P. STRAGIOTTI.

STRUCTURAL METAL SHAPE.

APPLICATION FILED MAR. 23, 1909.

951,348. Patented Mar. 8, 1910.

Fig. 2.

Fig. 1.

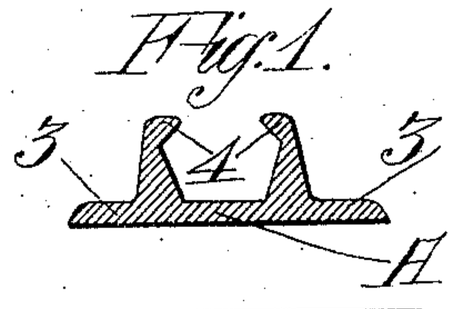


Fig. 3.

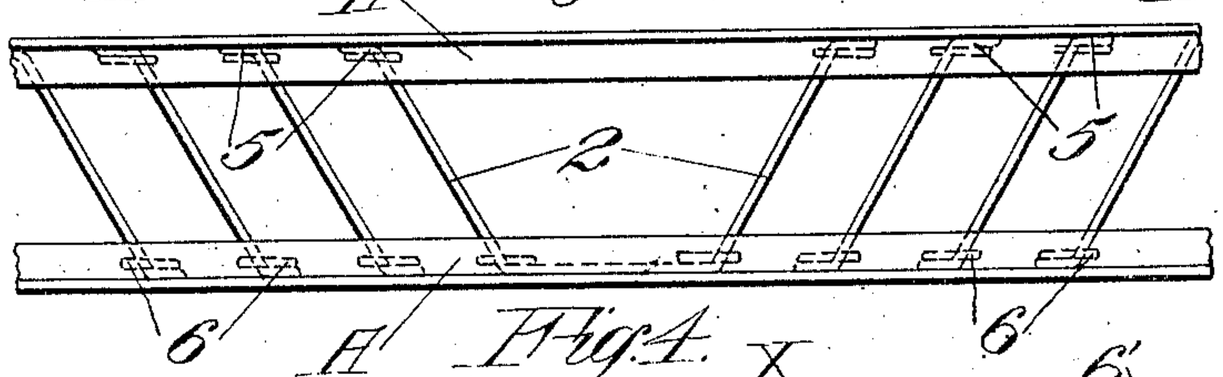


Fig. 4.

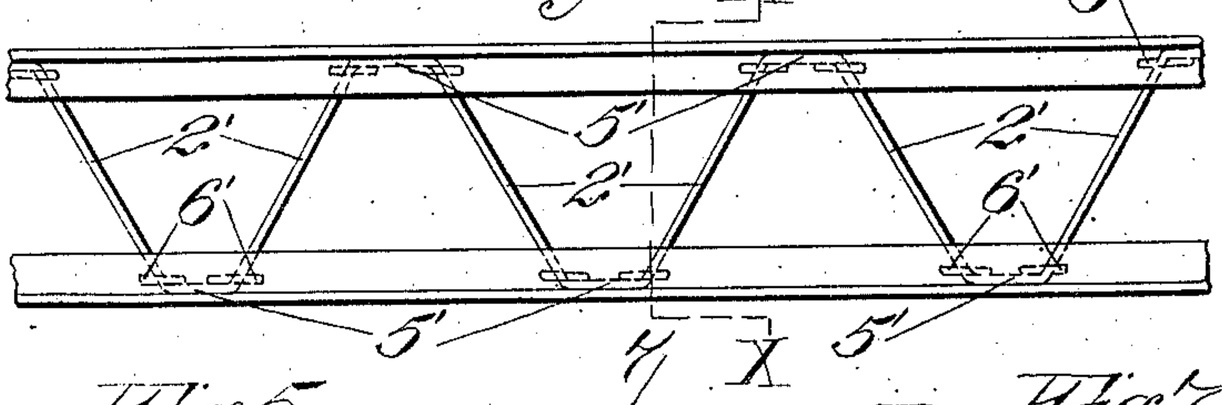


Fig. 5.

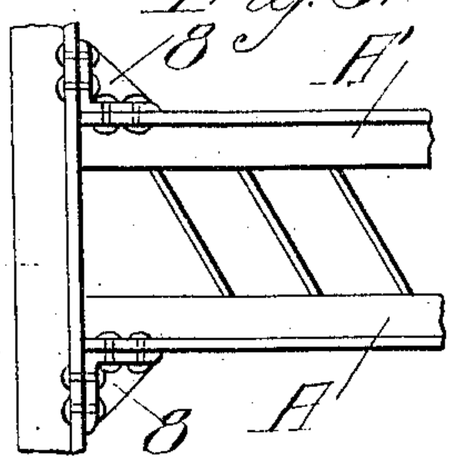


Fig. 7.

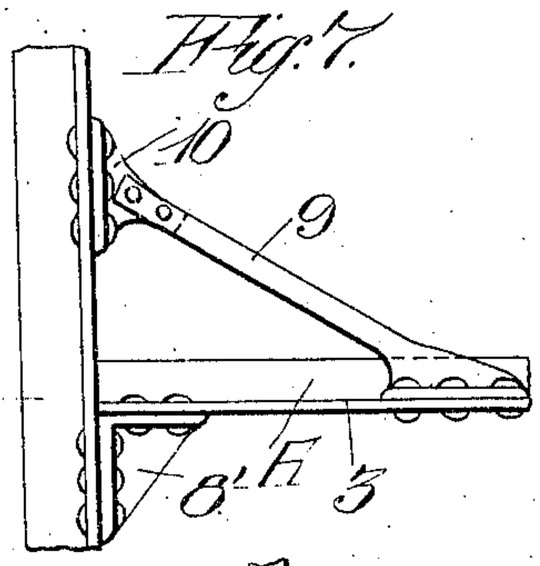


Fig. 8.

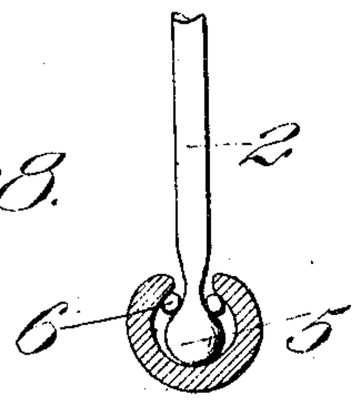


Fig. 6.

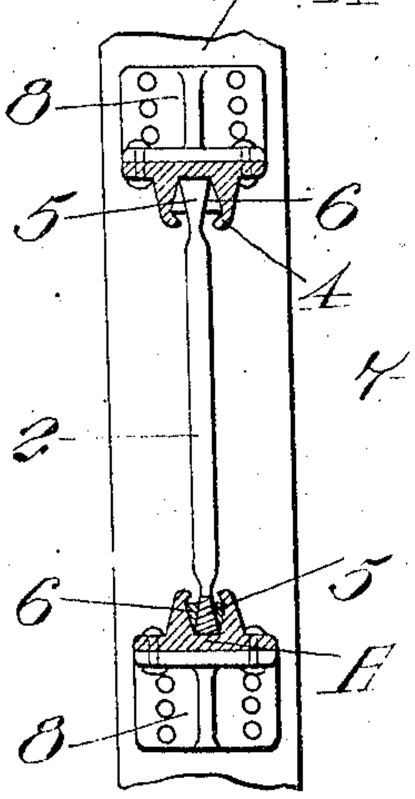


Fig. 9.

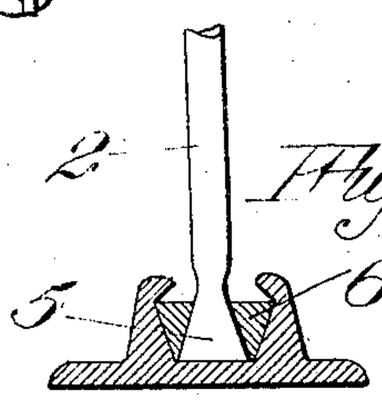
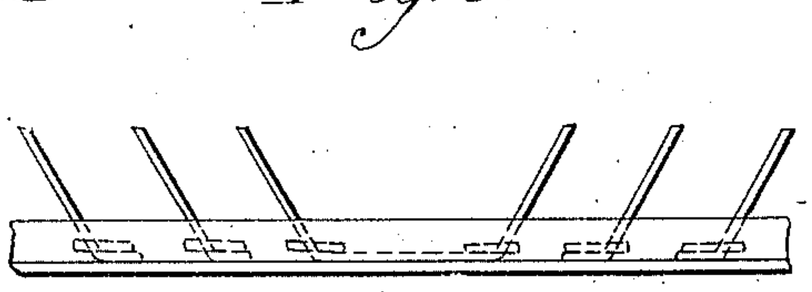


Fig. 10



WITNESSES

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STRUCTURAL METAL SHAPE.

951,348. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed March 23, 1909. Serial No. 485,331.

To all whom it may concern:

Be it known that I, PIETRO STRAGIOTTI, a subject of the King of Italy, residing at Hurley, in the county of Iron and State of Wisconsin, have invented new and useful Improvements in Structural Metal Shapes, of which the following is a specification.

My invention relates to building construction, and pertains especially to a structural metal shape for use in reinforced concrete building. Its object is to provide a simple, cheap, practical metal shape, easily assembled, which will possess the maximum degree of rigidity, which can be used in girders, and capable of use as a substitute for I-beams, and which shape may possess the advantages of an ordinary I-beam, in that it can be riveted direct to the columns.

It has other objects and advantages which will be manifest hereinafter.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figures 1 and 2 are cross sections of different forms of horizontal channel box. Figs. 3, 4 and 10 are side elevations of modified beam constructions. Figs. 5 and 7 show means of attaching a beam to a column. Fig. 6 is a cross section enlarged. Figs. 8 and 9 are sectional views of channel bars showing different methods of attaching the tension bars thereto.

In the embodiment of my invention I employ a channel bar A of special construction and combine with it the tension rods 2, with suitable means for securing these tension rods to the channel bars.

In Fig. 1, I show a channel bar with the lateral reinforcing flanges 3 corresponding, as will be seen later, to the flanges of an ordinary I-beam. In Fig. 2, I show a channel bar substantially U-shape in cross-section; and in both Figs. 1 and 2, the opposite lips of the channel are turned inwardly toward each other, as shown at 4, and inclose a space which is wider than the distance between the opposite lips 4 of the channels.

The lower ends of the rods 2 are specially shaped to provide knobs or swells 5, which latter are designed to be inserted into the channels, and when the keys 6 are driven in on each side of the swells and underneath the overhanging lips 4, these tension rods will be securely interlocked in the channels. It is manifest that the shape of the interlocking means 5 and 6 for the tension members and channels, is subject to various changes, without departing from the principle here involved. This form of connecting the tension rods to the channels is effective, and permits of quick work in assembling the parts, and does not diminish in any way the strength of the material, as no holes are required for any rivets. By embedding such connections in concrete they become permanent and absolutely safe, and will not loosen from shock or vibration; the concrete acting as an additional bond to increase the strength and safety of the juncture.

The tension rods 2 may assume a variety of shapes. In Fig. 3, I have shown them as simple diagonals having one end secured to the base channel A, and the opposite end of the tension rods secured to the opposed top channel A′. In a beam these channels extend diagonally in opposite directions from the center of the beam, as shown in Fig. 3, and when embedded in the concrete they resist the tensional stresses; the concrete resisting the compressional stresses. In Fig. 3, the bars A—A′ are of the type shown in Fig. 1, but manifestly they may be of the type shown in Fig. 2. By using bars of the type shown in Fig. 1, I get substantially an I-beam structure in which the flanges 3 correspond to the flanges of the I-beam, and such a structure can be riveted to the upright metal columns.

If an absolutely rigid I-beam structure is wanted, I employ a zigzag bar 2′, as shown in Fig. 4, in which this zigzag bar is provided with swells 5′ at the angles which are adapted to be inserted into the clamp space of the opposed channels and locked therein by suitable keys, as 6′. This structure produces a truss beam which can be advantageously substituted for the ordinary I-beam in many instances, and without the use of concrete, and it possesses the advantage of extreme lightness combined with great rigidity.

Many of the advantages of an I-beam are obtained by the design of Fig. 3, without the use of the zigzag bar of Fig. 4, but in which Fig. 3, as before stated, the rods 2 are designed to resist tensional stresses. In the design of Fig. 4, the compression strains are taken care of, in addition to the tensional stresses. In either case, the I-beam struc-

ture resulting from the use of the flanged channels similar to those of Fig. 1, permits the shape to be riveted directly to the steel columns in the identical manner of an I-beam, so that it is made possible to have a reinforced concrete structure directly riveted to a steel structure; something which has not heretofore been possible, as far as I am aware, with any other system of reinforced concrete building.

In Figs. 5, 6 and 7, I show a manner of riveting a beam, such as shown in either Fig. 3 or Fig. 4, to a vertical steel column, as represented at 7. In attaching a beam to a column, I rivet the beam to the column by means of the angle braces 8; the lateral flanges 3 of the channels A—A′ providing for the connection with the angle brace or bracket 8. In Fig. 7, I employ, in addition to the angle bracket 8′, the tension rods 9 riveted to each flange 3 at one end, the other end being riveted to a bracket 10 which in turn is riveted to the column 7.

By this system of attachment there is permitted a minimum amount of reinforcing material, and yet there is afforded a maximum degree of rigidity; and it is apparent that once this attachment is made, and the beam embedded in concrete, I get a reinforced concrete beam actually connected to the steel column without any special complication.

The points of advantage claimed for the present system are: the system of connection of the tension rods to the channel bars; the use of the channels having lateral flanges by which they can be riveted to a steel structure; and the combination of a reinforcing structure riveted to a steel structure.

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

1. A structural metal shape including a longitudinal channel bar having the edges of the channel inturned to inclose a space which is wider than the space between the inturned edges of the channel, a diagonal bar fitting the channel, and a drive key for locking the same in the channel, said key extending longitudinally of the channel and inserted between the inner wall of the channel and the side of the diagonal bar.

2. A structural metal shape including a longitudinal channel bar having the edges of the channel inturned to inclose a space which is wider than the space between the inturned edges of the channel, a tension rod fitting the channel, said rod within the channel having concaved sides, and keys fitting said concavities and locking against the inturned edges of said channel.

3. An I-beam structure comprising upper and lower spaced bars, each bar comprising a channel with lateral longitudinal flanges, connecting rods bent to fit within the channels and connected thereto, and drive keys introduced between the sides of the rods and inner sides of the bars.

4. An I-beam structure comprising upper and lower spaced bars, each bar comprising a channel with lateral longitudinal flanges, and connecting rods bent to fit within the channels and connected thereto, said connections between said rods and channels produced by keys fitting concavities in the opposite sides of the portions of the bars within the channels and interlocking against the overturned edges of said channels, said channels being bent inwardly to produce said overturned edges.

5. The combination of a metal column and a horizontal reinforcing metal shape comprising a horizontal channel bar, tension members secured in the channels of said bar, drive keys introduced between the adjacent sides of the channel bar and the tension members, and means for riveting said reinforcing metal shape to the column.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PIETRO STRAGIOTTI.

Witnesses:
C. W. Fowler,
T. W. Fowler.