *e*, as before, which anchors or bolts engage at their upper ends steel rods *e′*, transversely located over the suspension-bars and in the floor-slab. In building this construction wood cores or forms of such size and shape as will fill the spaces between the concrete beams G or ribs are employed. These cores are supported on heavy planks laid flat on studdings, (not shown,) the upper surface of said planks forming the line of the bottom of the concrete ribs. The cores or forms are set about four (4) inches apart at the bottom of the ribs; but said distance should be governed by the length of the span. Between the said cores are laid the flat tension-bars D of such dimensions as may be required, the same to be regulated by the span or length of ribs. These bars are formed with openings *d*, as in the other constructions, and are provided with anchors or rods *e*, the upper ends of which engage the steel rods *e′*, as before stated, which rods are located in the lower part of the ceiling, as shown.

From numerous practical experiments or tests with smooth straight tension-bars embedded in a concrete slab and then with tension-bars provided with anchors shown in my constructions I have found that by means of my constructions, especially that shown in Fig. 1 of the drawings, in clear spans of eighteen (18) feet between bearings or end supports, a load or weight seven and a half ($7\frac{1}{2}$) times greater will be supported thereby than with the aforesaid smooth bars without the anchors.

From the foregoing and by reference to the drawings it will be seen and understood that by employing my construction all of the parts of the metal-work will be covered and protected by the concrete, thus preventing corrosion and rendering the structure fireproof.

It is also apparent that my improved construction economizes in the use of steel beams and affords a light and durable structure.

By experiments I have found that when the construction shown in Fig. 1 is employed it may be built in clear spans between bearings or supports up to eighteen (18) feet and that when the constructions shown in Figs. 6 and 8 are used it may be built in clear spans between bearings of eighteen (18) feet up to forty (40) feet by increasing or decreasing the depth of the ribs and area of metal in the lower flat tension-bars.

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

1. The combination with a number of tension-bars suitably supported at their ends, of a series of upwardly-projecting anchors provided on their lower portions with nuts located above and below the tension-bars and at their upper ends with engaging means, wire-cloth located in a horizontal plane above the suspension-bars, and a mass of concrete or other plastic material embedding said bars, anchors, and wire-cloth, substantially as described.

2. The combination with a number of tension-bars suitably supported, of a series of upwardly-projecting anchors, a series of rods located in a plane parallel with the suspension-bars and engaged by the upper ends of said anchors, a mass of concrete or other plastic material embedding said bars, rods and anchors, substantially as described.

3. The combination with a number of tension-bars suitably supported, of a series of upwardly-projecting anchors, a number of rods located in a parallel plane with and above the suspension-bars and connected to the upper ends of the anchors, a mass of concrete or other plastic material embedding said bars, rods and anchors and formed with air-chambers, sheets of metal located in the upper portion of the air-chambers, substantially as described.

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Witnesses:
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