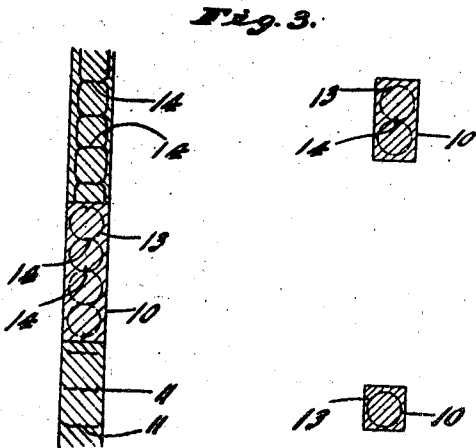
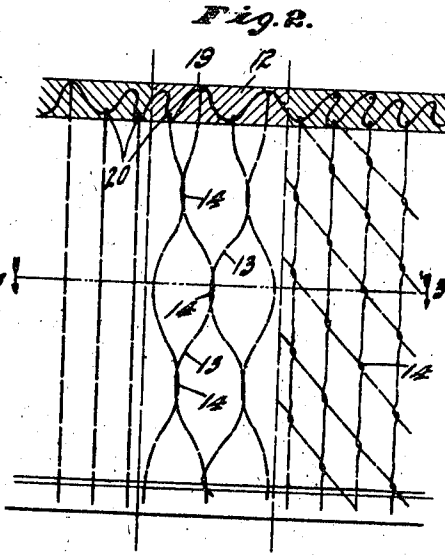
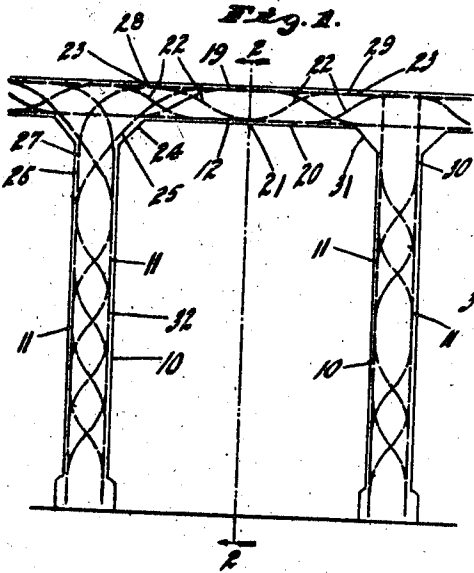


D. B. LUTEN.
 REINFORCED STRUCTURE.
 APPLICATION FILED DEC. 9, 1908.

989,272.

Patented Apr. 11, 1911.



Witnesses
 Thomas H. McMeas
 Katherine C. Fletcher.

Inventor
 Daniel B. Luten,
 By *Bradford Wood*
 Attorney

UNITED STATES PATENT OFFICE.

DANIEL B. LUTEN, OF INDIANAPOLIS, INDIANA.

REINFORCED STRUCTURE.

989,272.

Specification of Letters Patent.

Patented Apr. 11, 1911.

Application filed December 9, 1908. Serial No. 486,626.

To all whom it may concern:

Be it known that I, DANIEL B. LUTEN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Reinforced Structures, of which the following is a specification.

This invention relates to improvements in the construction of walls, columns, beams, knee braces, and the like, employed in building structures of various sorts, my invention being more particularly, although not exclusively, designed for such members when used as parts of buildings, bridges, sewers, etc., which are commonly constructed of concrete or other masonry; and the invention has for its general object to provide an improved structural member of the class and for the purpose above mentioned, characterized by greater strength and durability and capacity to resist the various strains to which it may be subjected in any and all directions, together with greater economy in respect to cost of materials and construction as compared with similar structures at present in use.

To these and other ends my invention consists, in general, in a wall, or column, and beam structure principally characterized by the incorporation therein of tension or reinforcing members so disposed as to bond the structure in all directions in which it may be subjected to strains.

As above stated, my invention has to do with wall, or column, and beam structures of concrete and generally similar materials and contemplates the strengthening and reinforcement of such structures in a comparatively simple and inexpensive manner by embedding therein a series of tension or reinforcing rods so disposed as to resist strains existing in the direction of any or all of the dimensions of the structure. In the accompanying drawing I have illustrated several structural members thus equipped with tension members disposed in a variety of relations to secure effective resistance to disruptive strains occurring longitudinally, crosswise and widthwise of the member: and referring thereto:—

Figure 1 shows a structure composed of vertical and horizontal members provided with tension rods disposed in accordance with the principles of my invention. Fig. 2 is a vertical sectional view of a similar

structure on the line 2—2 of Fig. 1 illustrating a variety of arrangements of the tension or reinforcing rods:—Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 2.

Referring to the drawing, Fig. 1 shows a wall, or column, 10 which is provided with rods or tension members 11 which follow one face closely for a short distance and then pass over to follow the other face similarly, the purpose being to resist the tensional strains caused in such columns by a transverse force applied either directly or through connected members and also to bond the material of the column together in a crosswise direction as well as in its longitudinal dimension to prevent it from bursting under transverse stresses set up therein as by a force applied longitudinally thereof.

12 shows a floor slab or beam having embedded near its upper surface the compression members 19 and near its lower surface the tension members 20.

Near the upper or lower surface of the beam, or the like, are embedded also metallic shearing members each of which comprises a horizontal central portion 21, with inclined arms 22 extending outwardly through the body of the floor or beam or the like from opposite ends of the central portion 21, and horizontal parts 23 extending outwardly from the ends of said inclined arms and ending over the column 10, or extending across into the next beam, or down the face of the column whence it may extend across to the opposite face as at 11. The upward extension of the shearing members away from the lower tension members results in a tension chord in the lower edge of the beam of decreasing section toward the ends of the beam as is desirable for efficiency since the tension in the lower edge is a maximum at the middle and decreases toward the supports. The extension of one of the rods 21 through the shearing region as at 22 and thence along the upper surface as at 23 and down the face of the column as at 26 and thence across to the opposite face of the column as at 32 results in the one reinforcing member passing continuously through all the regions of tension in the two members.

A knee brace 24 is shown strengthening the angle between the beam and its support and which may be made integral therewith. Such a knee brace is most effective when

combined with a beam and column reinforced continuously by tension members adjacent the faces opposite the knee brace as at 27 and 28 opposite 24, and at 29 and 30 opposite 31. To provide such reinforcement when both sides of the column have knee brace supports requires that the column shall be reinforced near each face and that the beam or slab shall be reinforced across the top of the column as shown at 23. A reinforcing member 25 passes obliquely through the brace and extends into and across the column and the beam, thus bonding the two members securely at their junction.

Fig. 2 represents a vertical section through a structure such as is shown in Fig. 1, and Fig. 3 a horizontal section, these views showing at 11 the reinforcing members as above described extending in vertical parallel planes and bonding the material of the column in two dimensions only as above described. But by arranging the rods or members in a helix or spiral as shown at 13 wherein they not only pass back and forth from one face to the other of the wall or column but also extend widthwise of the latter and are interlooped as shown at 14 the material is also bonded in the widthwise direction, making it secure against cracking or bursting in all three dimensions.

From the foregoing description it will be seen that the improvements herein described will be thoroughly efficient in securing the objects designed and while other forms or other methods, all within the spirit of the invention are apparent to those skilled in the art, those shown and described are deemed sufficient for purposes of illustration.

I claim:—

1. The combination of an upright member with a transverse member and a knee brace integral with both, all of hardened plastic having a tension member embedded in the transverse member and the upright member and following closely that portion of their surfaces opposite the knee brace and extending away from these surfaces and crossing the upright member between the middle of its height and the knee brace and crossing the transverse member between the mid-

dle of its span and the knee brace, and another tension member embedded in the knee brace and overlapping the first mentioned tension member in both transverse member and upright member.

2. The combination of an upright member with a transverse member and a knee brace integral with both, all of hardened plastic having a tension member embedded in the transverse member and in the upright member and following closely that portion of their surfaces opposite the knee brace and extending away from that surface of the transverse member and crossing the transverse member between the middle of its span and the knee brace, and another tension member embedded longitudinally in the knee brace and extending diagonally across the transverse member and the upright member.

3. The combination of an upright member with a transverse member and knee brace, all of hardened plastic with embedded tension members reinforcing the upright member and transverse member continuously adjacent the surfaces opposite the knee brace and extending away from said opposite surface of the transverse member intermediate its middle and the knee brace and other tension members embedded longitudinally through the knee brace.

4. The combination of a transverse member continuous over an upright member with knee braces, all of hardened plastic, reinforced continuously along the surfaces of the upright member and along the surfaces of the transverse member opposite the knee braces, said reinforcement having extensions away from said opposite surface between the knee brace and the middle of the spans of the continuous transverse member.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana, this 5th day of December, A. D. one thousand nine hundred and eight.

DANIEL B. LUTEN. [L. S.]

Witnesses:

C. H. KNIGHT,
J. P. COOK.

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