No. 842,894. PATENTED FEB. 5, 1907.

R. T. LEWIS.

METAL STRUCTURAL WORK.

APPLICATION FILED SEPT. 25, 1905.

Fig. 1.

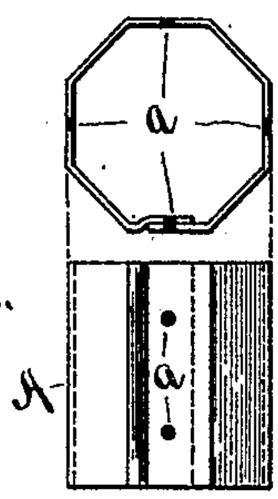


Fig. 2.

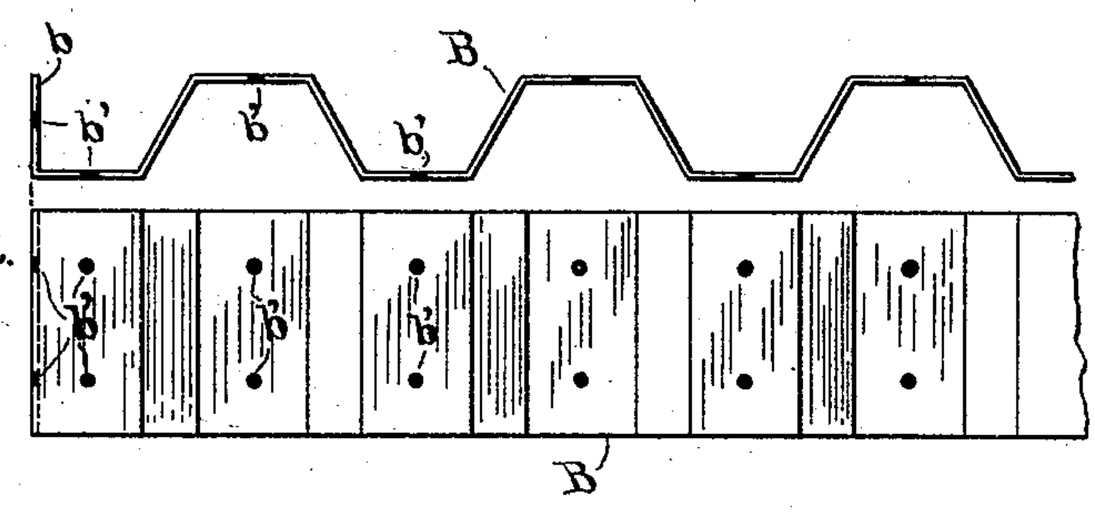


Fig. 3.

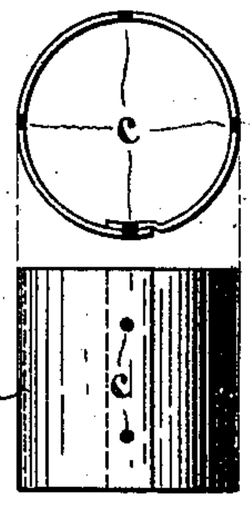


Fig. 4.

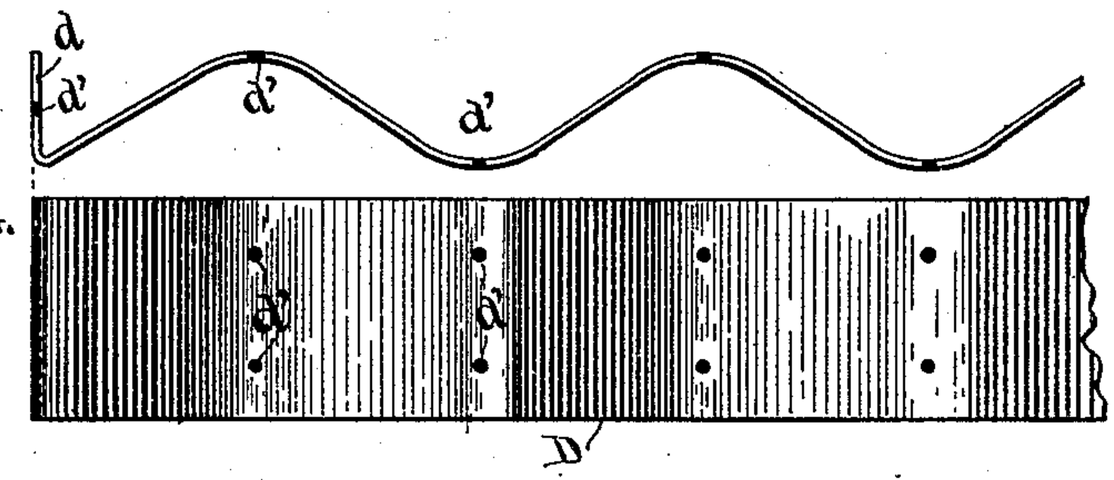


Fig. 5.

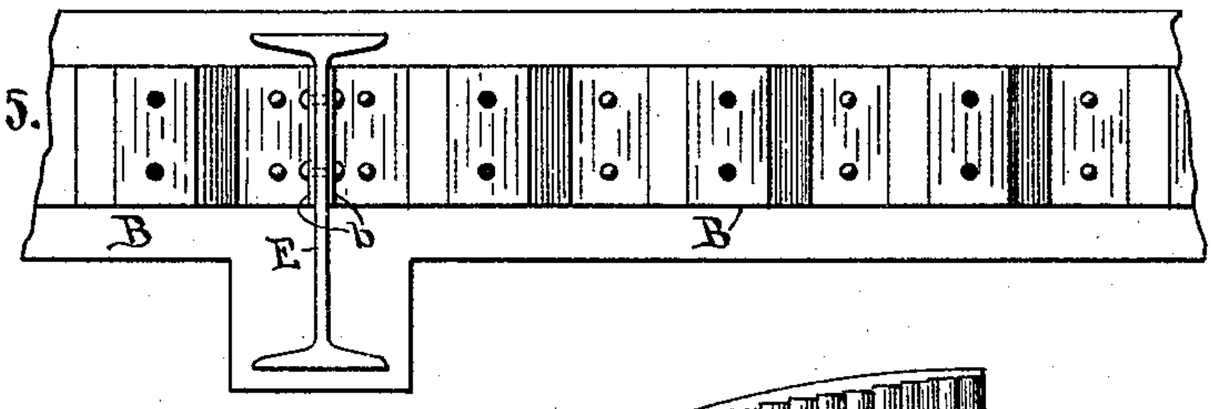


Fig. 6.

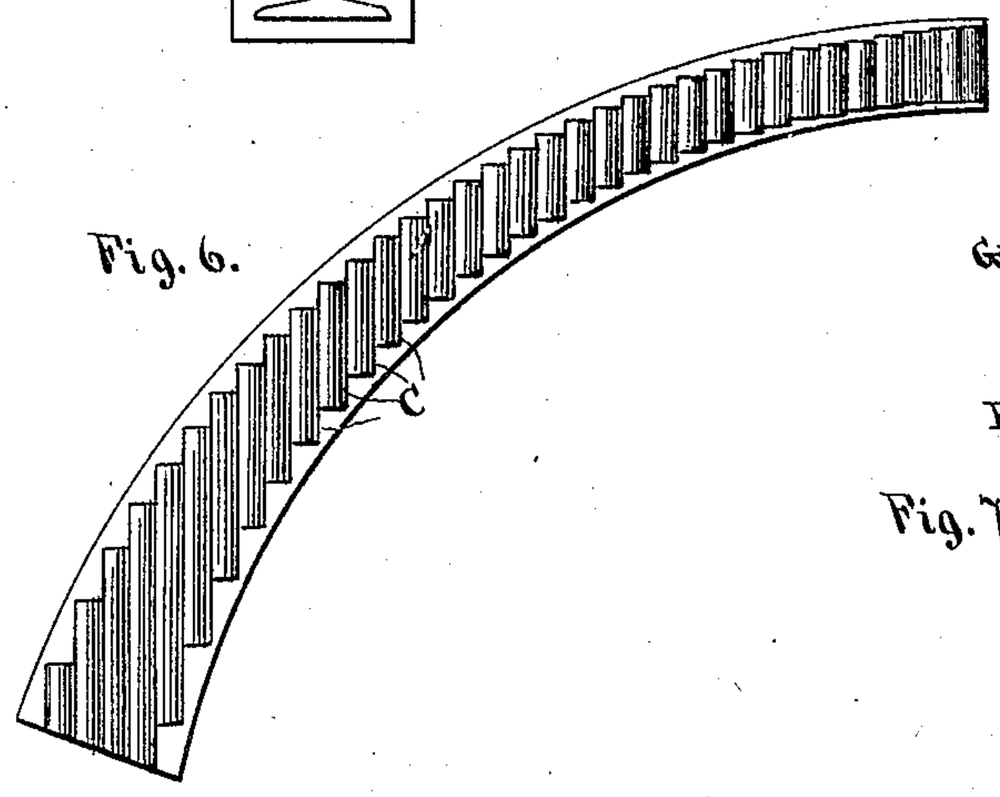
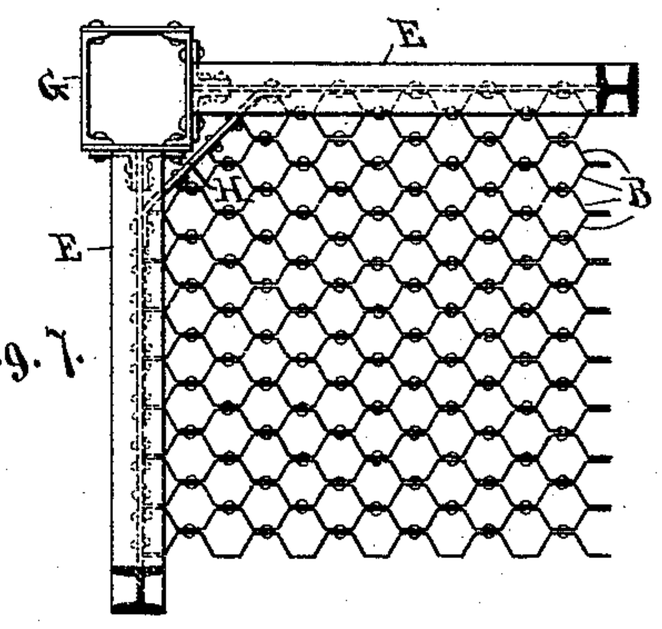


Fig. 7.



WITNESSES

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METAL STRUCTURAL WORK.

No. 842,894. Specification of Letters Patent. Patented Feb. 5, 1907.

Application filed September 25, 1905. Serial No. 279,924.

To all whom it may concern:

Be it known that I, RANSOME T. LEWIS, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Metal Structural Work, of which the following is a specification.

This invention relates to improvements in the construction of that part of the framework of floors, roofs, arches, domes, &c., which is employed to fill in and span the spaces or openings between the main frame members and supports; and the object of my improvements is to provide a light and strong skeleton framework of iron or steel or other metal so built up that it will be capable of supporting the loads to which it is to be subjected and of distributing or disseminating the stresses due to such loads from any given point throughout the combined members of the framework, whereby such stresses and strains will be transmitted to the supporting columns, girders, trusses, abutments, or walls more directly and evenly than under present forms of construction.

To this end my invention consists in filling in the spaces between the main supporting members with either a horizontal or arched system of abutting vertical cells formed from rolled plates or other shapes worked into proper form, said cells being rigidly fastened together and to the main supports by rivets, bolts, or other suitable means, each cell being united at two or more points in its periphery to adjacent cells, thereby causing the load or strain upon any one cell or set of cells to be transmitted in all directions to adjacent cells and thence distributed throughout the framework to the main supporting members.

I attain my object by constructing the parts of the framework and building them up in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents in plan and elevation a unit cell of octagonal form; Fig. 2, a continuous plate of metal bent to form when assembled with similar plates a series of hexagonal cells; Fig. 3, a unit cell of cylindrical form; Fig. 4, a plate bent to a sinuous form, so that when assembled with other similar plates a series of curviform cells will be produced; Fig. 5, a detail showing a partial end view, showing the manner of applying the cellular framework to the main beams or girders of a floor or other horizontal framework; Fig. 6, a detail end elevation showing the manner of assembling the cells in constructing an arch or dome; and Fig. 7, a plan view showing the manner of applying the cellular frame to the space between the main beams or girders in the construction of floors, roofs, and the like.

Like letters of reference designate like parts in the several views.

The cells are to built up of metal plates bent into any desirable form and of a depth varying according to the width or length of the space which the combined cells are to span and to the weight which is to be supported thereon. In the case of unit cells, such as A and C, (illustrated in Figs. 1 and 3,) the cells will be formed of plates bent into the shape illustrated with ends lapped or from seamless tubing and provided with holes, as indicated at *a c*, upon four sides to receive bolts, either screw or rivet, by which to rigidly fasten together adjacent cells where they abut one against another.

In Figs. 2 and 4 the continuous plates B and D are provided at the ends with flanges *b d*, respectively, whereby to attach them to the main supporting beams, columns, &c., said continuous plates extending from one beam or column to the next and having adjacent plates secured in like manner to the main frame members and fastened together where the bent sides abut against one another by means of screw or rivet bolts inserted through holes, as indicated at *b'* and *d'*. This manner of assembling the members of such a cellular framework is illustrated in Fig. 5, in which continuous plates B are shown attached to the sides of an I-beam E by means of the flanged ends *b*, said plates extending from I-beam to I-beam and completely filling the space between beams in the manner illustrated in Fig. 7, wherein I-beams E are shown projecting at right angles from a supporting-column G, the cellular system of plates B extending to oppositely-positioned beams and completely filling the space between beams, said plates being bolted at their sides or ends to the webs of the respective beams and to angle-plates H at the corners adjacent to the columns. Since the plates B wherever they touch one another are rigidly fastened together, it will be apparent

that the stresses due to a load at any point will be transmitted not directly across from one beam to the opposite beam, but will be disseminated throughout the cellular structure and transmitted to the beams at all four sides, and not to one point only upon each beam, but to many points distributed along the beams. By reason of this cellular structure, therefore, a framework of comparatively light weight can be made to sustain heavy weights without undue deflection.

The flooring or roof-sheathing or ceiling may be attached directly to or upon this cellular framework, or in fireproof construction the framework may be completely embedded in concrete, as indicated in the outlines of Fig. 5. Where a concrete filling is used, it will be advisable to run reinforcing rods or bars across or through the cell-openings in order to the more securely bind the top and bottom layers of concrete together.

In the case of arches or domes the cells will be built up to the contour of the arch or dome, as illustrated in Fig. 6, wherein a row of cylindrical cells C are shown as attached together and embedded in concrete, the arch or dome being completed by attaching similar rows of cells side to side until the framework is built up to the required dimensions. Of course in the case of a dome it will be understood that the cells will decrease in diameter as they approach the peak of the dome in order that the adjacent rows of cells may conform to the peripheral curve of the dome. This cellular system of construction may be applied in many ways and places. In addition to building constructions it will be found especially adapted for bridge-floors, also for subway-coverings and sidewalk-supports.

Having thus described the manner of building up the framework to conform with my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a structural framework, the combination, with the principal supporting members, of a cellular system of interconnected members spanning the space between the principal members, the cell members being rigidly bolted together where they abut one against another, and the outlying cells being rigidly attached to the principal members, whereby any weight or strain to which said system is subjected at any given point will be transmitted in all directions through the system to the principal members.

2. A structural framework comprising metal plates bent to form, when placed side to side, a system of vertical cells, the abutting sides of said cells being rigidly bolted together, in combination with principal supporting frame members, the outlying members of said cells being rigidly attached to the principal members and the cell-plates being proportioned as to thickness and depth to correspond with the load to be supported and the space to be spanned.

3. A structural framework comprising continuous metal plates extending between supports and bent to form, when placed side by side, a system of vertical cells, said plates, where they touch one another, being rigidly bolted together, in combination with principal supporting members to which said plates are rigidly attached at their ends and outlying sides.

In testimony whereof I have affixed my signature in presence of two witnesses.

RANSOME T. LEWIS.

Witnesses:
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A. S. DIVEN.