J. KAHN.

BUILDING CONSTRUCTION.

APPLICATION FILED JAN. 11, 1909.

948,395.

Patented Feb. 8, 1910.

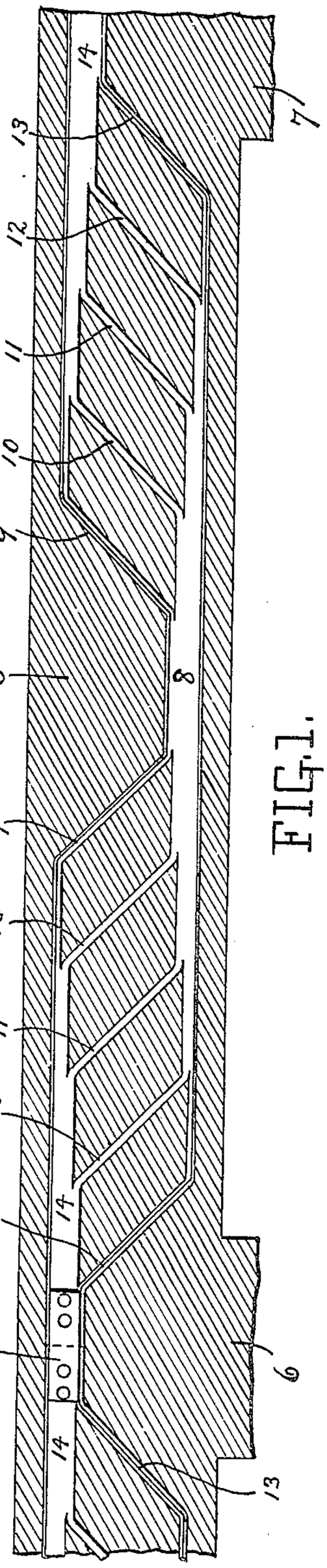

FIG. 1.

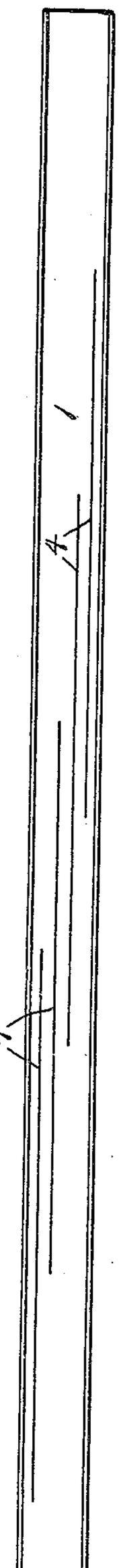

FIG. 2.

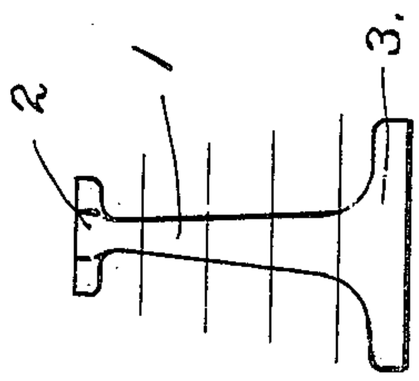

FIG. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

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BUILDING CONSTRUCTION.

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To all whom it may concern:

Be it known that I, JULIUS KAHN, a citizen of the United States, and resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Building Construction, of which the following is a specification.

My invention relates to reinforced concrete construction, particularly to beams and floor slabs which are intended to carry great weights, and its object is to provide a reinforcement for such construction so designed that maximum strength will be obtained for weight of metal.

My invention consists in a rolled beam which has the general shape of an I beam, with its lower flange of greater area than its upper, and its web tapering upward in thickness; which beam is slitted so that it may be expanded, forming a part-truss in which the upper tension members gradually increase toward the ends, the lower tension member gradually decreases toward the ends, and the inclined shear members are of increasing thickness toward the ends.

In the accompanying drawings Figure 1 is a vertical cross section of a composite beam showing my improved tension member in position. Fig. 2 shows one end of the tension member on a larger scale after being slitted ready for expansion. Fig. 3 is an end view of a tension member, the figure being provided with a series of horizontal lines to indicate where the member will be slitted.

Similar reference characters refer to like parts throughout the several views.

The reinforcements of concrete beams are usually badly designed and as a result much metal is wasted. The main tension member lying in the bottom of a beam should be of maximum strength at the middle of the beam and need have little strength at the ends of the beam. But the usual practice is to employ reinforcing members of the same cross sectional area throughout their length. Where continuous beams extend across columns, those portions in each side of the columns act as cantalivers and must be reinforced accordingly. The tension members nearest the upper surface must have greatest strength at the columns, as the stresses decrease toward the center of the beam. As the shear in the beam increases in proportion to the distance from the center of the beam it is also necessary that the auxiliary members of the reinforcement for concrete construction, which are to resist this shear, should also increase in strength in proportion to their distance from the center of the beam.

In the construction shown in the drawing the requirements set forth above have been practically met. The structural beam 1, which is of peculiar shape generally resembling an I beam, has an upper flange 2 and lower flange 3. This upper flange may vary from the size shown in dotted lines to that shown in solid lines, but is seldom made larger. The web increases in thickness toward the bottom. This beam is formed with a series of horizontal slits 4 which overlap each other and is then expanded as shown in Fig. 1. It has been found that this cross section meets approximately a greater number of problems and is therefore the most desirable merchantable form.

Fig. 1 shows continuous beams of concrete extending over supports 6 and 7. The tension member 8 in the lower portion of the beam has integral with it the inclined shear members 9, 10, 11, 12 and 13 which in turn unite to the upper longitudinal tension members 14. The members 14 of the adjacent span may merely overlap, be integral or connected in any desired manner as by plates 15. It will be noticed that the inclined shear members 10, 11, 12 and 13 increase in cross sectional area from the center of the beam and decrease from the supports, that the tension member 8 in the bottom of the beam decreases toward the ends of the beam and that the reinforcements 14 in the cantalivers decrease toward the ends of the cantalivers. The distance between the points of the attachment of the members 9 to the main tension member 8 will depend upon the beam which is to be reinforced and the load the beam is to carry. The length of the slit 4 will depend upon the vertical distance between the members 14 and 8 and upon the horizontal distance between the inclined members. The amount of taper to the members and general design of the beam 1 will also depend upon the load to be carried.

It will be understood that the members 14 are necessary only for reinforcing continuous beams. Single span beams may be reinforced by a tension member having the

main portion 8 and inclined members 9, 10, 11, 12 and 13. These will extend upward in the usual manner as shown in Fig. 1. The rule of increasing size for equally spaced shear members will be met with this construction. Any desired number of shear members can be formed from the metal shown in the drawings.

Having now explained my improvements what I claim as my invention and desire to secure by Letters Patent is:—

1. An expanded metal construction comprising outer members extending parallel to each other and connected by a plurality of tie pieces, the entire structure made of a single piece of metal and the tie pieces on each side of the center being parallel to each other and increasing in cross sectional area from the center all the parts being in the same plane.

2. An expanded metal construction comprising members extending parallel to each other and connected by a plurality of tie pieces which gradually increase in cross sectional area, the entire structure made of a single piece of metal and lying in the same plane.

3. An expanded metal construction comprising a lower tension member, upper tension members parallel to the lower member at its ends, and diagonal tie members extending between the lower tension member and the upper tension members, the tie members connected to each upper tension member being parallel to each other, the lower tension member decreasing in cross sectional area toward its ends, all the members being integral and in the same plane.

4. An expanded metal construction comprising a main tension member decreasing in size toward its ends, additional tension members parallel to the main tension member and increasing in size in proportion to the decrease of the main tension member, diagonal members connecting the main tension member to each of the other tension members and integral therewith and lying in the same plane.

5. An expanded metal construction comprising a main tension member decreasing in size toward its ends, its middle portion being in the form of an I beam having its web tapering upward and having the lower flanges of the greater cross-sectional area than the upper inclined shear members integral with the main member, and increasing in cross-sectional area from the center and additional tensional members parallel to the ends of the main member and connected thereto by the shear members.

6. An expanded metal structure consisting of one main member and two auxiliary members parallel to the ends of the main member and in line with each other, the auxiliary members increasing and the main member decreasing in size toward their outer ends, and ties extending between the main member and the auxiliary members and integral with the same all the parts be- in the same plane.

7. An expanded metal structure consisting of three members all in the same plane, two members being parallel to the third and in line with each other, the third member decreasing in size toward its ends, and ties between the members and integral therewith all the parts being in the same plane.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

JULIUS KAHN.

Witnesses:
MINNIE K. KENNEDY,
EDWARD N. PAGELSEN.