

No. 845,554.

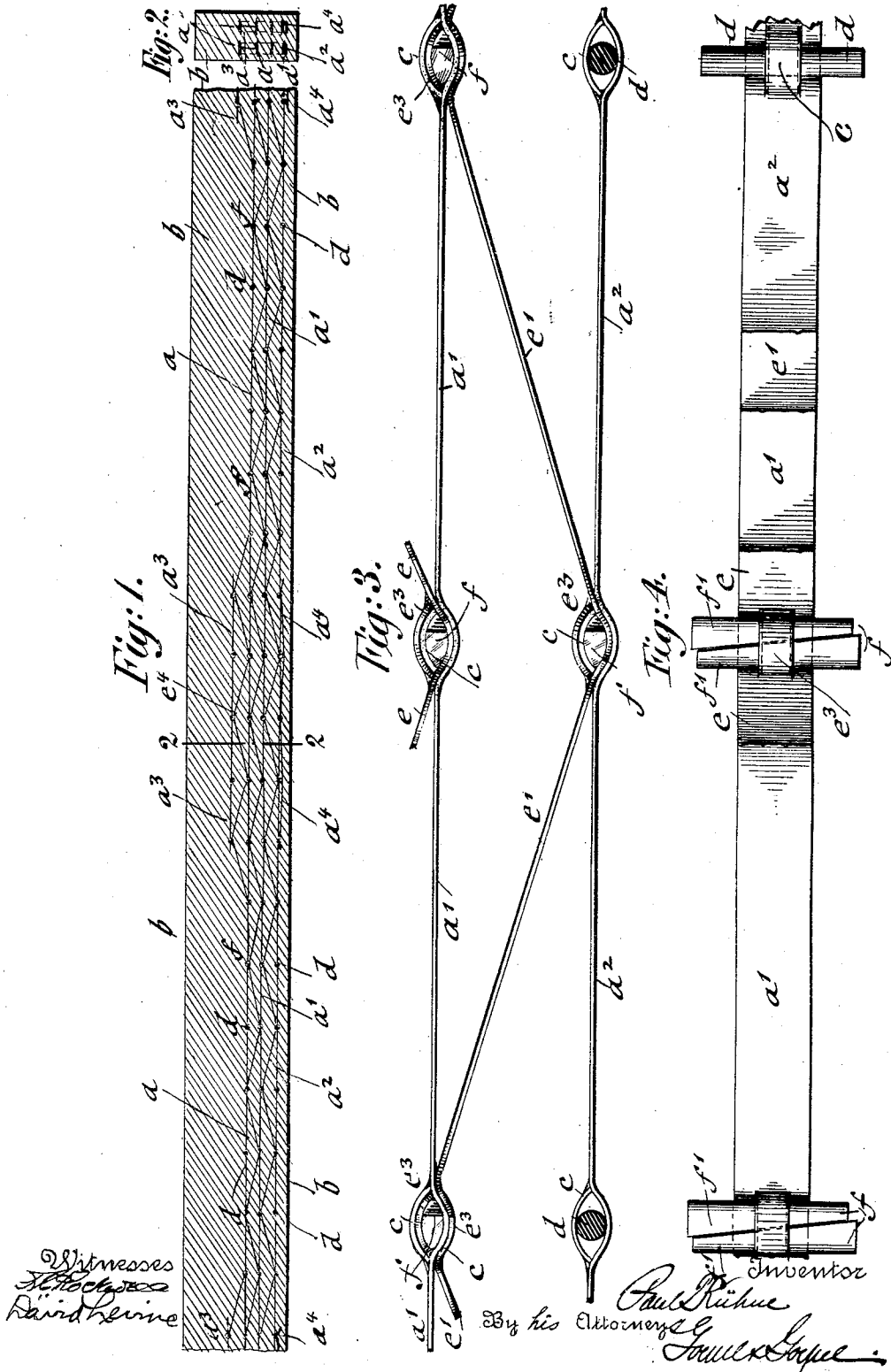
P. KÜHNE.

PATENTED FEB. 26, 1907.

CONCRETE STEEL CONSTRUCTION.

APPLICATION FILED OCT. 22, 1906.

2 SHEETS—SHEET 1.



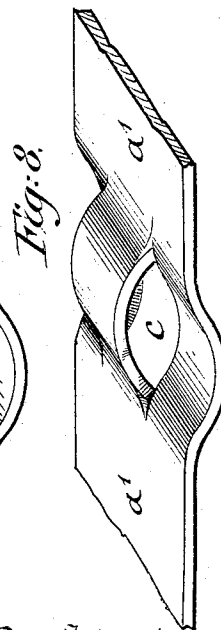
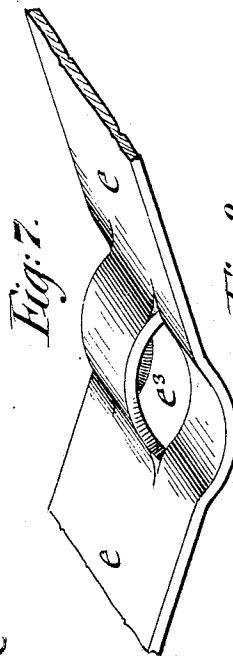
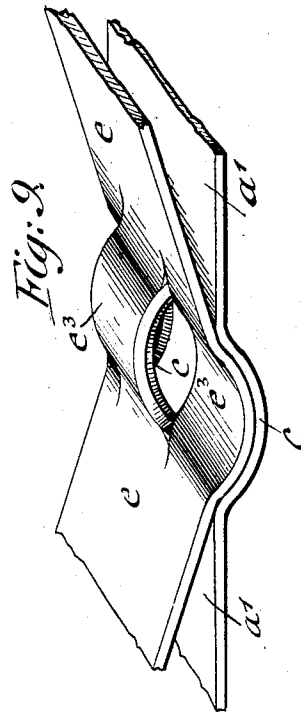
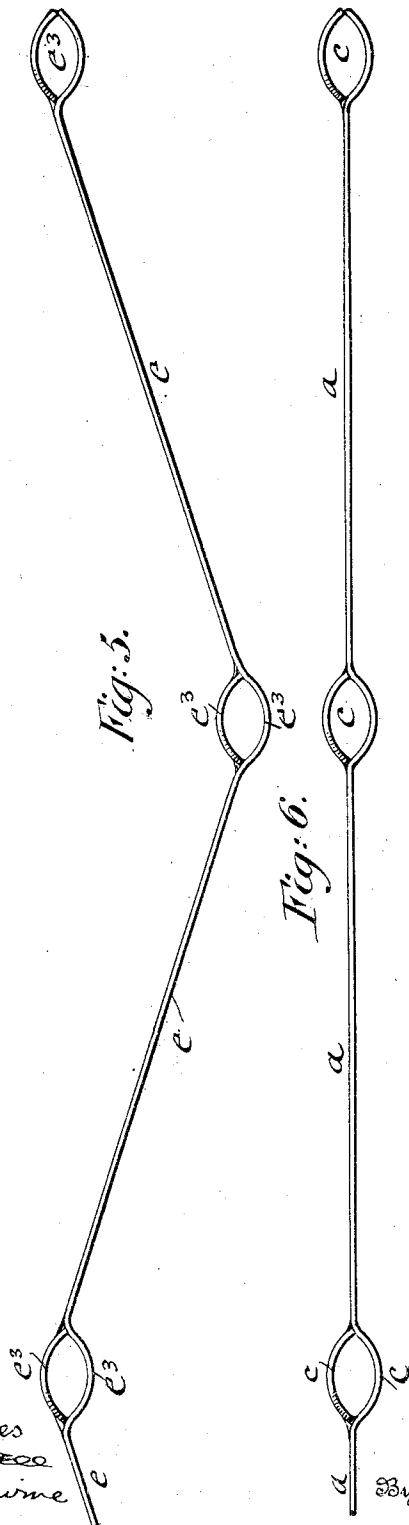
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

PAUL KÜHNE, OF NEW YORK, N. Y.

CONCRETE-STEEL CONSTRUCTION.

No 845,554.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed October 22, 1906. Serial No. 339,995.

To all whom it may concern:

Be it known that I, PAUL KÜHNE, a citizen of the United States, residing in New York, in the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Concrete-Steel Constructions, of which the following is a specification.

This invention relates to certain improvements in the concrete-steel construction for which Letters Patent were granted to me heretofore, No. 773,327, dated October 25, 1904, the object of the improvements being not only to increase the strength and resistance of said structure to tensile and shearing strains throughout the length of the concrete flooring, beam, or other structure, but mainly at the center and ends of the structure, and obtain thereby not only the more perfect interlocking and reinforcing of the concrete with the tension-bars, but also greater strength, rigidity, and continuity of the same; and for this purpose the invention consists of a concrete-steel construction which comprises a concrete body, a series of longitudinal tension-bars arranged vertically one below the other in said concrete body, a second series of tension-bars arranged on the same plane with the first series of parallel tension-bars and provided with obtusely-bent portions, both sets of tension-bars having bent-up loop portions, and keys for connecting the over and under lapping portions of the two sets of tension-bars.

The invention consists, further, in combination with the two sets of tension-bars—the main tension-bars and the obtusely-angled bars—and their key connections, of shorter auxiliary reinforcing tension-bars arranged at the center of the structure, said auxiliary tension-bars being connected with the main tension-bars and obtusely-angled tension-bars, respectively, by transverse keys extending through the loop portions of said tension-bars intermediately between the key connections with the obtusely-angled tension-bars, said main tension-bars being provided with transverse keys in their loop portions intermediately between the key connections with the obtusely-angled tension-bars.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of my improved concrete-steel construction, showing the arrangement of a set of main tension-bars, a set of obtusely-angled tension-bars connected therewith, and the aux-

iliary tension-bars. Fig. 2 is a vertical transverse section on line 2 2, Fig. 1. Fig. 3 is a detail side view showing the connections between the main tension-bars and the obtusely-angled tension-bars, drawn on a larger scale and partly in section. Fig. 4 is a plan view of Fig. 3. Figs. 5 and 6 are detail side views, respectively, of an obtusely-angled tension-bar and a main tension-bar. Figs. 7 and 8 are perspective views showing the loop connection of the obtusely-angled tension-bars with the main tension-bars; and Fig. 9 is a perspective view of the loop connection between the obtusely-angled and main tension-bars, showing the loops over and under lapping each other and ready for the driving of the locking-key.

Similar letters of reference indicate corresponding parts in the several figures of the drawings.

Referring to the drawings, a a' a'' represent a set of main tension-bars, a plurality of which is arranged vertically below each other in the concrete filling b , which is formed between the I-beams of a building or in floor, beam, or other concrete-steel construction. The main tension-bars are preferably made of flat steel strips, which are provided at uniform distances from each other with loop portions c , that are bent up from the body of the strips by cutting two parallel incisions in the same. Any required number of sets of these tension-bars may be arranged parallel to each other in the floor, beam, or other structure. In the loops of the tension-bars are placed transverse bars or keys d of round or other cross-section, which extend beyond the sides of the tension-bars a a' a'' . The keys d are firmly held in the loops by the tension of the same on the keys. The concrete filling enters the loops and the spaces between the same and surrounds the keys, producing thereby the direct anchoring and reliable engagement of the tension-bars and keys with the concrete. In the same vertical plane with the tension-bars a a' a'' is arranged a set of obtusely-angled tension-bars e e' , which are provided at the apexes of their angles with loops e'' in the same manner as the main tension-bars, but with this difference, that the upper portions of the bent-up loops of the loops of the main tension-bars, so that the narrower loops can pass between the spaces in the lower portions of the loops and underlap the upper portions of the loops, after

which interlocking keys f , which are composed of two beveled sections f' , are driven in opposite direction through the over and under lapping portions of the loops, so as to firmly lock the main tension-bars a a' a'' to the obtusely-angled tension-bars e e' . For the purpose of producing the accurate and quick connection of these two systems of main and obtusely-angled tension-bars it is necessary that the distances between the loops at the ends of each obtusely-angled portion of the tension-bars e e' is equal to the distance between the loops of the main tension-bars a a' a'' , so that the keys d and f can be quickly inserted and driven into the loops and hold the two sets of tension-bars together. The apexes of the obtuse-angled bars are connected alternately with an upper and lower main tension-bars, so that a truss-like arrangement of the tension-bars in the concrete filling is obtained, by which, in connection with the transverse locking-keys f , projecting at both sides of each set of trussed tension-bars, a firm support for the concrete filling forming the floor, beam, or other structure is obtained. The intermediate loops of the upper and lowermost tension-bars are provided intermediately between the key connections between the main and obtusely-angled tension-bars with single keys d , which are inserted in the loops of the main tension-bars, as shown in Figs. 1 and 3.

At the center of the concrete filling or structure are arranged short auxiliary reinforcing tension-bars a^3 and a^4 , of which the upper one is connected by an intermediate shorter obtuse-angled bar e^4 with the uppermost tension-bar a , while the lower shorter reinforcing auxiliary tension-bar a^4 is keyed to the loops of the lowermost main tension-bar and next-adjacent obtusely-angled tension-bar, said shorter tension-bars a^3 a^4 and obtusely-angled tension-bar e^4 serving to strengthen the trussed system of main and obtusely-angled tension-bars at the center of the structure—for instance, of a concrete floor-filling—where the greatest tension is exerted on the concrete body, and add thereby to any extent as determined by calculation to the strength of the sets of connected main and obtusely-angled tension-bars employed in the special construction. In a similar manner the ends of the trussed sets of tension-bars may be reinforced by shorter auxiliary tension and obtuse-angle bars, so as to resist the shearing strains adjacent to the supporting-beams, or the shorter auxiliary reinforcing-bars may be arranged at any point in the concrete-steel construction where shearing or other stresses are exerted on the same.

When a number of sets of tension-bars are locked and trussed together in the manner described and firmly embedded by their transverse keys in the body of concrete forming the floor, beam, or other structure, in-

creased strength and resistance against tensile and shearing strains are imparted to the structure, which resistance is further increased by the shorter auxiliary tension-bars at the points where the greatest stress is exerted on the structure.

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

1. A concrete-steel construction consisting of a set of superimposed main tension-bars provided with loops, a set of obtusely-angled tension-bars placed in the vertical plane of the main tension-bars and provided with loops vertically in line with the loops of the main tension-bars, transverse keys passing through the loops of the main and obtusely-angled tension-bars and securing said bars together, and a concrete body surrounding the trussed tension-bars.

2. In a concrete-steel construction, the combination of two sets of tension-bars—a main set provided with loop portions equidistantly from each other and a set of obtusely-angled tension-bars arranged in the same vertical plane as the main tension-bars and also provided with loops vertically below the loops of the main tension-bars, keys passing through the loops of the main and obtusely-angled tension-bars for locking them together, keys passing through the intermediate loops of the upper and lower main tension-bars, and a concrete body inclosing the connected sets of main and obtusely-angled tension-bars.

3. In a concrete-steel construction, the combination, with a set of main tension-bars provided with loops equidistantly from each other, of a set of obtusely-angled tension-bars also provided with loops underlapping the loop portions of the main tension-bars, locking-keys passing through the loops of the main and obtusely-angled tension-bars, shorter auxiliary reinforcing tension-bars and obtusely-angled bars, keys connecting said auxiliary bars with each other and with the uppermost and lowermost tension-bars, and a body of concrete surrounding said interlocked and trussed sets of main and obtuse-angled tension-bars.

4. In a concrete-steel construction, the combination of superimposed main tension-bars having loops bent up vertically therefrom, a tension-bar arranged in the plane of said main tension-bars and which is also provided with vertically-bent-up loops to cooperate with the loops of said main tension-bars, and wedge-keys passing transversely through the loops of said bars and detachably uniting them into one structure.

5. In a concrete-steel construction, the combination, with a system of straight main tension-bars arranged in a vertical plane one below the other and provided with loop portions formed by parallel incisions at points

equidistantly from each other, a set of obtusely-angled tension-bars located in the same plane with the main tension-bars and also provided with loop portions vertically in line with the loops of the main-tension-bar loops, the loop portions of the obtusely-angled tension-bars being made of slightly less width than the adjacent over or under lapping loop portions of the main tension-bars so as to permit respectively the over and under lapping of the same with the over or under lapping loop portions of said main

tension-bars, and beveled keys driven through the over and under lapping loop portions of both sets of tension-bars for locking the same together to form a trussed support for the concrete body or filling.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

PAUL KÜHNE.

Witnesses:

PAUL GOEPEL,
HENRY J. SUHRBIER.