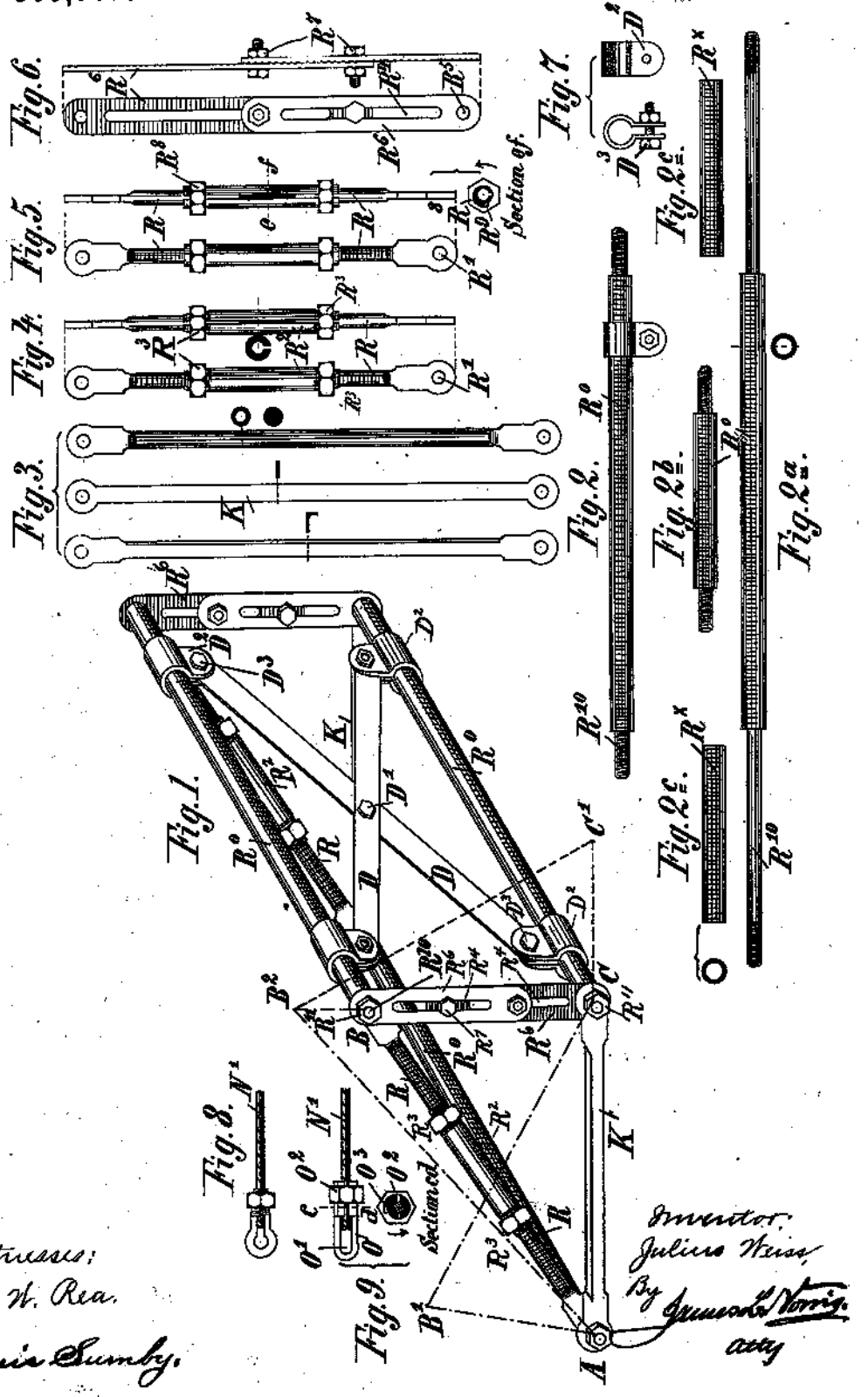
(No Model.) 3 Sheets—Sheet 1.

J. WEISS.

ELEMENT FOR BUILDING BRIDGES.

No. 509,781. Patented Nov. 28, 1893.



Witnesses:
J. W. Rea.
Dennis Sumby.

Inventor.
Julius Weiss.
By Munn & Co
atty

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

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3 Sheets—Sheet 2.

J. WEISS.

ELEMENT FOR BUILDING BRIDGES.

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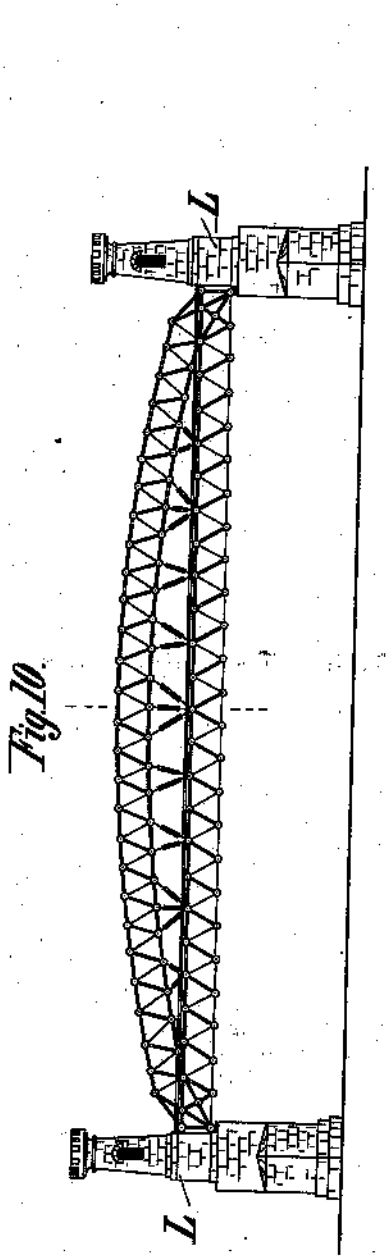

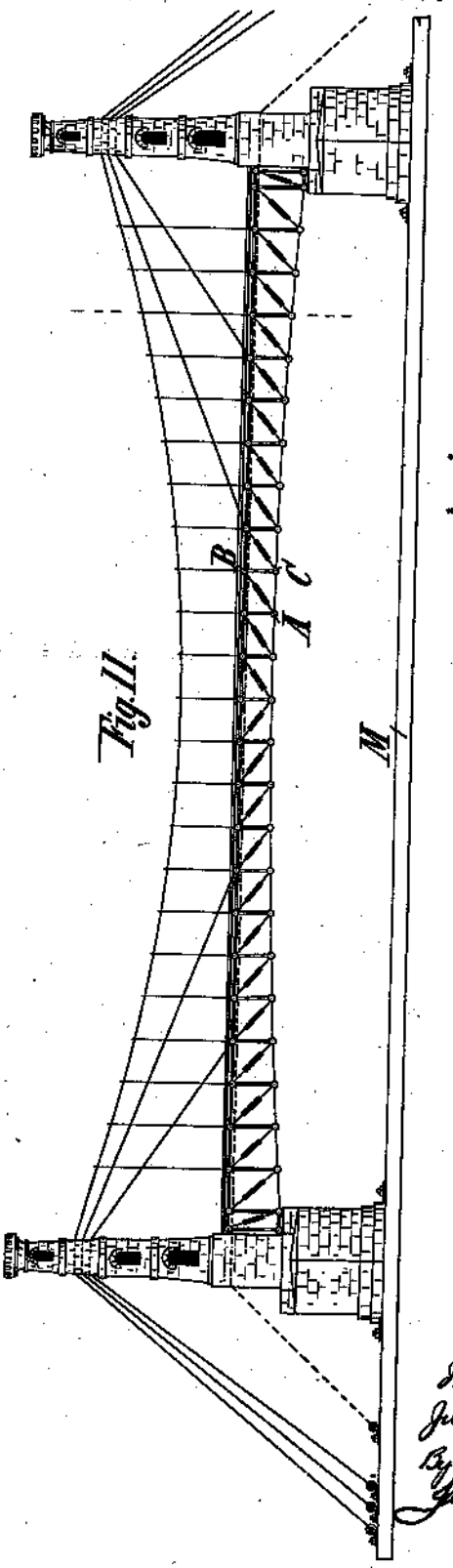

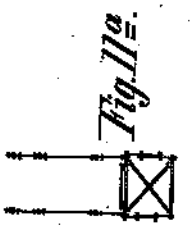

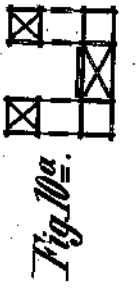

Witnesses;
S. N. Rea
Dennis Sunby.

Inventor;
Julius Weiss
By Yarwood & Norris.
Attys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

J. WEISS.

ELEMENT FOR BUILDING BRIDGES.

No. 509,781. Patented Nov. 28, 1893.

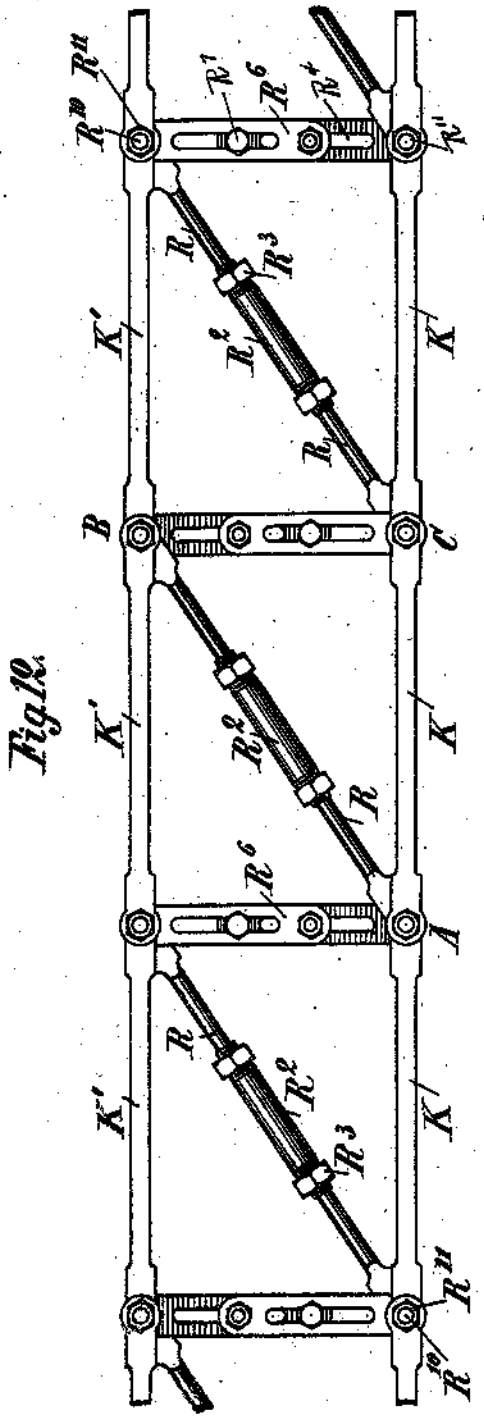

Fig. 12.

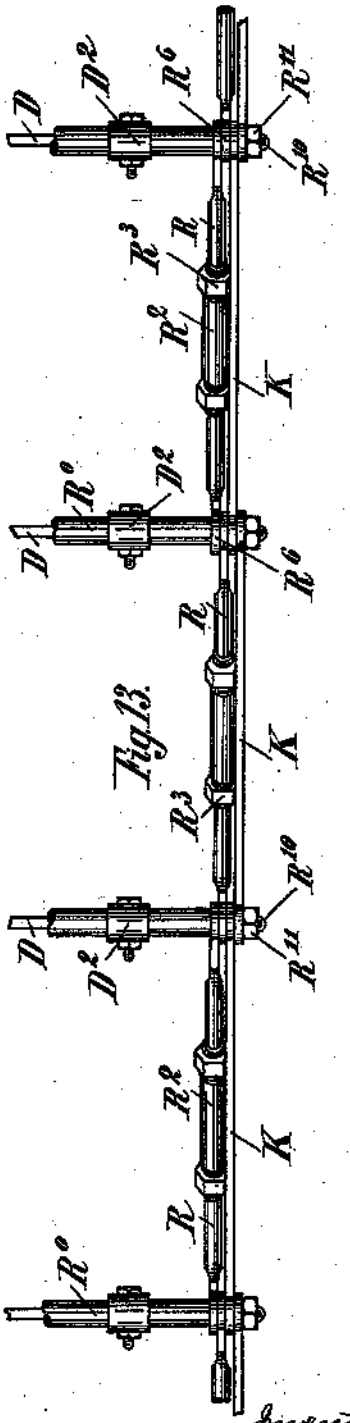

Fig. 13.

Witnesses:
G. W. Rea
Albert Emmett

Inventor:
Julius Weiss
By James La Norris.
Atty

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JULIUS WEISS, OF HAMBURG, GERMANY.

ELEMENT FOR BUILDING BRIDGES.

SPECIFICATION forming part of Letters Patent No. 509,781, dated November 28, 1893.

Application filed December 2, 1892. Serial No. 453,864. (No model.)

To all whom it may concern:

Be it known that I, JULIUS WEISS, a subject of the Emperor of Germany, and a resident of Hamburg, in the Empire of Germany, have invented certain new and useful Improvements in Materials for Building Bridges, chiefly designed for instructive purposes, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to materials for building bridges. By means of the several parts of these materials bridges of various kinds can be composed, such as for instance truss bridges with simple or double girder systems, arched girders, fish-belly girders, or wire rope bridges and the like, owing to the fact that the girders are composed, on the principle of the triangle of links or tie rods which are partly adjustable in length, and that the triangles placed side by side are connected with each other by transverse and diagonal struts. In a truss system thus composed the several links or tie rods form as it were the outlines of a wedge.

In the accompanying drawings, Figure 1 represents a triangle composed of tie rods and constituting the fundamental form of the truss system. Figs. 2, 2^a and 2^b show the rods serving as transverse struts. Fig. 2^c represents sleeves to be slid upon the ends of the transverse rods shown in Fig. 2^a. Fig. 3 represents tie rods of various transverse sections which form one side of a triangle of a truss girder. Figs. 4 to 6 show tie rods which form the other sides of a triangle of a truss girder. Fig. 7 shows a clamping socket for the tie rods of unchangeable length serving as diagonal struts. Figs. 8 and 9 represent clamps for the wire ropes of the wire rope bridges. Figs. 10 and 10^a are a side elevation and section of a truss bridge. Figs. 11 and 11^a are a side elevation and cross section of a wire rope bridge composed of the several parts represented in Figs. 1 to 9. Fig. 12 is a side elevation showing a number of the triangular sections connected together, and Fig. 13 is a partial plan view of the same.

In the truss system represented the triangles A B C connected with each other by transverse struts R^0 and diagonal rods D are composed in such a manner that the base A C is formed of a connecting bar or chord section K of unchangeable length and having any suitable section. The second side of the triangle is changeable in length and consists of two rods R preferably fluted and provided with pin holes R′. Upon these two rods is slid a sleeve R^2 which is slotted in the longitudinal direction and has at its ends, which are fluted interiorly, taper screw threads fitted to receive the nuts R^3. The third side B C of the triangle, constituting a link of changeable length, consists of two flat members R^6 furnished with longitudinal slots R^4 and pin holes R^5. They are preferably fluted on the sides turned toward each other, in order to increase the effect of the screws R^7 passed through the said slots R^4 and holding them together. In this manner it is possible to convert every triangle A B C for example into a triangle A B′ C, by changing the length of the sides A B and B C. But the side A C may also be made of a link or tie rod of changeable length, so as to produce triangles of the form of A B^2 C′. By these changes in the length of the sides of the triangle the distance of the several transverse rods R^0 from each other will also be varied, which renders the adjustability of the diagonal necessary. This is attained by connecting their crossing point by a single bolt D′. The clamping sockets D^2 connected to the ends of the diagonals are roughened interiorly and transverse rods R^0 surrounded by them are roughened on the outside, so that, when tightening the nuts on the screws D^8 extending through the clamping socket and the diagonal a firm connection of these three parts is obtained. It is clear that the adjustable links or tie rods of various forms may be optionally exchanged with each other. The fixing of the sleeve R^2 upon the above mentioned links or tie rods R R may be effected by substituting for the nut R^3 a muff R^8 preferably made polygonal and which presents an eccentric bore in transverse section. When a muff R^8, is employed the split sleeve R^2 is formed with a correspondingly eccentric axial projection R^9, so that when the muff R^8 is turned in the proper direction a cam action takes place between the eccentric bore of the muff R^8 and the pro-

jection R^9 and the split sleeve R^2 is tightened around and clamped against the tie rods R, R.

In the construction of bridges the lower ends of the tie rods R, of one triangular section are slipped upon the ends or journals R^{10}, (Fig. 2^a) of the lower transverse rod R^0, of the preceding triangular section, the lower and upper connecting bars or chord sections K, K' are slipped upon the upper and lower transverse rods R^0, of said preceding triangular section and the nuts R'' are then screwed upon the journals R^{10}, thus firmly securing the various triangular sections together as shown in Figs. 12 and 13, of the drawings. More than two triangles may also be arranged side by side, in order to produce for instance a bridge with a broad carriage way. In this case it is expedient to make the said journals R^{10} of such a length that the links or tie rods on one side of the bridge can be slid upon them, use being made of one or more sleeves R^x. The heads L of the bridge may consist of wood or other appropriate material; they are preferably fixed by screws upon a plank M.

For erecting the bridges it is advisable to stretch between the heads of the bridge wire ropes or cords which carry the several truss systems until the bridge is finished and are then removed again. When erecting wire rope bridges the fixing of the wire ropes N' is preferably effected by means of clamps O consisting of a plate provided with an eye O' and whose lateral parts are bent to the form of a slotted socket receiving the end of the wire ropes. Upon the socket is slid a muff O^2 which is similar to the muff R^5 slid upon the sleeve of the aforesaid link or tie rod and is bored in accordance with the eccentric projection O^3 in order to clamp the ropes in the sockets.

What I claim is—

In the art of bridge building, a triangular section comprising connecting bars or chord sections K, links R^5, changeable in length, tie rods R, changeable in length, transverse rods R^0, and diagonal rods D, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of November, 1892.

JULIUS WEISS.

Witnesses:
ALEXANDER SPECHT,
DIEDRICH PETERSEN.