

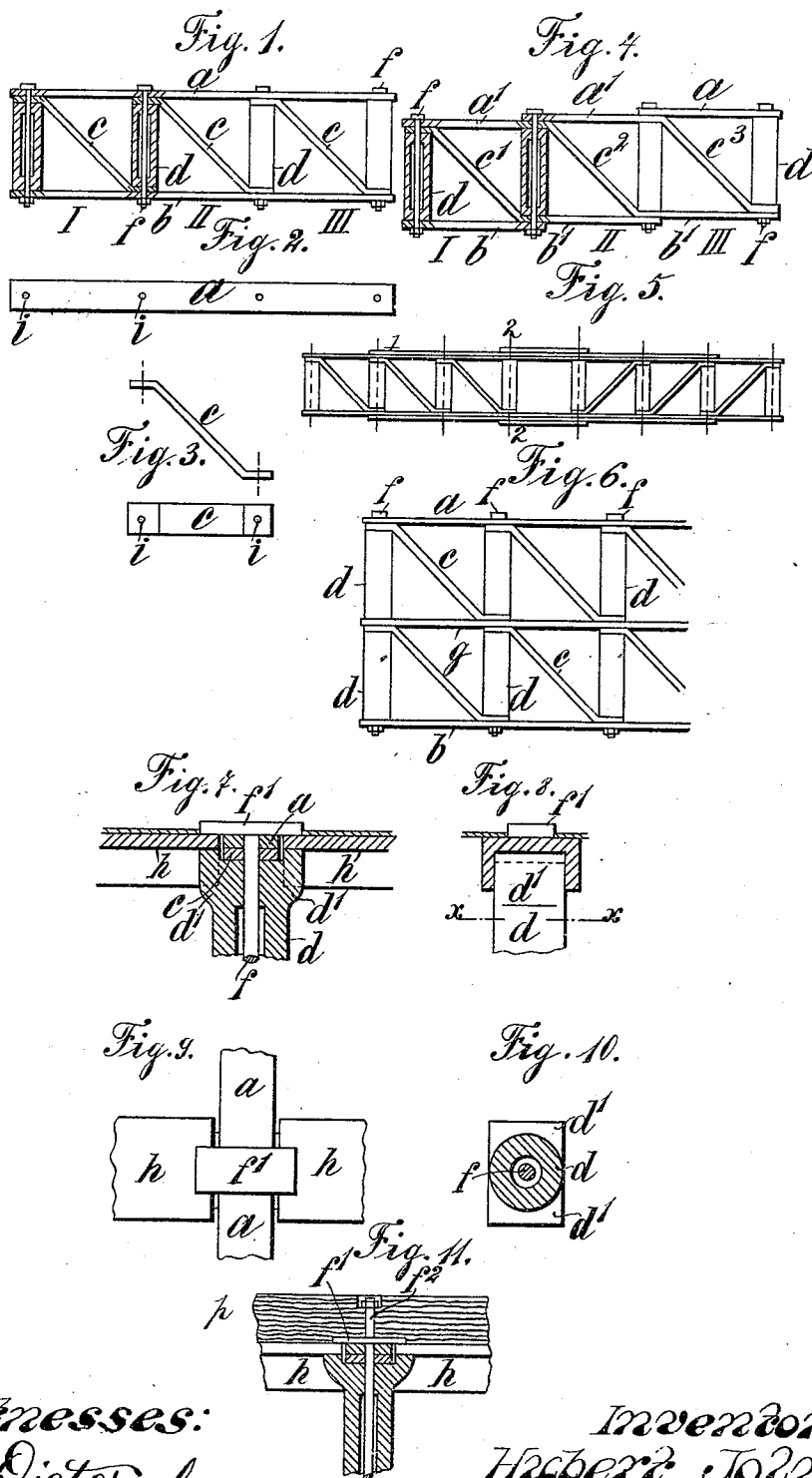
(No Model.)

3 Sheets—Sheet 1.

H. JOLY.
LATTICE OR TRUSS GIRDER.

No. 513,187.

Patented Jan. 23, 1894.



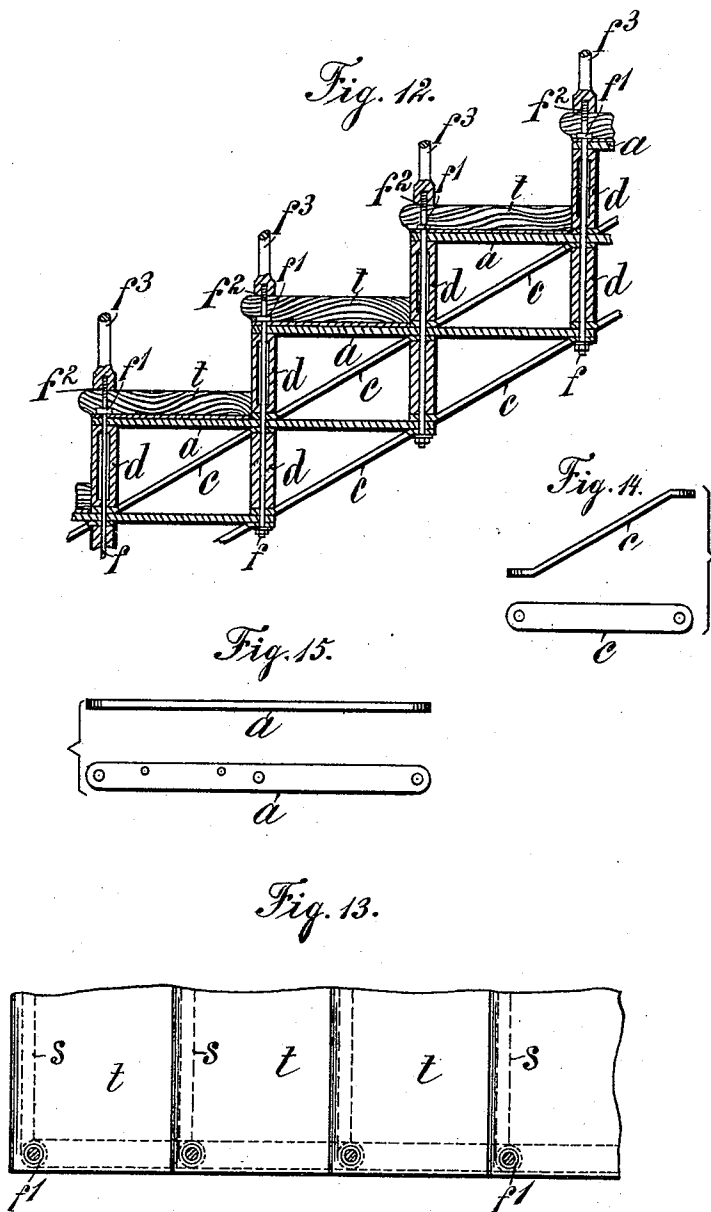
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Inventor:
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By *[Signature]* Atty.

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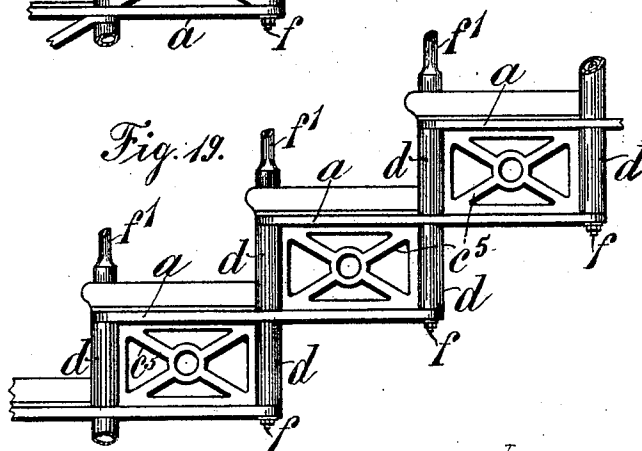
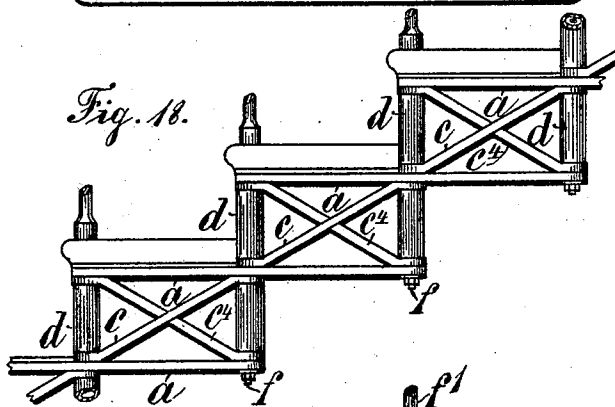
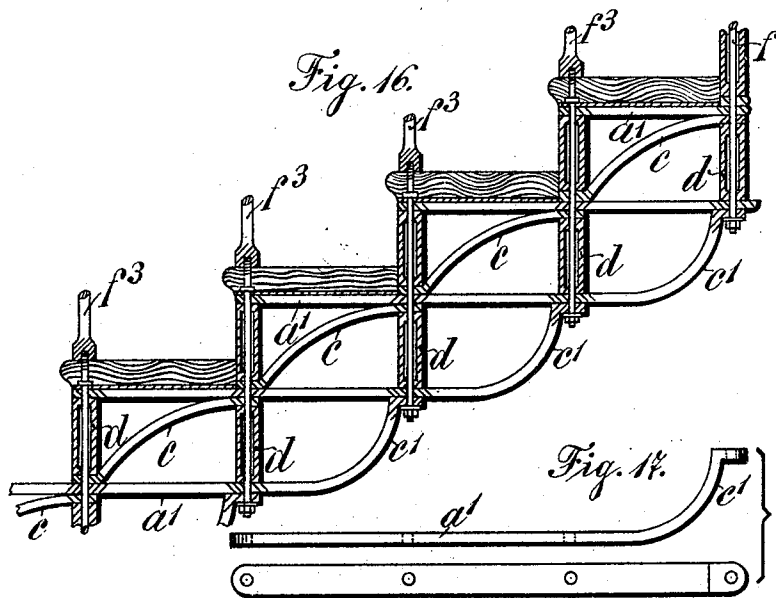
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Atty:

UNITED STATES PATENT OFFICE.

HUBERT JOLY, OF WITTENBERG, GERMANY.

LATTICE OR TRUSS GIRDER.

SPECIFICATION forming part of Letters Patent No. 513,187, dated January 23, 1894.

Application filed February 17, 1893. Serial No. 462,743. (No model.) Patented in Germany June 6, 1890, No. 55,578.

To all whom it may concern:

Be it known that I, HUBERT JOLY, a subject of the German Emperor, residing at Wittenberg, Germany, have invented certain new and useful Improvements in and Relating to Lattice or Truss Girders, (for which Letters Patent have been obtained in Germany as follows: No. 55,578, dated June 6, 1890, and No. 63,897, patent of addition to No. 55,578, dated October 10, 1891;) and I do hereby declare the following to be a full, clear, and exact description of the invention.

My invention has relation to lattice or truss girders for bridges, roofs, ceilings, stair carriages and analogous purposes, and consists essentially in the construction of the girders, as will now be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation partly in section of a lattice or truss girder embodying my invention. Fig. 2 is a plan view of one of the longitudinal members. Fig. 3 is a like view and a side elevation of one of the diagonal members. Fig. 4 is an elevation partly in section of a modified arrangement of the members of the girder. Fig. 5 is a side elevation of a girder constructed as shown in Fig. 1, and combined with re-inforcing or bracing longitudinal members. Fig. 6 is an elevation of a compound girder of the construction shown in Fig. 1. Figs. 7 to 11 are detail views illustrating means for connecting roof or floor joists or girders with a girder constructed according to my invention. Fig. 12 is a sectional elevation of a stair carriage composed of two girders embodying my said invention, and Fig. 13 is a partial top plan thereof. Fig. 14 shows in side elevation and plan one of the diagonal members. Fig. 15 shows by similar views one of the longitudinal members. Fig. 16 is a sectional side elevation of a stair carriage showing a modified form of diagonal member. Fig. 17 shows in side elevation and plan view the combined horizontal and diagonal member employed in Fig. 16, and Figs. 18 and 19 are side elevations illustrating further modifications in the construction and arrangement of the diagonal members.

In its simplest form the lattice or truss girder shown in Fig. 1, is composed of two longitudinal members, *a*, and *b*, of the required

length, of tubular vertical members, *d*, arranged at suitable distances apart to form the fields or panels, I, II, III, &c., of diagonal members, *c* whose ends are perforated and have bearing on the upper and under side of the verticals, *d*, respectively, and of tie rods, *f*, that extend through the longitudinal members, the bearing ends of the diagonal members, and the vertical members, as shown, said parts being connected or clamped to the vertical members through said rods in any well known or desired manner, as for instance, by a nut screwing on a threaded end of the rod, whose other end is provided with a suitable bolt head, or by means of keys or wedges seating in a slot in the rod, or otherwise, as may be found most convenient or desirable.

As shown in Figs. 2 and 3 the longitudinal members, *a*, and diagonals, *c*, are provided with holes *z*, for the passage of the tie rods.

One of the essential objects of my invention lies in the provision of means whereby a girder for any purpose is obtained that is easily constructed and readily assembled, and it is the aim to so construct the members of the girder, as to make like members interchangeable in the structure, and the construction of the said members as described in reference to Figs. 1, 2, and 3, will obviously admit this, as it is evident that the longitudinal members may be interchangeably used for top or bottom girts, while the diagonals and verticals can be connected with said girts at any point thereof. The structure is extremely simple, its members readily assembled, and consequently of less cost than other structures of the kind. This simple form of girder constitutes the basis for the construction of girders for various uses, as for bridges or buildings, &c., of varied form, as horizontal, or straight, or inclined, or arched, and said girders may be strengthened or reinforced by the combination therewith at any desired point or points of short longitudinal reinforcing girts, 1, and 2, as shown in Fig. 5. For certain purposes the longitudinal and the diagonal members may be constructed of a single piece, having two parallel horizontal parts, *a'*, *b'*, connected by a diagonal part, so that each individual member will form the upper and lower horizontal members of two fields, or panels, as I and III,

while the connecting diagonal will extend across an intermediate field or panel, as II, as shown at a' , b' , c' , and a' , b' , c' , Fig. 4.

When required a number of girders constructed as described in reference to Fig. 1 may be combined for strength by superposition, the only difference in the structure consisting in the length of the tie rods, f , which must obviously be of sufficient length to extend through the superposed verticals, b , and in the fact that one of the longitudinal members, a , or b , is dispensed with, there being but one intermediate member, as g , between two superposed girders, as shown in Fig. 6.

When the girder is used as a support for joists or rafters or cross girders, the upper end of the verticals d , is enlarged and recessed for the reception of the horizontal portion of a diagonal c , on which the longitudinal member a is laid the upper face of said enlarged portion of the vertical on opposite sides of the recess, forming a bearing for the horizontal member of a U-shaped girder, h , for instance, whose legs are seated on an offset, d' , formed on each side of the enlarged end of the vertical d , as shown in Figs. 7 to 10, the heads, f' , of the tie bolts in this construction being made sufficiently large to overlap the proximate ends of two such U-shaped girders one on each side of a vertical d .

If the cross girts are to be floored or planked over, the said planks, as p , Fig. 11, may be recessed for the reception of the tie rod head, f' , and said rod provided with an extension f^2 , that extends nearly through the planking, p , which may thus be secured to the verticals, and the cross girts by means of a nut countersunk in or bearing on the upper face of such planking, as may be required. Nor is it necessary that the cross girts should be U-shaped in cross section, as they may be of T or other shape, and either straight or curvilinear, simple or compound, and still be readily connected with and supported by the lattice or truss girder, with but slight modification in the form of the head of the verticals to suit the cross-sectional form of the cross girts.

In Figs. 12 to 19 I have shown my invention in its application to stair carriages in such manner that the extension f^2 of the tie rods may be utilized as a means for securing the balusters f^3 , to the tread, t , said extension f^2 being screw threaded at the end which extends through and sufficiently above the tread to admit of screwing the base of the baluster thereto.

In each field of the girder (except of course the terminal fields) the upper longitudinal member a , of one field constitutes the lower member of the field next above it, and in conjunction with risers or cross ties s , Fig. 13 connecting a vertical on one side of a step with that of the opposite side a bearing is formed for the tread t .

In Fig. 12 I have shown one straight diagonal for each field, and a similar diagonal for

the half fields formed intermediate of the terminal fields, whereby a strong and well braced stair carriage is formed. It is, however, not necessary that the diagonals should be straight, as they may be curved, as shown in Fig. 16, according to the weight of the stairs and the weight it is to carry, and as shown in said Fig. 16, one set of diagonals is curved in one direction and the other in an opposite direction, and, as shown, the said diagonals c' , form an integral part of the longitudinal girts, a' , as described hereinabove in reference to Fig. 4. Nor is it necessary that the diagonals should be arranged more or less parallel to each other, as they may be arranged to cross each other, as shown at c , c' , in Fig. 18, the diagonals c' , serving to resist tension instead of pressure, as is the case with the diagonals c . On the other hand, the diagonals c , c' , may take the form of trellised or more or less open work, or solid plain, or ornamented panels, as shown at c' , Fig. 19.

In the structures illustrated in Figs. 16, 17, and 18, the longitudinal members a , or a' are also connected with three verticals, d , and it will be readily understood that by the combination with said vertical and horizontal members of the carriage, of two curved diagonals, or two crossed diagonals, or, in lieu thereof, trellised or latticed, or full panels, great strength and rigidity is imparted to the carriage.

In either construction shown in Figs. 12 to 19, the relative arrangement of the longitudinal and vertical members of the girder provides a triangular framing, so to speak, for each tread of the stairs.

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

1. A girder composed of upper and lower horizontal members, tubular verticals, diagonals extending from one vertical to another, and tie rods extending through the verticals and connecting the horizontal and diagonal members thereto, for the purpose set forth.

2. A girder composed of upper and lower horizontal members, tubular verticals, diagonals extending from one vertical to another, and tie rods extending through said verticals and connecting the horizontal and diagonal members thereto, said tie rods having one end screw-threaded and provided with a head below said screw-threaded portion, for the purpose set forth.

3. A girder composed of upper and lower horizontal members, tubular verticals, diagonals extending from one vertical to the other, said diagonals forming an integral part of the horizontal members, and tie rods extending through the verticals and connecting the horizontal members thereto, for the purpose set forth.

4. In a truss or lattice girder, the combination with the vertical members thereof, of horizontal and diagonal members formed integral, substantially as described.

5. In a truss or lattice girder, the combination with the vertical members thereof, of horizontal and diagonal members formed integral, said diagonal members having a concavo convex form, for the purpose set forth.

6. A girder composed of upper and lower rails, tubular verticals between said rails, stays extending from the upper end of one vertical to the lower end of the next, and a tie rod extending through each vertical the rails and the stays, for the purpose set forth.

7. A girder composed of upper and lower members, tubular verticals and diagonals ex-

tending from one vertical to another, in combination with tie rods extending through the verticals and connecting the horizontal and diagonal members thereto, and one or more reinforcing horizontal members secured to the main horizontal members, for the purpose set forth.

In witness whereof I affix my signature in presence of two witnesses.

HUBERT JOLY.

Witnesses:

W. HAUPT,

F. FOLY.