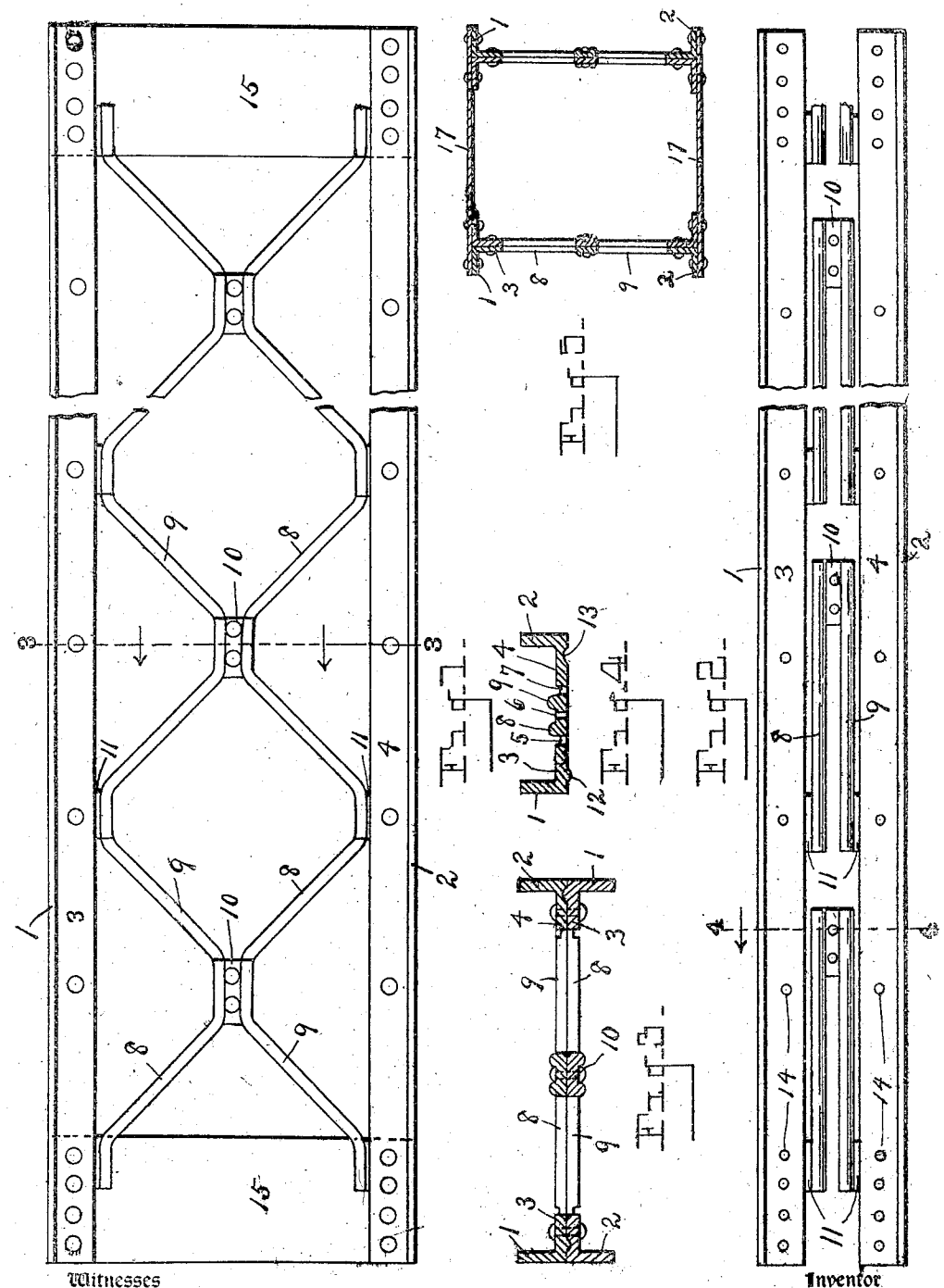
No. 862,973 PATENTED AUG. 13, 1907.

J. KAHN.

TRUSSED GIRDER.

APPLICATION FILED APR. 15, 1907.

2 SHEETS—SHEET 1.



Witnesses

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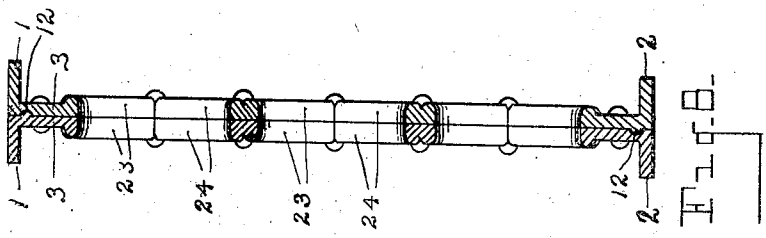


Fig. 8.

Fig. 6.

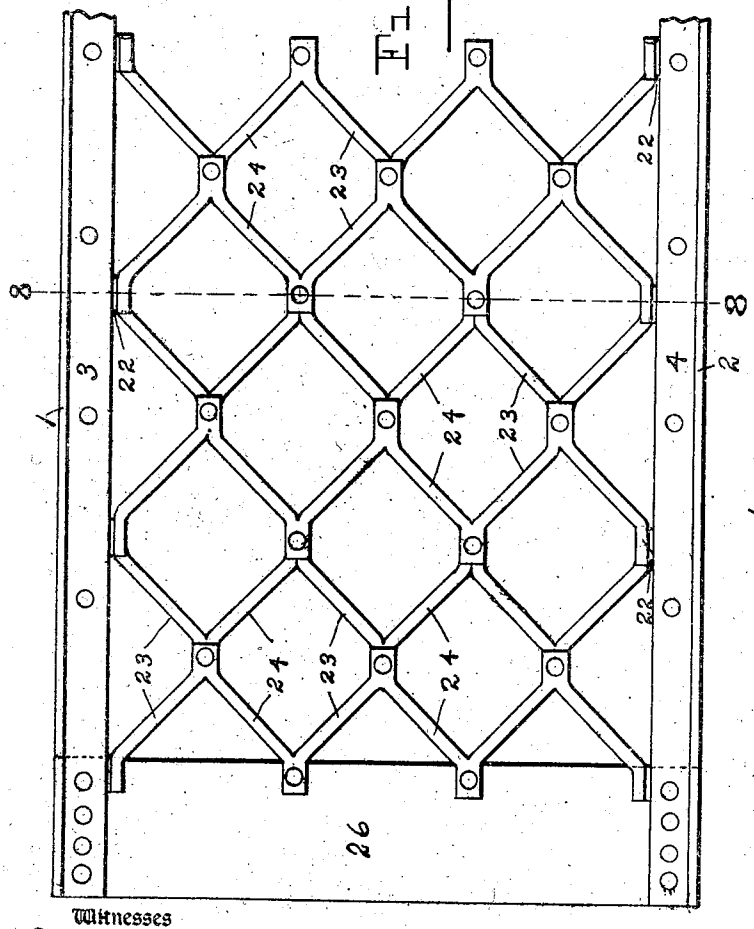
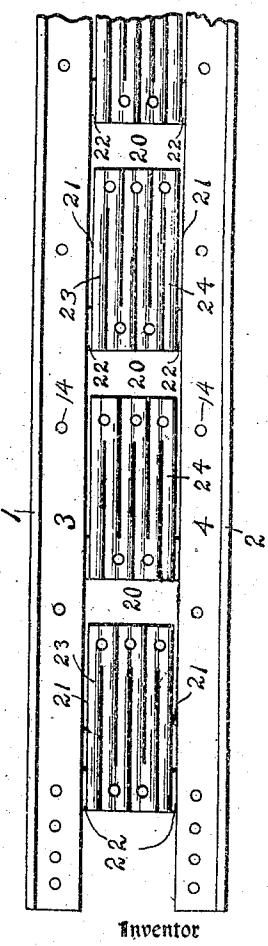


Fig. 7.



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UNITED STATES PATENT OFFICE.

JULIUS KAHN, OF DETROIT, MICHIGAN.

TRUSSED GIRDER.

No. 862,973. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed April 15, 1907. Serial No. 368,413.

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 Trussed Girder, of which the following is a specification.

The strength of metal beams and girders depends generally on the upper and lower flanges, and on the distance between them. With few exceptions, the usual I beams are not of the most economical design so far as material is concerned, their dimensions being determined more by the problems of manufacturing that must be overcome than the necessary strength of the parts. In the larger percentage of beams and girders much metal could be safely cut out of the webs without weakening the structure, but the value of the metal thus cut out would be much less than the cost of the labor required to remove it.

My invention consists in a trussed girder in which the greatest possible strength is obtained for the amount of material employed; or in other words, it consists in a girder or beam which offers the most economic structure possible for the desired strength, cost of material and cost of labor both being considered.

My invention consists in a trussed structure formed from properly rolled bars or beams, the middle portion of each of which is slotted or sheared, and the outer portions expanded to form a portion of a truss.

It consists further in combining a plurality of these part trusses to form a complete truss.

It consists further in so forming the contiguous faces of the part trusses that they will properly interlock to insure perfect union.

I attain my invention in the constructions illustrated in the accompanying drawings, in which

Figure 1 is a side view of my complete trussed girder. Fig. 2 is a view of a beam properly rolled, machined and ready to be expanded to form one member of my improved girder. Fig. 3 is a cross section on the line 3—3 of Fig. 1. Fig. 4 is a cross section on the line 4—4 of Fig. 2. Fig. 5 is a cross section of a box girder formed with two of my improved trussed girders. Fig. 6 is a view of a modified form of my improved girder. Fig. 7 is a view of a beam properly machined ready for expanding. Fig. 8 is a cross section on the line 8—8 of Fig. 6.

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

As the factors which determine the strength of a beam or girder in bending are the cross-sectional area of the upper and lower flanges and the distance between these flanges and the neutral axis, it follows that for equal weights of beams, particularly for long spans, the depth of the beam will generally determine its value. The web of the beam need be of but little greater strength than sufficient to withstand the crushing of the load.

By my present invention I provide a beam embodying the principles of a truss with its advantages of lightness and correct proportion, in contra-distinction to the usual plate girder which is formed with a web plate of even thickness, and unnecessary weight.

In forming my improved girder, a channel beam is rolled with flanges 1 and 2, (see Fig. 4) and with flat portions 3 and 4, grooves 5, 6 and 7, and ridges 8 and 9. The beam is then sheared or punched as shown in Fig. 2, the web being now composed of the members 8 and 9 connected together at their right ends by the plate 10, and having their opposite ends secured to the angles 1—3 and 2—4 by the connections 11. The parts 3 are formed with a bead or ridge 12 adapted to fit a groove 13 in an adjacent member, as shown in Fig. 3 forming the well known tongue-and-groove joint. Holes 14 are punched where desired and the beam is expanded by moving the angles away from each other.

When the angles are separated, the parts 8 and 9 will bend at the connections 11, and at the plates 10, as shown in Fig. 1. A companion part truss having been prepared (with its bead or ridge 12 at the bottom instead of at the top) it is secured to the first portion of the truss. Plates 15 are secured between the ends of the part trusses as shown in Fig. 1, to properly take the thrust of the supports.

The angles and plates 10 of the two part trusses are connected by rivets and the trussed girder is complete. The upper, lower and diagonal members of these girders will act as truss members in the usual manner. When greater stiffness is desired, a pair of these trusses may be connected by upper and lower plates 17 to form a box girder as shown in Fig. 5. When a stiffer stronger web is desired, the construction shown in Figs. 6, 7 and 8 may be employed. The upper and lower angles are formed by the parts 1—3 and 2—4, and these portions of the two part-trusses are connected by the tongues 12 fitting into grooves in the other member as before described. Instead of one diagonal member connecting to the lower longitudinal member, the two diagonal members joining at the neutral axis, the construction is modified as follows. Referring to Fig. 7, the beam is machined to form transverse slots 20 and lateral slots 21 extending therefrom. This leaves rectangular portions connected to the upper and lower members by the parts 22. These rectangular members are then sheared forming rods 23 and 24, connected in pairs at their ends. The web of the original beam may be so rolled that these rods 23 and 24 have considerable depth. The upper and lower members are then separated, and two part trusses are secured together as shown in Fig. 6, by rivets through the webs 3 and 4, and through the joined portions of the rods 23 and 24. The lattice thus formed will be very stiff, because of the many points of union between the diagonal members of the truss. The ends may be

stiffened by adding the plate 26. By these constructions, a girder is provided in which the upper and lower members may have any desired weight, while at the same time the web has no unnecessary metal.

In many cases, the ordinary I beams cannot be employed to carry even light loads on extreme spans, as they are not strong enough to carry their own weight, but owing to its lightness, my improved trussed girder is especially adapted for such use.

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

1. A part-truss comprising upper and lower members, and an open-work intermediate portion integral therewith formed of connected oppositely inclined parts.

2. A trussed girder built up from a plurality of part-trusses, each part-truss comprising a longitudinal upper member, a longitudinal lower member, and diagonal members extending inwardly from the longitudinal members and joined at their ends to the diagonal members of the other part-truss.

3. A trussed girder comprising a plurality of similar part-trusses secured together, the longitudinal portions of the part trusses being held in alinement by interlocking projections.

4. A trussed girder formed by securing together two similar part-trusses, each part-truss comprising longitudinal upper and lower members and diagonal members extending inwardly from the longitudinal members a portion of the distance between them, the diagonal members of one part-truss being secured at their ends to the ends of similar members of the other part-truss.

5. A trussed girder formed by securing together two similar part-trusses, each comprising longitudinal upper and lower members and diagonal members integral therewith, each of the diagonals of the trussed girder being composed of diagonal members of both part-trusses secured together at their ends.

6. A trussed girder formed by securing together two similar part trusses, each comprising longitudinal upper and lower sections and an open work section between them, the open work section being formed from short oppositely inclined diagonal bars integral with the longitudinal members, and having adjacent ends joined, the joined ends of the diagonal bars forming the open work section of the two part trusses being connected.

7. A trussed girder comprising a plurality of similar part-trusses, and means to hold the longitudinal portions of the part-trusses in alinement.

8. A structural member formed by securing together a plurality of parts, each comprising longitudinal members, and connecting members integral therewith, extending inwardly from said longitudinal members and connected at their ends to the connecting members of another part.

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

JULIUS KAHN.

Witnesses:
W. N. SALTER,
E. N. PAGELSEN.