

(No Model.)

2 Sheets—Sheet 1.

J. MONIER.

CONSTRUCTION OF RAILWAY SLEEPERS, &c.

No. 302,664.

Patented July 29, 1884.

Fig 1

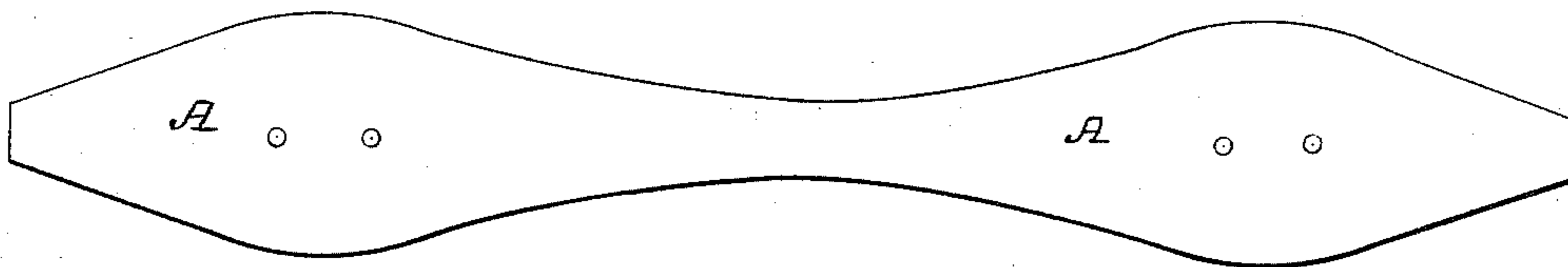


Fig 2

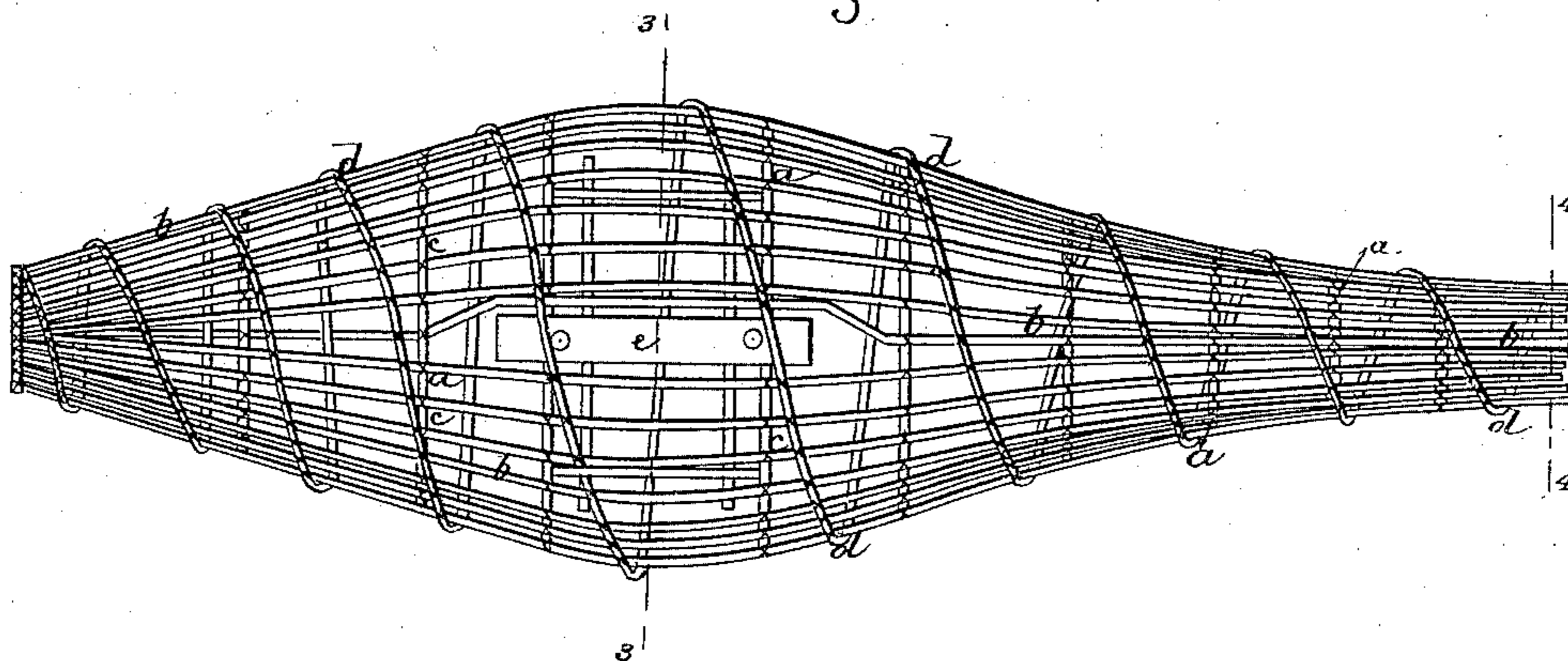


Fig 3

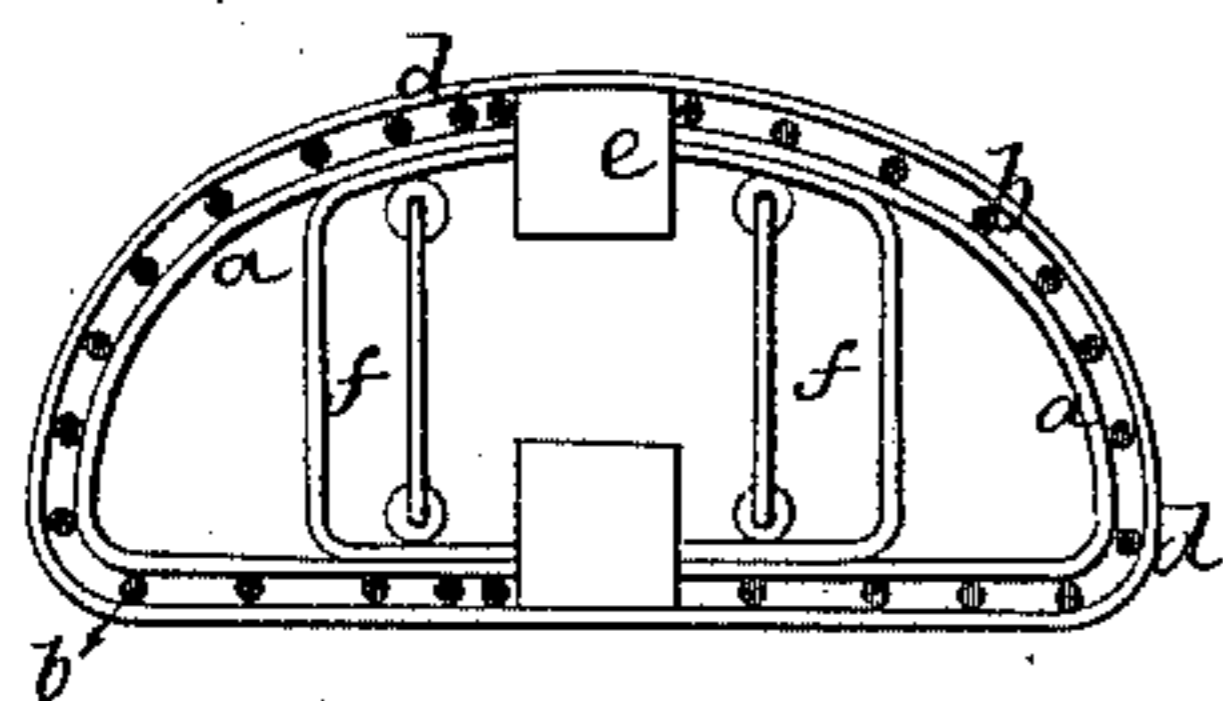


Fig 4



Fig 5

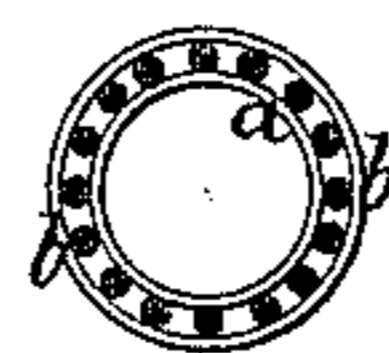


Fig 7

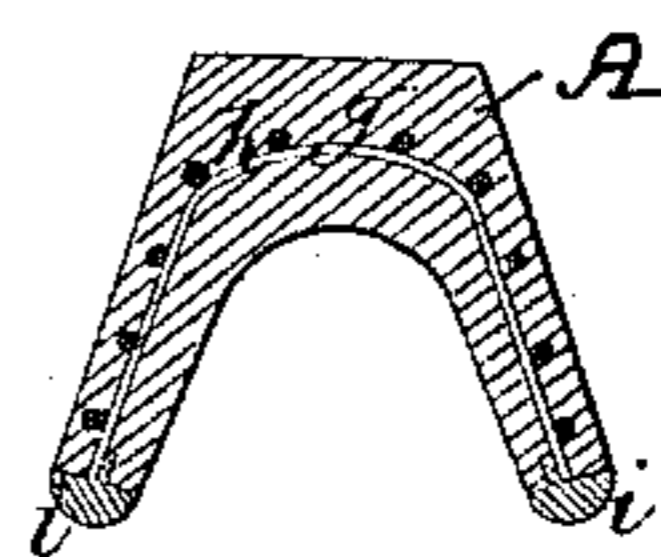


Fig 8

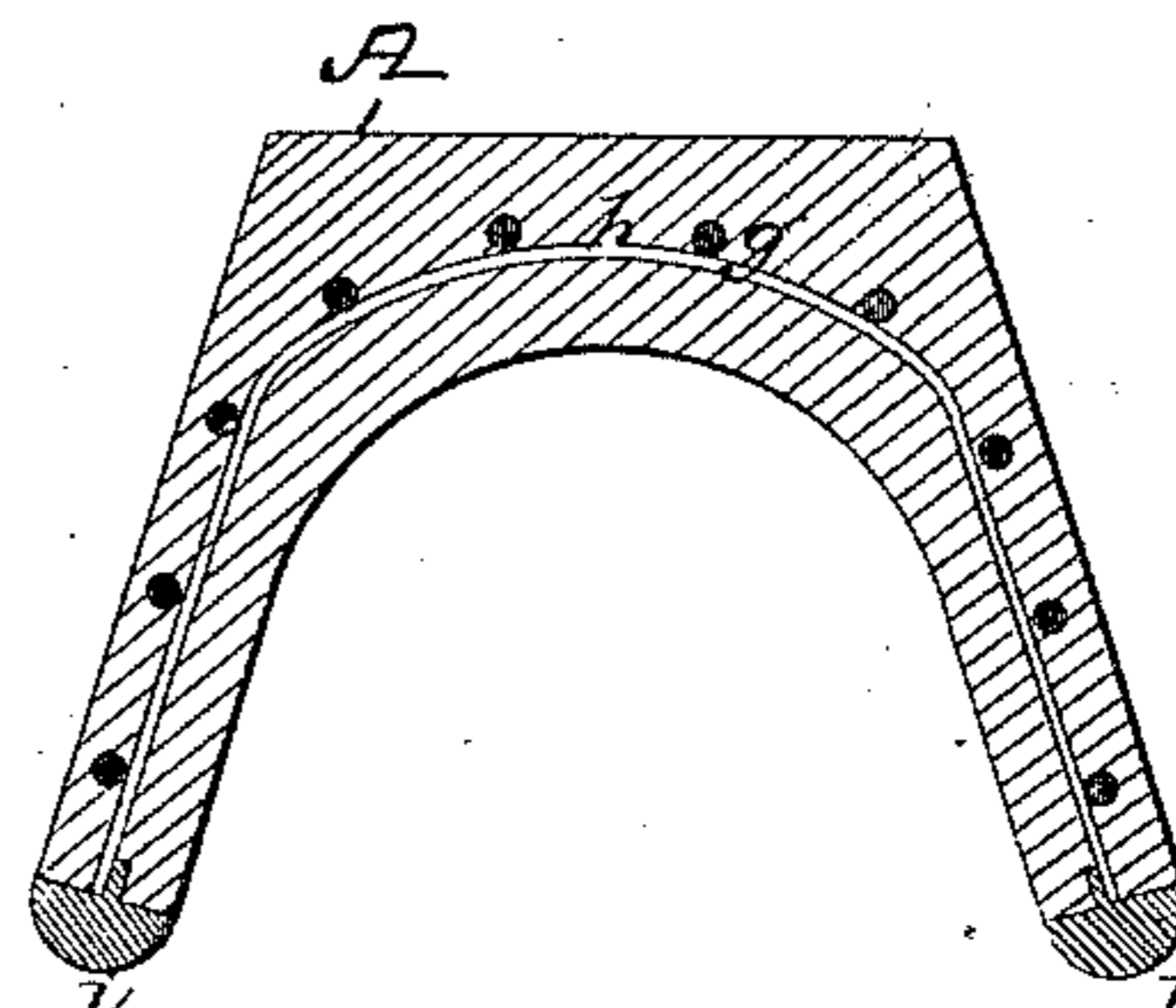
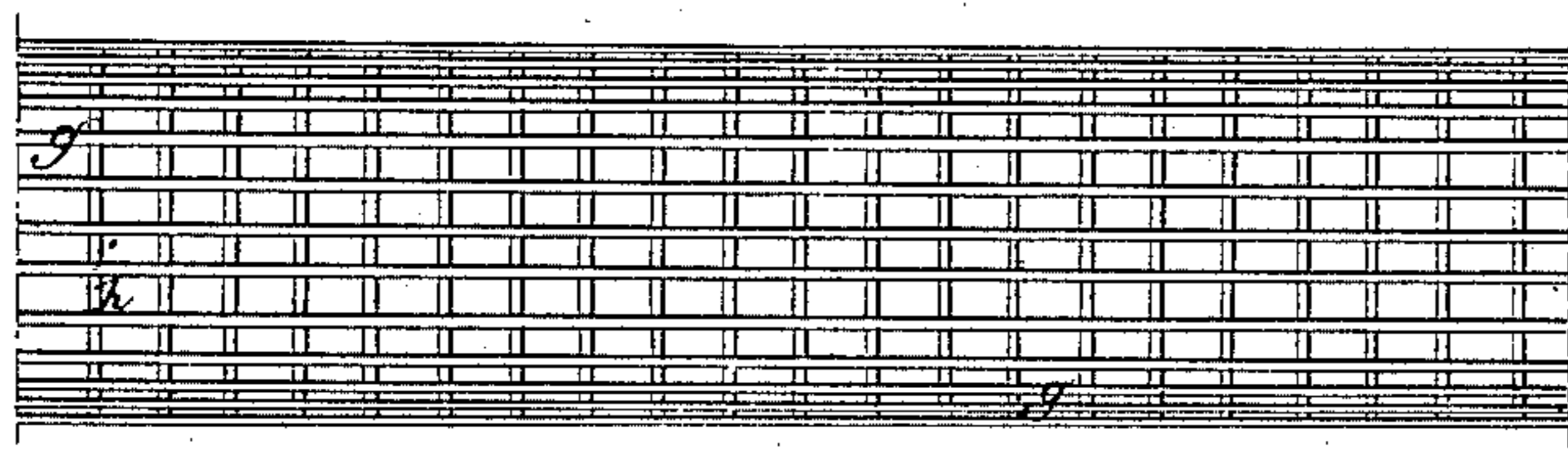


Fig 6



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Fig 9

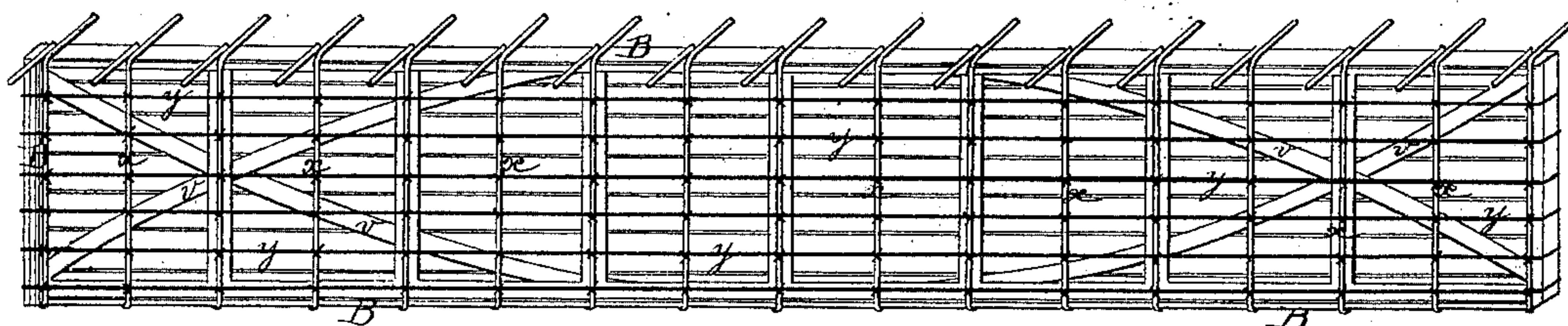


Fig 10

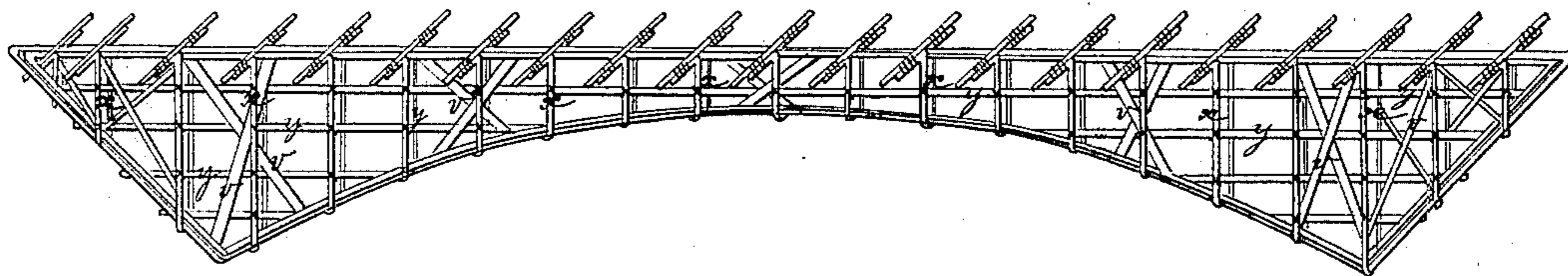


Fig 11

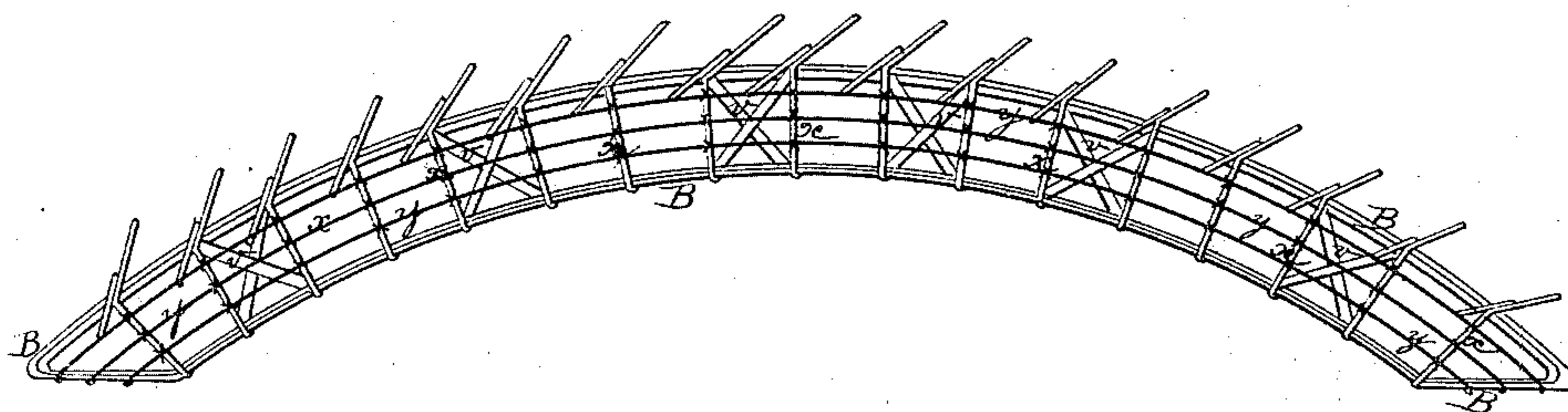


Fig 12

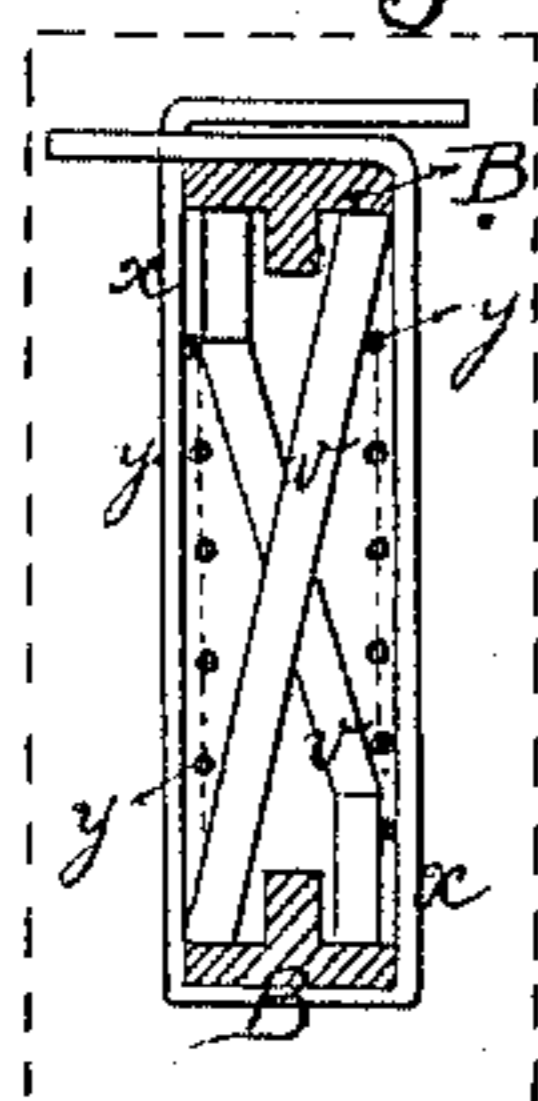


Fig 13

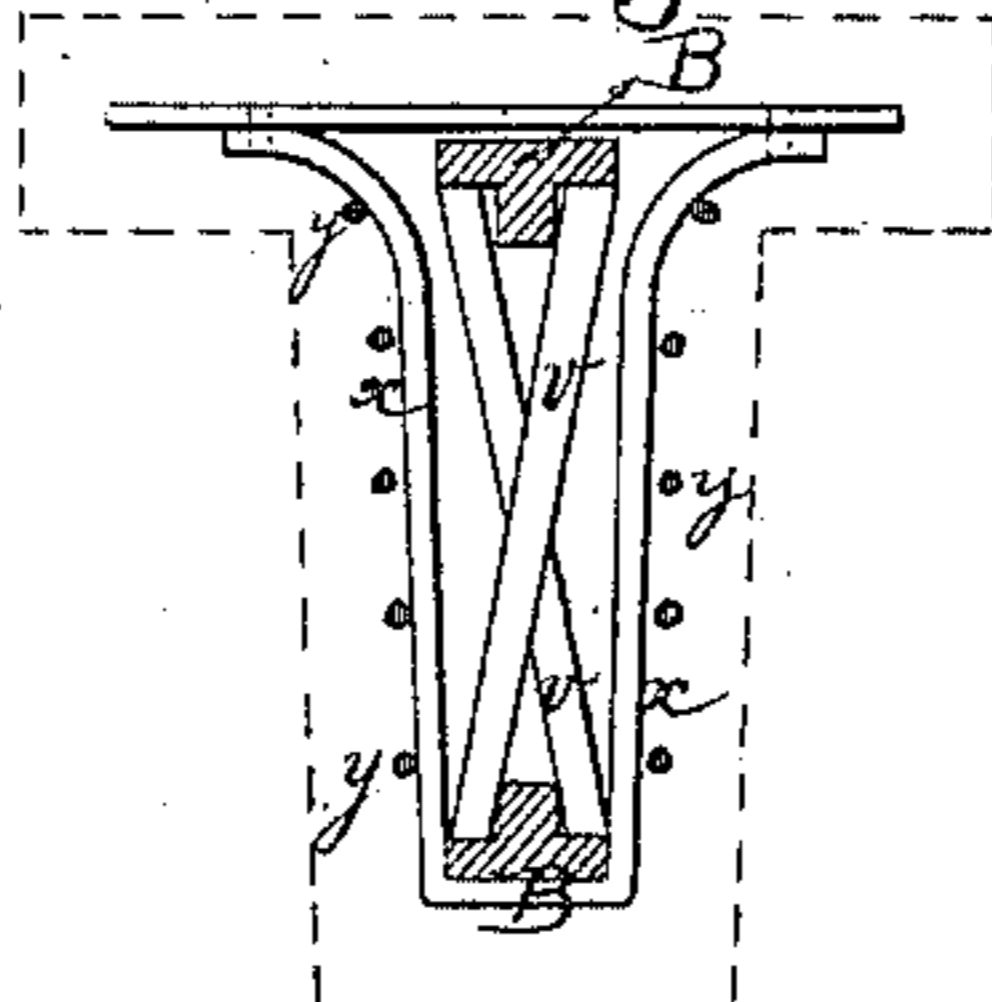
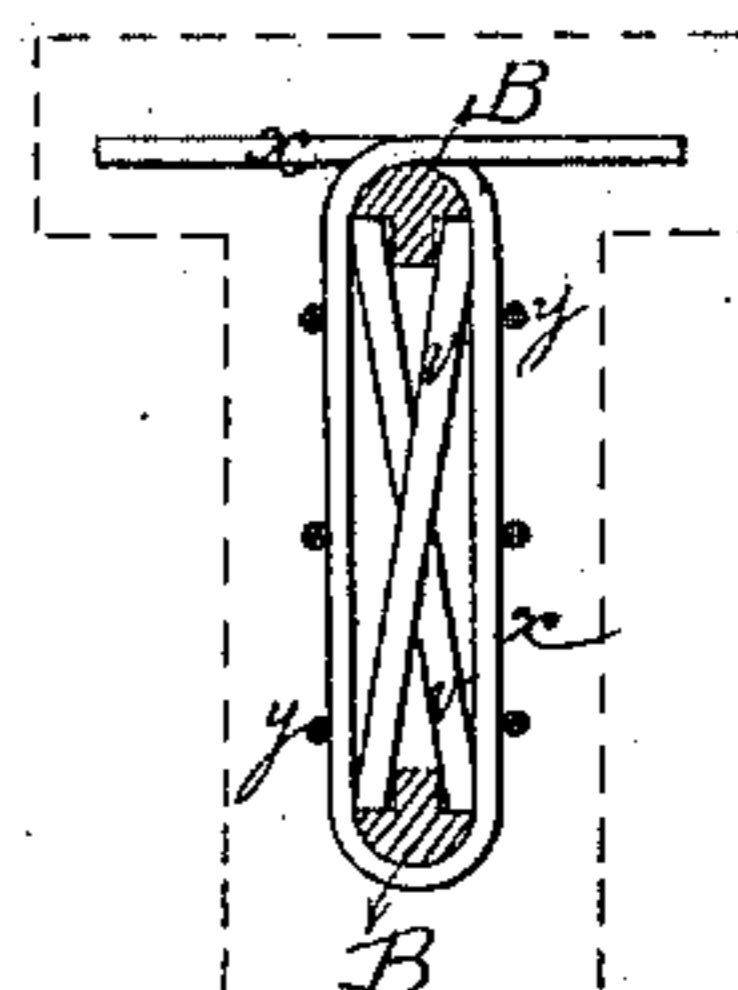


Fig 14



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# UNITED STATES PATENT OFFICE.

JOSEPH MONIER, OF PARIS, FRANCE.

## CONSTRUCTION OF RAILWAY-SLEEPERS, &c.

SPECIFICATION forming part of Letters Patent No. 302,664, dated July 29, 1884.

Application filed December 22, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH MONIER, a citizen of the French Republic, and a resident of Paris, France, have invented an Improved Structure of Metal and Concrete or Mortar Combined, of which the following is a specification.

My invention relates to the manufacture for use and sale of integral elements of construction—such as railway-ties, girders for bridges, &c.—of metal and concrete or mortar combined, the mortar forming the covering for a metal skeleton. This skeleton is composed of longitudinal bars or rods and transverse ribs, secured together by metal ligatures. This constitutes the essential feature of my invention. My structures or structural elements are made in the factory and are portable. Consequently they may be manufactured, handled, and shipped the same as iron castings, for example.

In the drawings I have illustrated the application of my invention to the production of two forms of cross-ties for railways, and three forms of trusses or girders for bridges.

Figures 1 to 5 illustrate one form of tie, which has a flat base and convex top, the portions of the tie where the rails rest being enlarged and bulbous. Fig. 1 is a plan of the completed tie. Fig. 2 is an enlarged view of one-half of the metal skeleton only, adapted to show its structure. Fig. 3 is a cross-section on line 3 3 in Fig. 2. Fig. 4 is a similar section on line 4 4. Fig. 5 is an end view.

The external contour of the tie is rounded and irregular on top and generally flat below. The section is largest at the points where the rails rest on the tie. From these points the tie is gradually reduced toward its center and its extremities, the end being a circle and the center an oval. This form imparts great strength, elasticity, and lightness, these qualities being especially great at the higher points, where the rails rest.

The skeleton is of metal, usually iron or steel, and comprises transverse hoops or rings *a*, of the proper forms and sizes to suit the points where they are placed, longitudinal rods *b*, tied to the rings *a* by metal ligatures *c*, and a strong spiral band, *d*, wound exteriorly around the skeleton from end to end

and attached to the rods *b* by ligatures. Plates *e* are provided to receive the rails or the rail-chairs, and these plates are supported from below interiorly of the skeleton by frames *f f*.

When the skeleton thus made is finished, it is covered entirely with cement or some mixture of cement and sand that will harden into an artificial stone or substance resembling it. The cement covering adheres perfectly by entering the interstices of the skeleton, and it fills or may fill the entire interior space of the tie, so as to cover the metal and protect it from corrosion. The metal skeleton gives to the structure the required toughness and strength.

Figs. 6, 7, and 8 illustrate the application of my invention to a tie having a uniform cross-section and an inverted trough shape. Fig. 6 shows the skeleton in plan. Fig. 7 is a cross-section of the tie complete, and Fig. 8 is the same on a larger scale. The skeleton of this tie comprises longitudinal bars of metal *g* and arched ribs *h*, these members being secured together where they cross by metal ligatures, preferably of wire. The tie is provided with base-pieces or shoes *i* of iron, preferably half-round, as shown. These extend the entire length of the tie and give it a firm seat. The cement covering *A* incloses the metal, as shown, inside and out, and a flat seat is provided at the top to receive the rails or rail-chairs.

Figs. 9 to 14 illustrate the application of my invention to three forms of girders for bridges and other structures. Fig. 9 is a side elevation of a plain straight girder. Fig. 10 is a side elevation of a girder straight above and arched below. Fig. 11 represents an arched girder of segment form. Figs. 12, 13, and 14 are cross-sections, respectively, of the said girders. The cement covering *A* of these girders is indicated by dotted lines only. Whatever may be the form of the girder, its skeleton is constructed as follows: *B B* are longitudinal bases and caps of substantially T-shape in cross-section. These form the basis of the girder. *v v* are cross-braces between *B B*. *x x* are metal bands, which are passed around the frame formed by *B B* and *v v*, the ends of said bands being made to project so as to take a firm hold in the cement covering.

*y y* are longitudinal rods, to which the bands *x* are secured by wire ligatures.

The road-bed of the bridge may be formed of metal lattice-work covered with cement and made in sections. This I have not deemed it necessary to show.

I am aware that it is not new, broadly, to embed iron structures in concrete to form elements of construction, and I do not claim this.

Having thus described my invention, I claim—

1. As an article of manufacture, an integral element of construction composed of a metal skeleton comprising longitudinal bars or rods and transverse ribs secured by ligatures of metal, and a covering of cement, in which said metal skeleton is embedded, all constructed and arranged substantially as set forth.

2. As an improved article of manufacture, a railway cross-tie composed of a metal skeleton made of longitudinal rods, transverse ribs, and metal ligatures, in the form shown—that is to say, rounded and irregular on top and level on the bottom, bulbous and enlarged at the points where the rails rest, and slender at the middle, and the said skeleton covered with or embedded in concrete, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH MONIER.

Witnesses:

ROBT. M. HOOPER,  
GEORGES CHAPUIS.