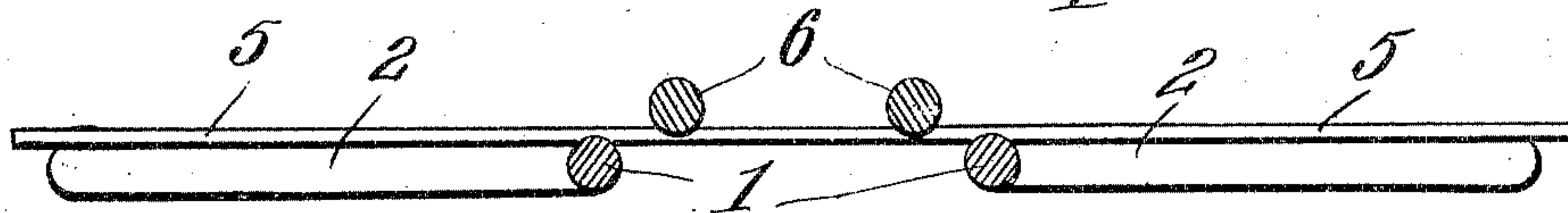
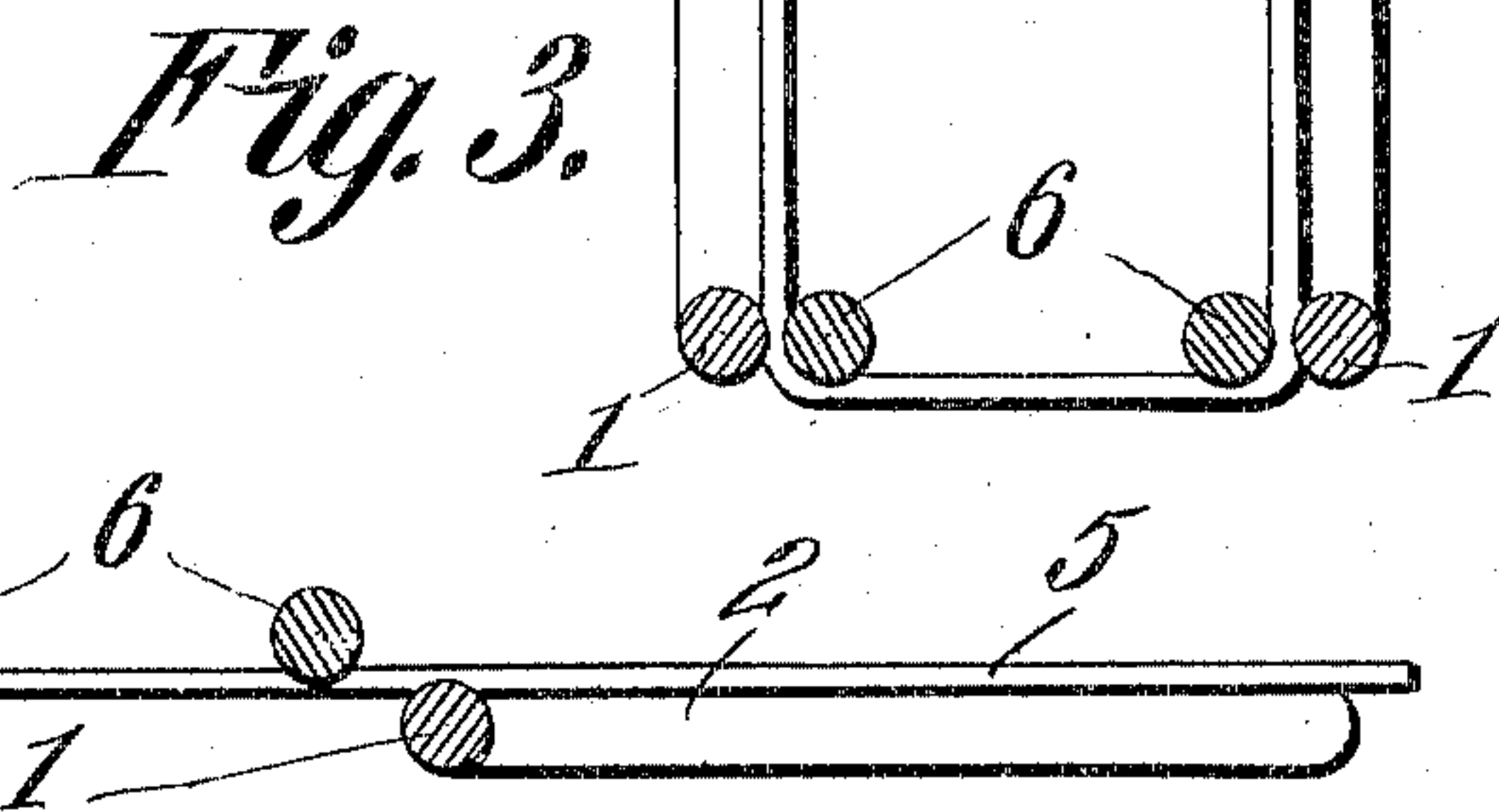
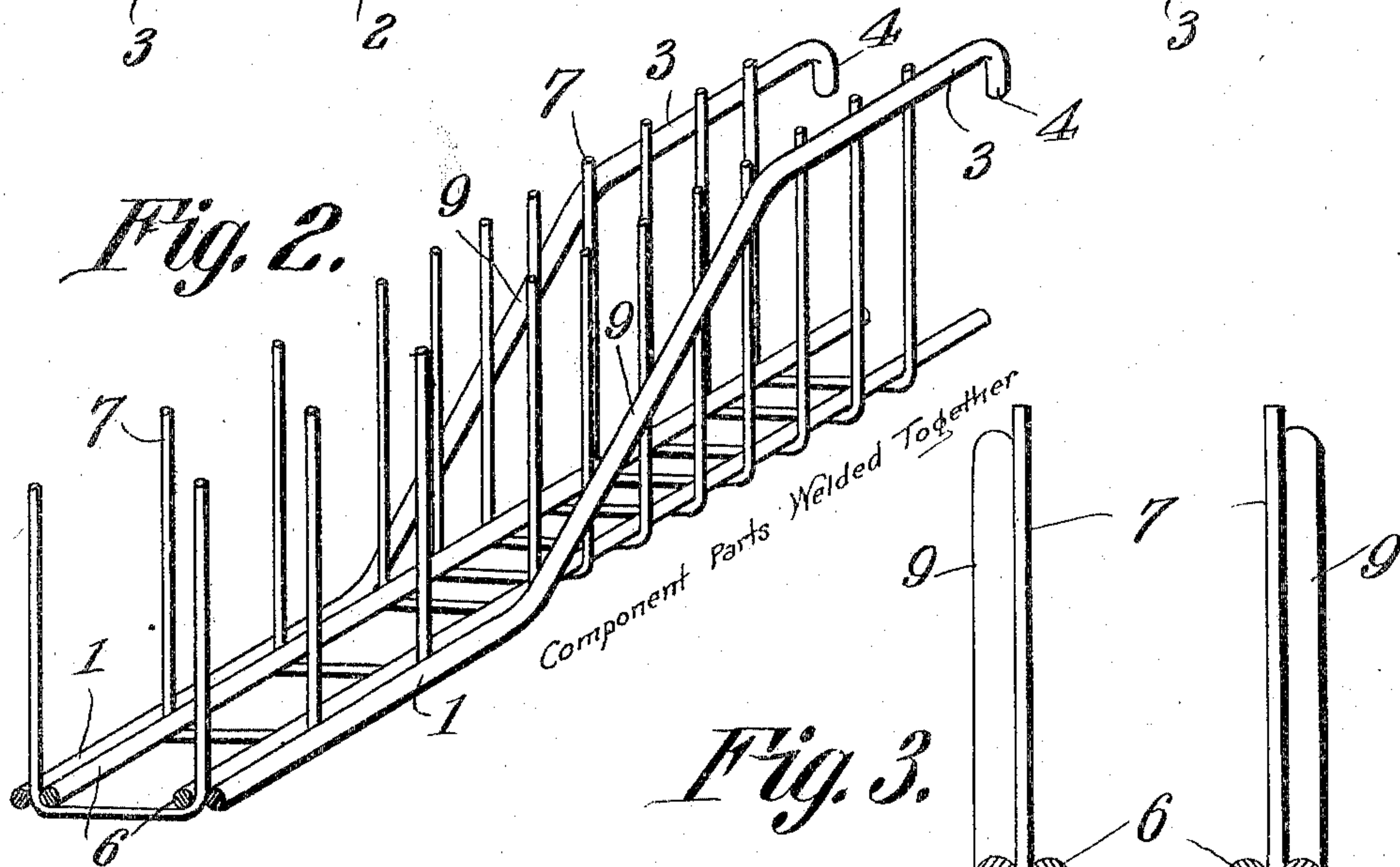
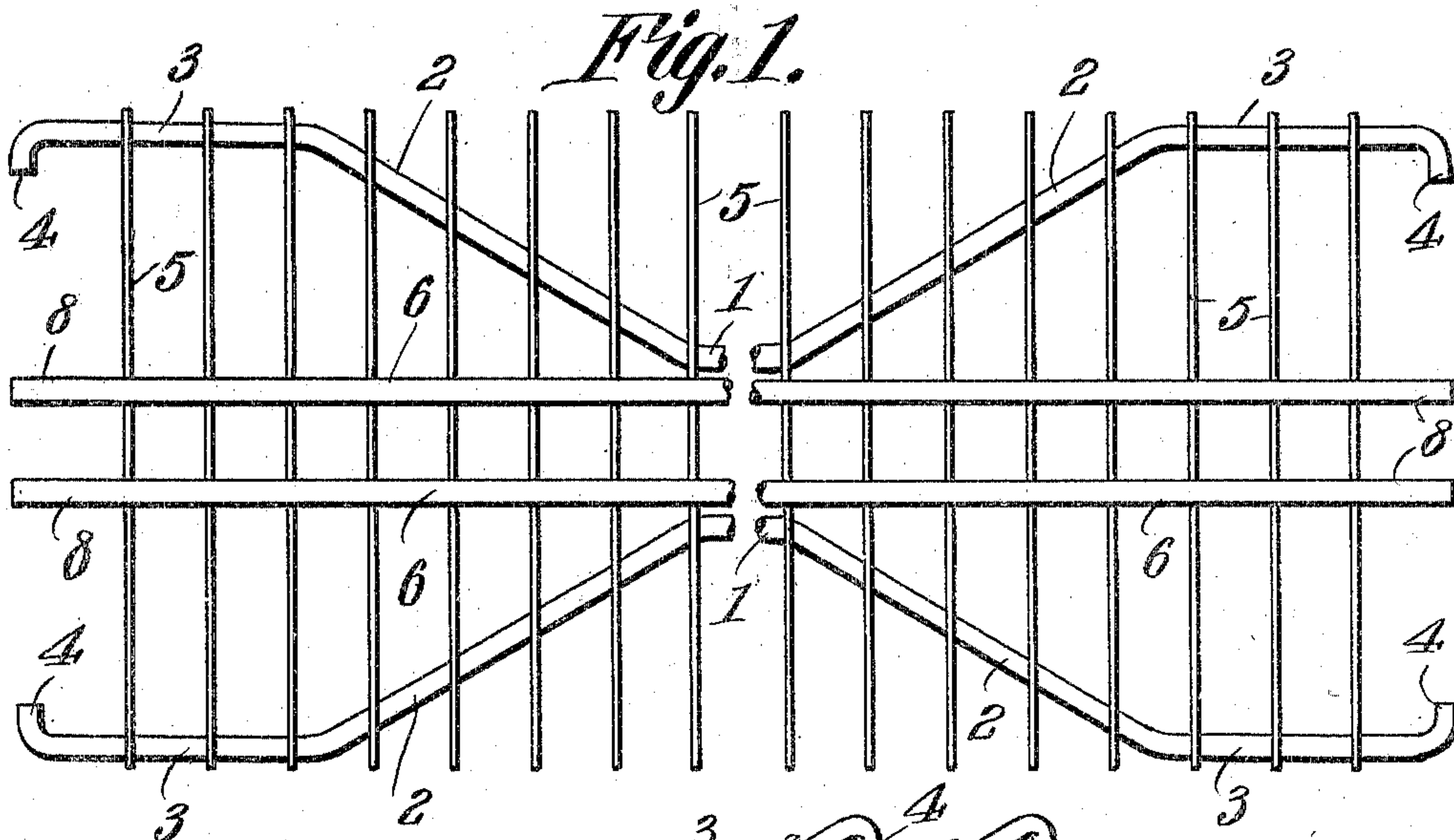


J. A. ETTLER.  
 REINFORCING ELEMENT FOR CONCRETE STRUCTURES.  
 APPLICATION FILED JAN. 24, 1910.

967,505.

Patented Aug. 16, 1910.



Component Parts Welded Together

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# UNITED STATES PATENT OFFICE.

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REINFORCING ELEMENT FOR CONCRETE STRUCTURES.

967,505.

Specification of Letters Patent.

Patented Aug. 16, 1910.

Application filed January 24, 1910. Serial No. 539,748.

*To all whom it may concern:*

Be it known that I, JOHN A. ETTLER, a citizen (intention declared) of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a new and useful Reinforcing Element for Concrete Structures, of which the following is a specification.

My invention relates to an improvement in the metallic frame work used for strengthening concrete girders, where a number of steel bars are laid parallel in the bottom or tensile side of the girder, some of these bars having their ends upturned, and all of the bars being transversely connected by ties of steel, commonly known as stirrups.

The objects of the invention are, to simplify the process of manufacture of reinforcing elements of the type above mentioned; to provide a reinforcing element which may be handled and transported with ease and with small danger of distortion; and to provide a reinforcing element which, by manual manipulation and without tools, may be given the required form upon the job, by unskilled labor.

With the above and other objects in view, the invention consists in the novel construction and arrangement of parts hereinafter described, delineated in the drawings, and specifically claimed, it being understood that changes, properly falling within the scope of what is claimed, may be made, without departing from the spirit of the invention.

Similar numerals of reference are employed to denote corresponding parts throughout the several figures of the drawings.

In the accompanying drawings,—Figure 1 illustrates my invention in top plan, the central portion of the device being broken away, for facility of illustration; Fig. 2 is a perspective of one end of the reinforcing element of my invention, showing the form that the same will assume after it has been bent into proper position, upon the job; Fig. 3 is a transverse section of the showing of Fig. 2; and Fig. 4 is a transverse section of the showing of Fig. 1.

In carrying out the invention the lower tension bars are bent, adjacent their ends, so that they will diverge, as denoted by the numeral 2. The ends of the lower tension bars are then brought into parallel relation as shown at 3, and terminally bend toward

each other to form the rectangularly disposed hooks 4. The lower tension bars are then laid flat upon a supporting surface, with their intermediate portions 1, and their portions 3, parallel to each other, respectively. Upon these lower tension bars, are superposed ties 5, the said ties being preferably disposed at right angles to the portions 1 and 3 of the bars 3, and secured to the bars, preferably by electric welding. A pair of straight bars 6, constituting the upper tension bars, are then superposed upon the ties 5, intermediate the portions 1 of the lower tension bars, and secured to the ties 5, by any suitable means, preferably, as hereinbefore pointed out, by electric welding.

The process hereinbefore described, is carried out in the work-shop, and when the device is constructed as shown in Fig. 1, the process of manufacture is complete. It should be noted therefore, that the device in its completed form, is a flat structure. By reason of this fact, a plurality of these reinforcing elements may be bundled together in flat form, or rolled up together, in which form they may be shipped, without danger of distorting the structure. It should be noted, moreover, that when the reinforcing elements are manufactured as shown in Fig. 1, and bundled together or rolled up for shipment, the freight rate upon them will be materially less than under other conditions. Owing to the flat formation of the reinforcing element, the component parts thereof may readily be united, preferably by electric welding, as hereinbefore point out. In fashioning this reinforcing element, there is no punching, shearing, or bolting of the parts, operations which always result in a weakening of the structure. Likewise, no special shapes are required in the manufacture of the device, the ordinary metal bars of commerce being employed throughout.

The reinforcing element, in the form shown in Fig. 1, is shipped to its destination. When the reinforcing element in its flat form, is upon the job, a laborer takes his stand at either end of the device, placing his feet upon the ends 8 of the straight upper tension bars 6, and seizing the portions 3 of the lower tension bars gives an upward pull. During this upward pull, the portions 2 of the lower tension bars, act as cranks or



levers, to facilitate the bending of the ties 5 into the upright, parallel positions shown in Fig. 2, the ties 5 of Fig. 1, becoming the U shaped stirrups 7 of Fig. 2, and the diverging crank portions 2 becoming the diagonally disposed tension elements 9.

By referring to Figs. 3 and 4 of the drawings, it will be seen that the upper tension bars 6 are so positioned between the lower tension bars, that when the device is bent into the form shown in Fig. 3, the portions 1 and 6 of the device will be disposed in a common plane. This construction is of importance, for the reason that, under the superposed load upon the girder, the tension members 1 and 6 will have the same moment, thus giving a maximum strength to the girder under the superposed load.

The portions of the device exercise double functions. Thus, the diverging portions 2 of the lower tension members constitute cranks or levers for the bending of the ties 5, and likewise constitute, when the device is disposed as shown in Fig. 2, diagonally disposed tension members, serving to receive certain stresses in the completed girder. During the bending operation, the rods 6 constitute fulcrums, over which the ties 5 are bent, and in the structure shown in Fig. 2, these bars 6 obviously become tension elements in the completed device. The ties 5 serve as guides, adapted to maintain the portions 1 and 6 of the device at fixed distances apart, and so positioned with respect to each other, that, when the device takes the form shown in Fig. 2, as soon as the ends of the ties 5 are brought into upstanding, parallel relation, the portions 1 and 6 will be disposed in a common plane, as hereinbefore pointed out. In the ultimate form of the structure, the ties 5 which, in the first instance, serve to connect the upper and lower tension members, become the U shaped stirrups 7.

It should be noted that in a single operation, and by unskilled labor, the reinforcing element may be given its ultimate form, all of the U shaped stirrups 7 being fashioned in a single operation. Every reinforcing element may be fashioned directly upon the work, under the eye of the inspector or master-workman, thus avoiding a minute inspection of every reinforcing element before it is embedded in the concrete, to ascertain whether or not the element has been properly bent at the factory, or to ascertain

whether the same has been strained, bent, or broken in shipment.

Having thus described the invention, what is claimed is:—

1. An article of manufacture constituting a reinforcing frame for concrete structures, consisting of a pair of bars diverging in a common plane adjacent their ends; straight, flexible ties superposed in a common plane upon the bars transversely of the bars and rigidly secured thereto; and a pair of straight bars superposed upon the ties and rigidly secured to all of the ties between the first named bars, the ties constituting the sole means for connecting the bars.

2. An article of manufacture constituting a reinforcing frame for concrete structures, consisting of a pair of bars diverging in a common plane adjacent their ends and terminated in straight, parallel portions; straight, flexible ties superposed in a common plane upon the bars transversely of the bars and rigidly secured thereto; and a pair of straight bars superposed upon the ties and rigidly secured to all of the ties between the first named bars, the ties constituting the sole means for holding the bars together.

3. An article of manufacture constituting a reinforcing frame for concrete structures, consisting of a pair of bars parallel in their intermediate portions and diverging adjacent their ends and terminated in parallel portions; straight, flexible ties superposed upon and rigidly secured to the bars transversely thereof; and a pair of straight bars superposed upon and rigidly secured to the ties between the first named bars, the terminal, parallel portions of the first named bars constituting levers for bending the ends of the ties into parallel relation, and the straight bars constituting fulcrums for said bending of the ties; the ties constituting guides so to position the straight bars between the members of the first named pair of bars, that the intermediate portions of the first named bars, and the straight bars, will occupy a common plane when the ties are thus bent.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN A. ETTLER.

Witnesses:

F. H. MASON,  
A. K. DAGGETT.