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C. F. VARNEY.

REINFORCED BAR FOR CONCRETE.

APPLICATION FILED JULY 26, 1907.

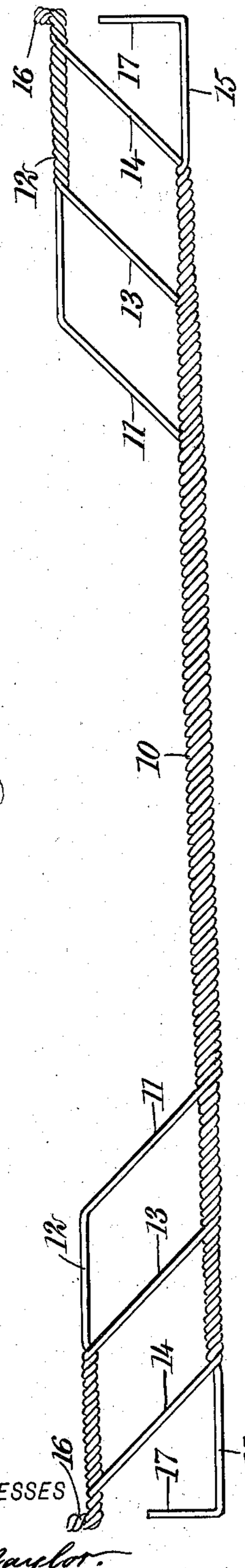

Fig. 1.

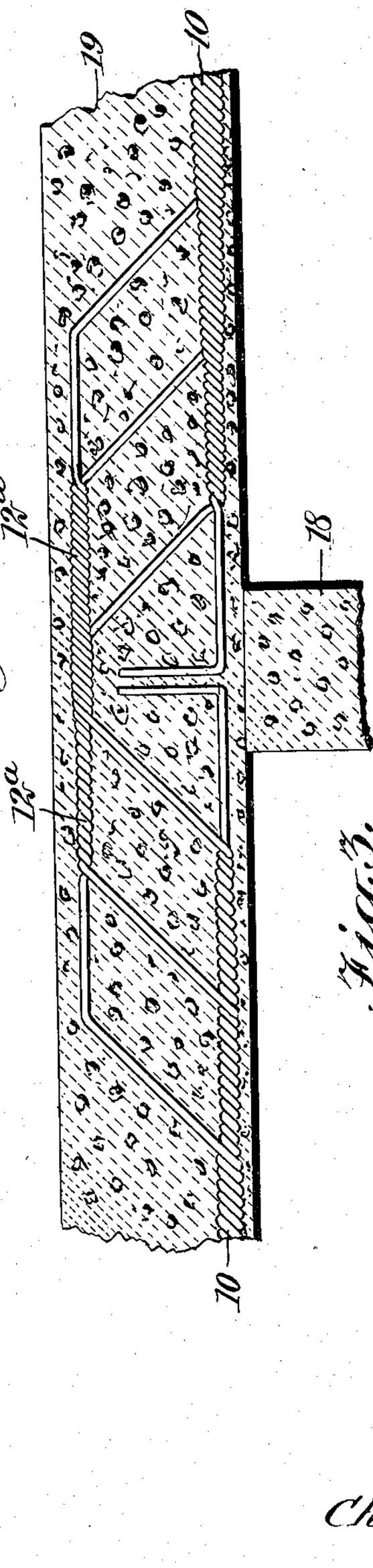

Fig. 2.

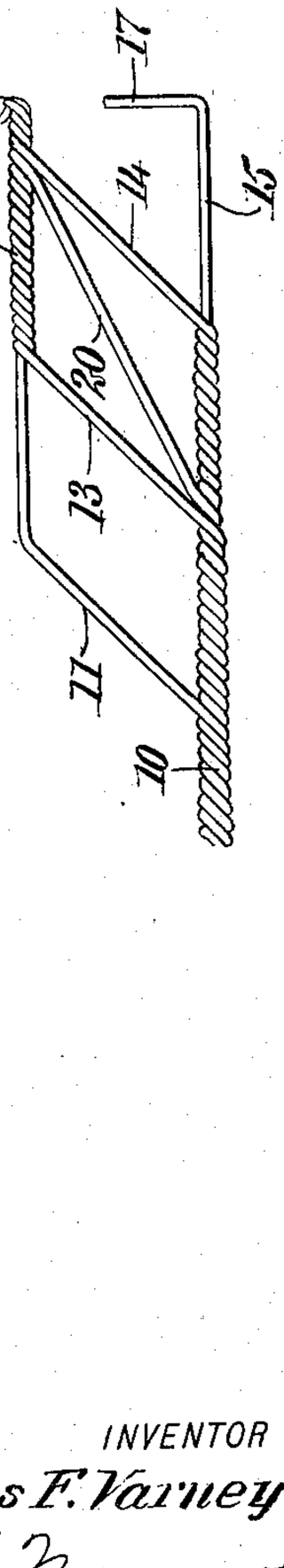

Fig. 3.

WITNESSES

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REINFORCED BAR FOR CONCRETE.

No. 881,834. Specification of Letters Patent. Patented March 10, 1908.

Application filed July 26, 1907. Serial No. 385,600.

To all whom it may concern:

Be it known that I, CHARLES F. VARNEY, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Reinforced Bar for Concrete, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in bars, rods, or trusses designed for use in the construction of concrete beams, girders, walls, floors, columns, and the like, and the object of the invention is to provide a construction in which there are two or more tension members arranged parallel or at any desired angle to each other and connected by shear members, adjacent ends of a plurality of the latter being intertwined to hold them together and form the first-mentioned tension members. The intertwining may be secured by twisting, braiding, or in any other suitable manner to insure the retention of the strands in engagement with each other, and without the aid of separate tie pieces. In the preferred construction, the main tension bar, which extends along a concrete beam or girder adjacent the lower surface thereof, is made up of a plurality of strands of any desired form in cross section. As the main tension bar approaches the end of the girder or a support therefor, separate strands or groups of strands leave the tension member at intervals along the length and extend at an angle thereto to form shear members. The strands forming the separate shear members are then brought together and intertwined to form a second tension member extending parallel to the main tension member, or at any desired angle thereto. By means of this construction, the separate tension members are securely and firmly anchored in the concrete by the irregularity in contour formed by the intertwining, and the ends of the shear bars are firmly held in place, inasmuch as they are integral with the strands forming the tension members. The minimum amount of metal is employed and this metal is distributed at the points where needed and in proportion to the need. The main tension bar is of greatest cross sectional area at its center and decreases toward the ends, while the second and small tension members are of greatest cross sectional area at the ends of the beam and decrease toward the center. The vertical cross section through the reinforcement is uniform throughout the length of the bar, as the same number of strands are present throughout the entire length.

The invention consists in certain features of construction and combinations of parts, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which

Figure 1 is a side elevation of one form of reinforcing bar involving my invention; Fig. 2 is a side elevation of a slightly modified form, showing the distribution of the parts within a concrete beam or girder; and Fig. 3 is a side elevation of one end of a bar showing a further modification.

In the specific form illustrated in Fig. 1, I provide a main lower tension bar 10 made up of a plurality of strands intertwined to retain them in engagement with each other. The specific form of intertwining illustrated involves the simple twisting of the strands about each other. At points upon opposite sides of the center of the bar and at equal distances therefrom, one of the strands 11 is separated from the main body of the bar and extends at an angle thereto to form a shear bar. At a short distance from the body of the bar 10, depending upon the height of the beam, girder, floor, or other structure in connection with which the bar is being employed, this strand is again bent to form a second tension bar 12, substantially parallel to the main tension bar, or if desired, at any suitable angle thereto. Intermediate the point at which the strand 11 leaves the main bar and the end of the bar, a second strand 13 is bent to form a second shear bar extending toward the tension bar and parallel with the first-mentioned shear bar, or at any desired angle thereto. At the point at which this shear bar intersects the single stranded portion of the tension member 12, it is bent to lie parallel to said single strand, and the two are interwined to form a second section of the upper or auxiliary tension bar. Any number or all of the strands of the tension bar 10 may be separated off at intervals, and bent upward to the upper strand and there intertwined with the others to increase the size of said upper tension bar.

In the specific form illustrated in Fig. 1, the main tension bar at its center is made up of four strands, and three of these branch off to form the shear bars 11, 13 and 14, the fourth strand 15 remaining to form the terminal portion of the main tension bar. The intertwined ends 16 of the strands at the terminal of the upper tension bar may be bent at any desired angle to the main general direction of the tension bar to form a more secure anchorage. All of the strands are preferably of substantially the same length, and with the shear bars lying parallel and the tension bars lying parallel, all of the upper strands will terminate at the same point. The terminal portion 17 of the single lower strand 15 may be bent at an angle to form an anchorage, or may be secured to the adjacent end of a second reinforcing bar, or may be employed for securing the end of the reinforcing bar in place in any suitable manner.

If it is desired to make a continuous beam or girder having a support intermediate its ends, the upper tension bar 12^a, at one side of a support, partition, or wall 18, may be formed integral with the adjacent upper tension bar 12^a upon the opposite side of the support, partition, or wall, as illustrated in Fig. 2. In this construction, it will be noted that the formation is the same, save that the strands of one upper tension bar instead of being bent at an angle to form an anchorage, as shown in Fig. 1, are extended across and constitute the strands of the other upper tension bar. The distribution of the concrete 19 in Fig. 2, is substantially the same as would be employed in connection with the bars shown in Fig. 1, namely, the lower or main tension bar is located adjacent the lower surface of the concrete and the upper or auxiliary tension bar is located adjacent the upper surface of the concrete.

It is evident that neither the upper and lower tension bars, nor the separate shear bars, need necessarily lie parallel. In Fig. 3 I have illustrated one end of a bar similar to that illustrated in Fig. 1, but in which there is an extra shear bar 20 leaving the lower tension bar at the same point as the shear bar 14, but instead of extending parallel to this shear bar, it extends at a more acute angle and unites with the upper tension bar at a point closely adjacent the upper end of the shear bar 14.

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

1. A metallic reinforcement for concrete structures, composed solely of a plurality of strands twisted together for a distance intermediate their ends to form a main lower tension bar, said strands having portions bent laterally to form a plurality of substantially parallel inclined shear members spaced apart adjacent each end of said main tension bar, and the terminal portions of said strands being reunited and twisted together to form two upper tension bars substantially parallel to said lower tension bar adjacent each end thereof, and integral with and in the same vertical plane as said shear members and said lower tension bar.

2. A metallic reinforcement for concrete structures, including two substantially parallel tension bars lying in the same vertical plane and each formed of a plurality of strands twisted together, the strands of each bar increasing in number along the length thereof in opposite directions, and the strands of one bar being integral with the strands of the other bar and connecting the two together at a plurality of points to form diagonal shear members, all lying in the vertical plane of said bars.

3. A metallic reinforcement for concrete beams, girders and the like, comprising a tension bar formed of a plurality of strands twisted together and of decreasing number from the central portion thereof toward the ends, said bar adapted to extend over a supporting point, adjacent the upper surface of the concrete, and two tension bars below the ends of the said first-mentioned bar and in the same vertical plane therewith, each of said last-mentioned bars being formed of a plurality of strands twisted together, the strands of the first-mentioned bar being integral with the strands of each of the other bars and having diagonally-disposed connecting portions spaced apart to form shear members in said vertical plane and at opposite sides of said supporting point.

4. A metallic reinforcement for concrete structures, comprising two substantially parallel tension bars lying in the same vertical plane, each bar being formed of a plurality of strands twisted together and the number of strands of each bar varying along the length thereof, the strands of one bar being integral with the strands of the other bar and constituting the sole connecting means between the two and forming a plurality of inclined shear members in the same vertical pane with said bars, the number of strands cut by a vertical plane through said metallic reinforcement being uniform throughout the length thereof.

5. A metallic reinforcement for concrete beams, girders and the like, comprising two substantially parallel tension bars lying in the same vertical plane, each bar being formed of a plurality of strands twisted together and the number of strands of each bar varying along the length thereof, the strands of each bar being integral with the strands of the other bar and constituting the sole connecting means between the two and forming a plurality of inclined shear members in the same vertical plane with said bars, cer-

tain of said adjacent strands lying at divergent angles to brace one bar rigid with the other.

6. A metallic reinforcement for concrete structures, composed of a plurality of shear members, all lying in substantially the same vertical plane, and a lower tension bar rigid with each of said shear members, the upper ends of each of said shear members being twisted together to anchor the same and to form a second tension bar also anchored against longitudinal movement.

7. A reinforcing means for cementitious bodies, composed of a lower tension bar formed of a plurality of strands twisted together, the ends of said strands being extended to form shear members, all lying in substantially the same vertical plane, and an upper tension bar composed of the upper ends of each of said shear members secured together by twisting.

8. A reinforcing structure for concrete, comprising a bar formed of a plurality of rods or strands twisted together, certain of said rods or strands having portions extending laterally at one side of the bar to form a series of spaced shear members, and the terminal portions of said rods or strands being reunited and twisted together to form a second bar substantially parallel to the first-mentioned bar.

9. A reinforcing structure for concrete, comprising two substantially parallel bars, each formed of a plurality of rods or strands twisted together, certain of the strands of one bar being integral with the strands of the other bar and connecting the two bars to form a plurality of spaced shear members.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. VARNEY.

Witnesses:
CLAIR W. FAIRBANK,
JOHN P. DAVIS.