

1,033,106.

Patented July 23, 1912.

3 SHEETS—SHEET 1.

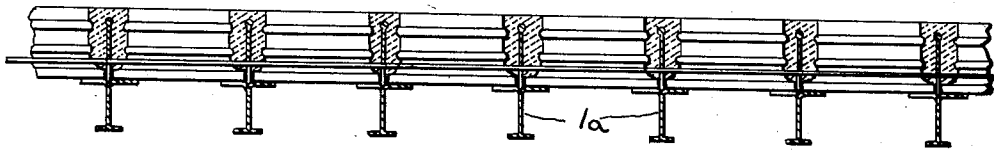


Fig. 1.

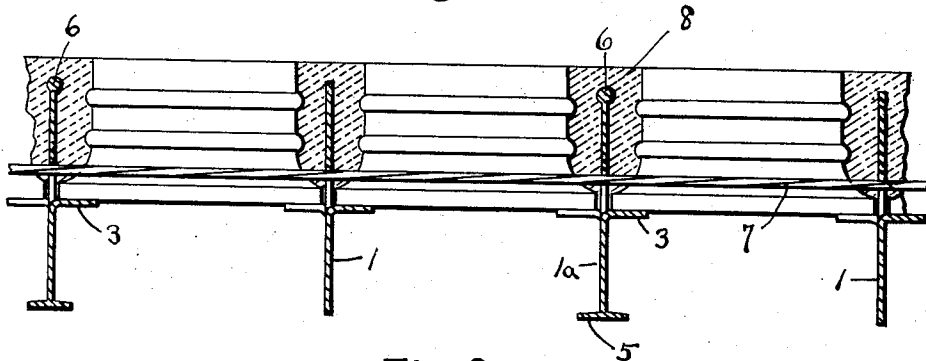


Fig. 2.

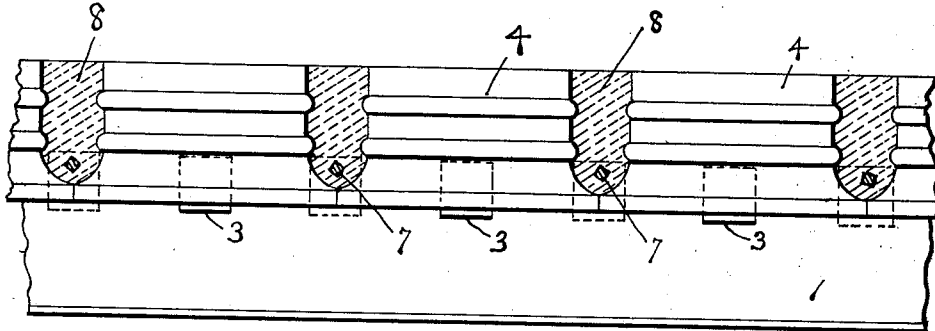


Fig. 3.

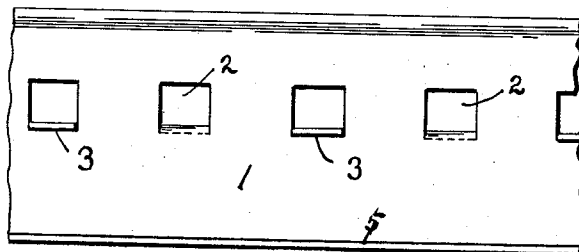


Fig 4.

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BUILDING CONSTRUCTION.
APPLICATION FILED JAN. 11, 1908.

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3 SHEETS—SHEET 2.

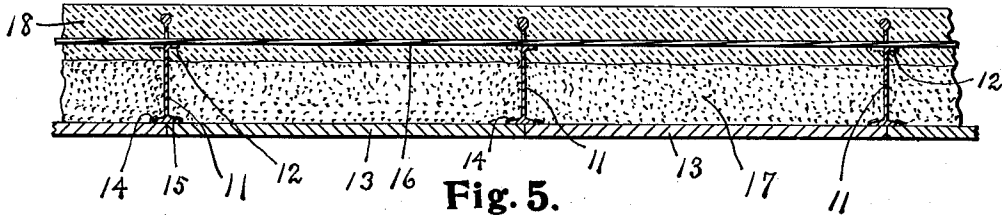


Fig. 5.

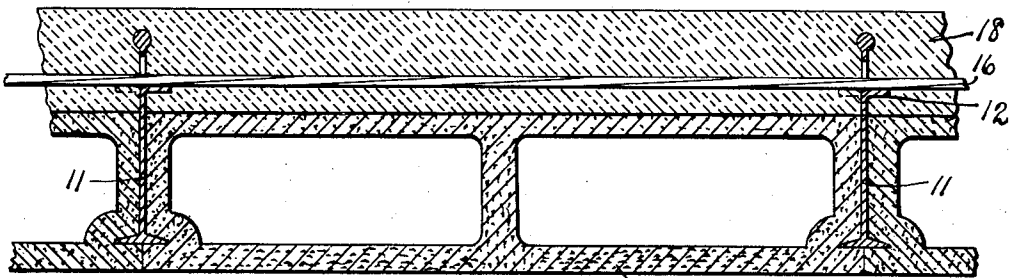


Fig. 6.

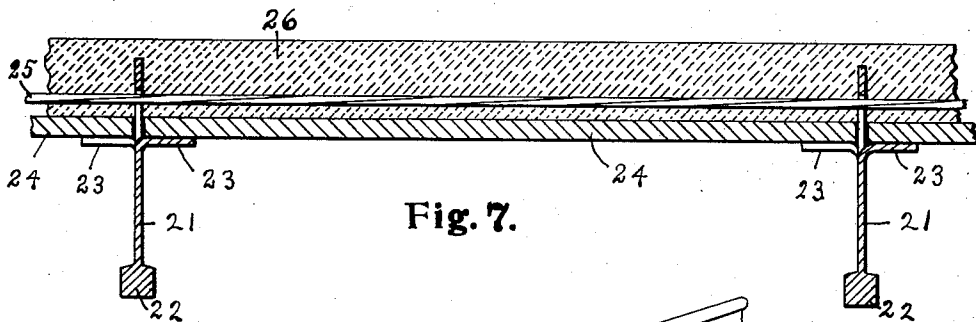


Fig. 7.

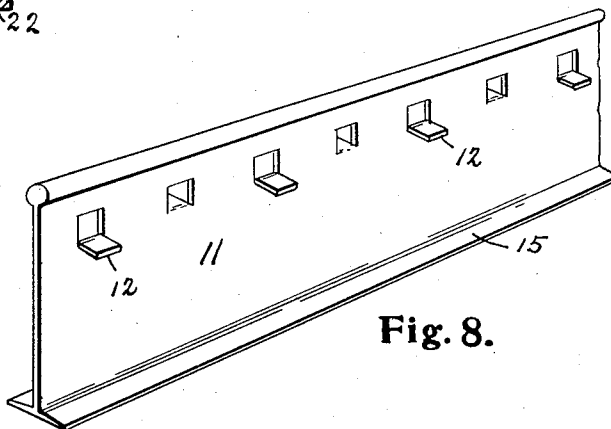


Fig. 8.

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3 SHEETS—SHEET 3.

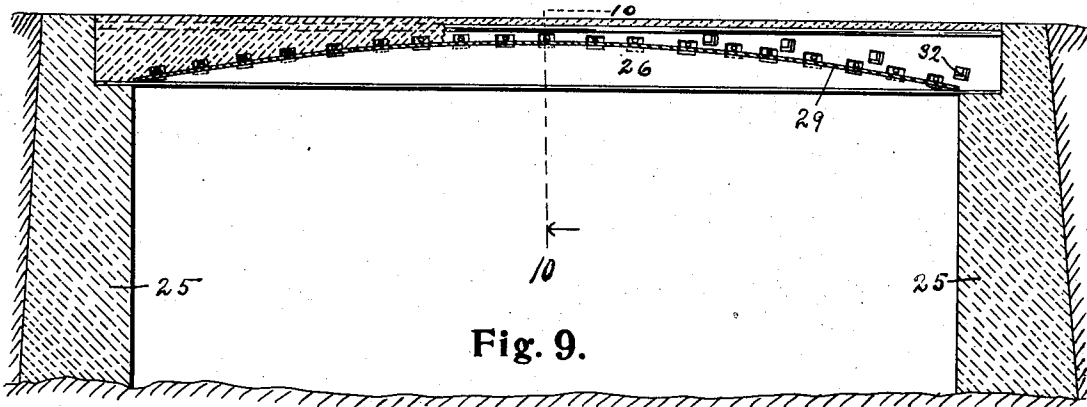


Fig. 9.

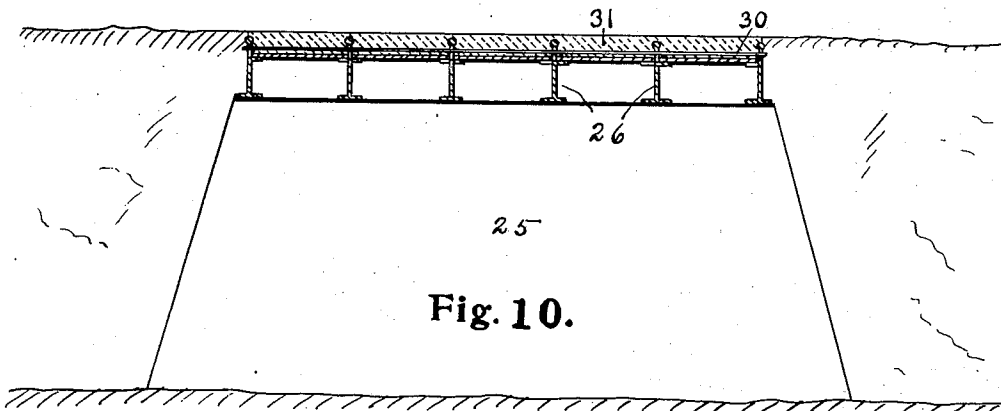


Fig. 10.

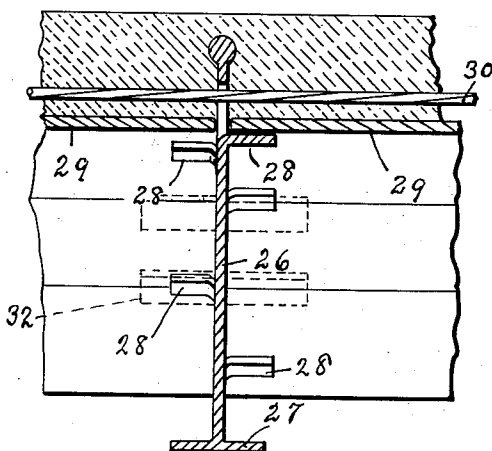


Fig. 11.

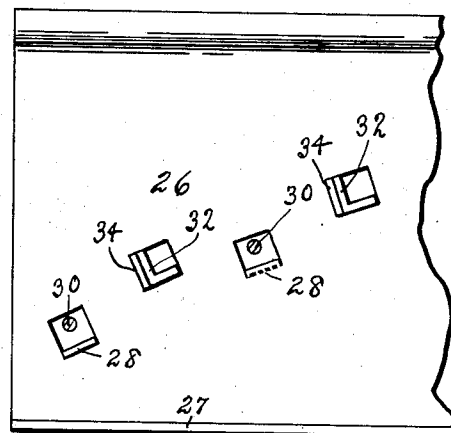


Fig. 12.

Witnesses.
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UNITED STATES PATENT OFFICE.

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BUILDING CONSTRUCTION.

1,033,106.

Specification of Letters Patent.

Patented July 23, 1912.

Application filed January 11, 1908. Serial No. 410,410.

To all whom it may concern:

Be it known that I, JULIUS KAHN, a citizen of the United States, and a 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 combined metal and concrete beams particularly that class of beams in which metal is reinforced with concrete, in contra-distinction to a beam in which the concrete is reinforced with metal.

The object of my invention is to provide a beam or floor construction in which all tensile and shearing stresses are taken up by steel and in which the compression stresses are taken up by concrete or other material having high compressive strength.

This invention consists in a novel metal beam having concrete or other plastic material molded around the compression side of the beam, in combination with transverse tension members molded in the lower portion of the concrete in order to transmit any tensile stresses from the concrete to the metal beams.

My invention consists further in a combined concrete and metal construction wherein novel parallel metal beams have forms supported at or above their neutral axes and concrete placed above these forms.

In the accompanying drawings Figure 1 is a transverse section of a side-walk light. Fig. 2 is a similar view on a larger scale. Fig. 3 is a cross section at right angles to Fig. 2. Fig. 4 is a side view of a metal beam adapted for this construction. Figs. 5, 6, and 7 are transverse sections of modified forms of this invention. Fig. 8 is a perspective view of the beam adapted for use in the construction shown in Figs. 5 and 6. Fig. 9 is a longitudinal cross section of this particular construction adapted for the use of high-way bridges and culverts. Fig. 10 is a transverse cross section of the same on the line 10—10 of Fig. 9. Figs. 11 and 12 are details of this construction on a larger scale.

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

Figs. 1, 2, and 3 illustrate a side-walk construction. The beams 1 and 1^a have a series of openings 2, and the tongues 3 thus formed are bent down at right angles to the beam and furnish supports for the glass lenses 4. These beams are plain flat bars 1 of no great thickness or they may be very light rolled beams 1^a with flanges 5 at the lower edges, and if desired, provided with small bulbs 6 at the upper edges. Transverse rods 7, which may be of any desired type of metal, are passed through the openings 2 and are surrounded with concrete or any other desirable plastic material 8. The longitudinal spaces around the upper edges of the beams are also filled with this concrete. The resultant construction is of great strength for the amount of material employed. All the shearing stresses resulting from the loads placed upon such side-walk lights are taken up by the webs of the beams 1 or 1^a. The tension stresses are taken up by the lower flanges 5 of beams 1^a or by the lower edges of the webs of the beams 1. The compression stresses are taken up by the concrete 8 and by the glass lenses. Should the load be concentrated upon any one point, the small reinforced concrete beams formed by the concrete members 8 and the rods 7 will transmit a portion of the load to the adjacent beams. These metal rods 7 should extend the entire breadth of the light and the beams 1 or 1^a the entire length, thus forming a net-work of beams in which the longitudinal beams are formed of metal reinforced by concrete, while the transverse beams are formed of concrete reinforced by metal. As the openings 2 are formed at or just above the neutral axis of the metal beams, the beams will not be weakened thereby. The tongues 3, being turned down alternately on opposite sides, furnish supports for the glass portion of the lights until the concrete has set. The lenses themselves serve as centering for the concrete so that no false-work whatever is required for this construction.

In Fig. 5 I have shown a construction which is admirably adapted for floors. The beams 11 have tongues 12 sheared and bent

out. Slabs 13 of terra-cotta, concrete or any other desired material are made to extend between the centers of the beams 11, and are provided with metal hooks 14 to engage the lower flanges 15 of the beams. The rods 16 extend through the openings of all of these beams of a panel or span in a floor construction such as shown in this drawing so as to connect the same. The beams 11 are first spaced properly and the slabs 13 are secured thereto by bending down the upper ends of the fasteners 14. A layer 17 of cinders is then placed on these slabs to the desired depth and on this, around the rods 16, a slab 18 of concrete is molded. When the concrete has set it will form a proper compression member in a beam of which the lower flanges 15 form the tension member and the web of the beam 11 the shear member. As stated before in describing Figs. 1, 2, and 3, a compound structure is formed; one portion being metal beams reinforced by concrete compression members; and the others a slab of concrete having embedded in its lower side a series of metal rods 16 to equalize the stresses arising from concentrated loads between adjacent beams.

In Fig. 6 the metal beam 11, transverse rods 16, and concrete slab 18 are similar to the construction just described and shown in Fig. 5. The floor is formed by placing the terra-cotta tile 19 between adjacent beams 11 passing the rods 16 through the opening formed by bending down the tongues 12 and then spreading the concrete 18 over the tile. The tile 19 may be formed from any other desirable material. In erecting a floor one row of tiles 19 is placed with one edge resting on any desired support, and a beam 11 is moved against this row of tiles. A second row of tiles is then placed against the first beam and a second beam pushed against this row of tiles. A line of supports may be used to support each row of tiles until after the beam is placed against it. In this manner a floor is constructed without the use of false-work, thus avoiding a large expense. The distance between adjacent beams as well as the depth of the beams and their weight will depend upon the load to be carried.

In Fig. 7 the beams 21 are flat plates with lower tension members 22 and have struck out portions 23 similar to those just described. The distance from the upper edges of the beams to these laterally projecting tongues is greater however in this construction than those shown in Figs. 5 and 6. Plates 24 of metal, but preferably of terra-cotta or concrete are laid on these projections 23 and the rods 25 are passed through the openings in the web of the beam 21. Concrete is then placed in position on the plates 24 and around the rods and forms the floor slab. This construction also has the

great advantage of not requiring any false-work for its erection. It also comprises longitudinal beams formed by reinforcing metal with concrete.

In the construction shown in Figs. 9, 10, 11 and 12 an arch of concrete is combined with a metal beam. The arch of concrete forms the compression member of trusses of which trusses the tension and shear members are of metal. In this construction as in those just described provision is made for transferring excess stresses from one longitudinal beam to those adjacent by means of reinforced concrete beams. In the construction shown, beams 26 extend between abutments 25, which beams are provided with flanges 27 and projecting tongues 28, which tongues lie in the arc of a circle. After the beams are positioned, plates 29 are properly laid on these tongues 28, the rods 30 are passed through the openings in the beams, and the slab 31 of concrete is spread over the plates 29. For the purpose of more thoroughly combining the effectiveness of the beams 26 and the concrete, the tongues 34 may be struck up to project at right angles to the line of thrust of the arch. Short pieces of metal 32, angle bars preferred, are placed in these openings and receive the thrust and transfer it to the beams. The action is then that of a bow-string truss. For moderate spans this construction is very cheap. It is especially adapted in short spans for high-way bridges and culverts. As no false-work is required this structure can be erected very quickly and under conditions which would render a more complicated structure almost impossible.

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

1. In a building construction, the combination of steel beams, each comprising a flat web, a cylindrical enlargement at its upper edge and a tensional member at its lower edge of larger cross-sectional area than the enlargement at its upper edge, transverse rods extending across and through the steel beams and following the curve of an arch longitudinally of the beam, brackets supported by the beams, supporting bodies resting on these brackets, and concrete molded on the supporting bodies and around the upper edges of the metal beams.

2. In a building construction, the combination of a slab of concrete, a plurality of steel beams having their upper edges embedded in the concrete, said beams having perforated webs, the cross sectional area of that portion of the beams which is in tension exceeding that which is in compression, brackets extending from the sides of the steel beams, arched concrete-supporting

means resting on the brackets, the bottom of
the concrete following the lines of an arch
so that the complete structure combines an
arch with a beam, and transverse rods ex-
5 tending through the concrete between the
beams.

In testimony whereof, I have signed this

specification in the presence of two subscri-
ing witnesses.

JULIUS KAHN.

Witnesses:

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ELIZABETH M. BROWN.