S. BURROWES.

REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED MAY 9, 1908.

953,368.

Patented Mar. 29, 1910.

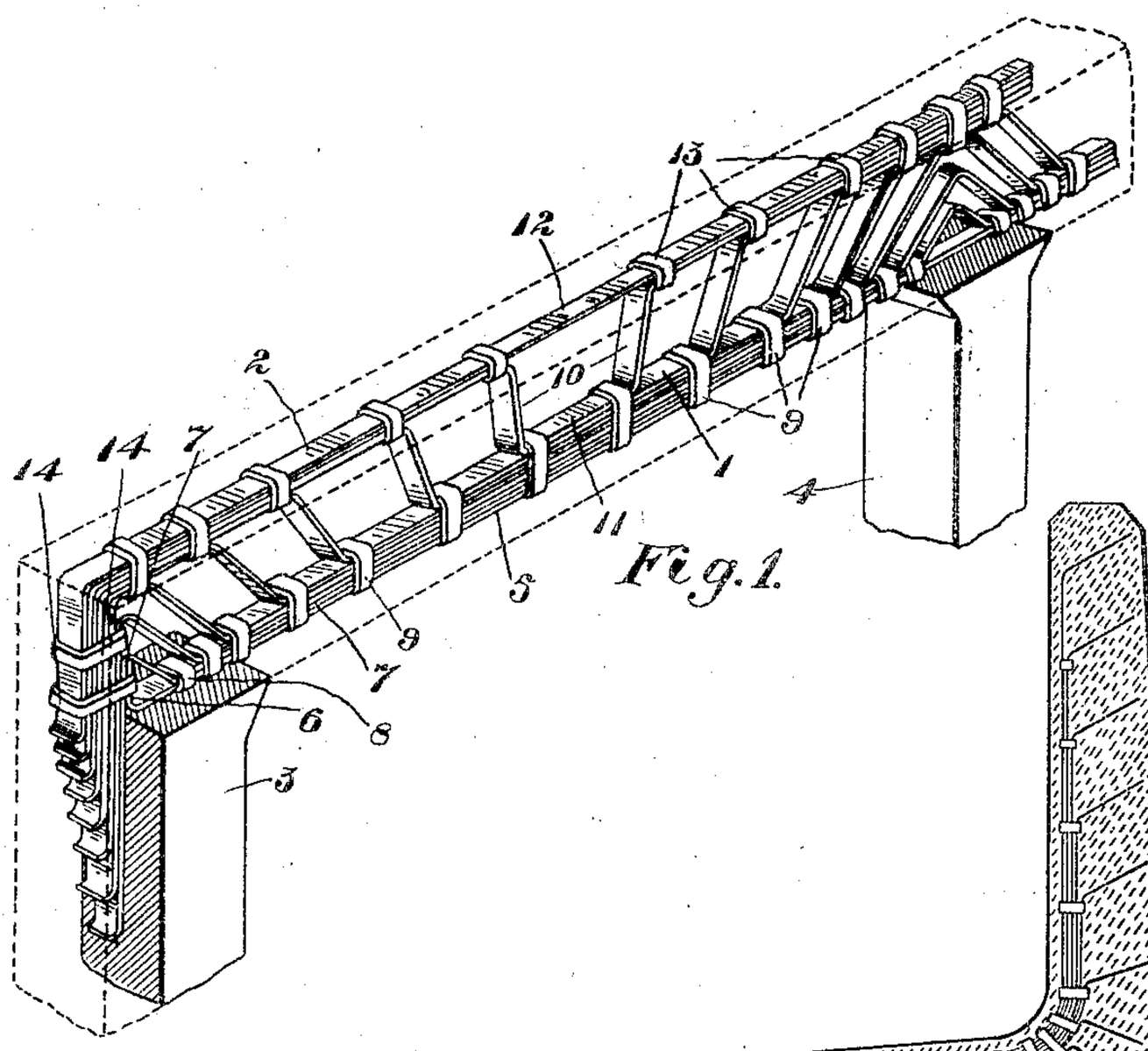

Fig. 1.

Fig. 3.

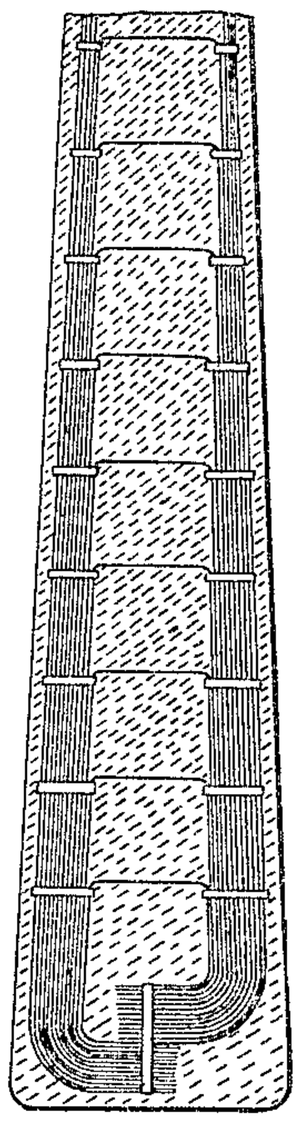

Fig. 4.

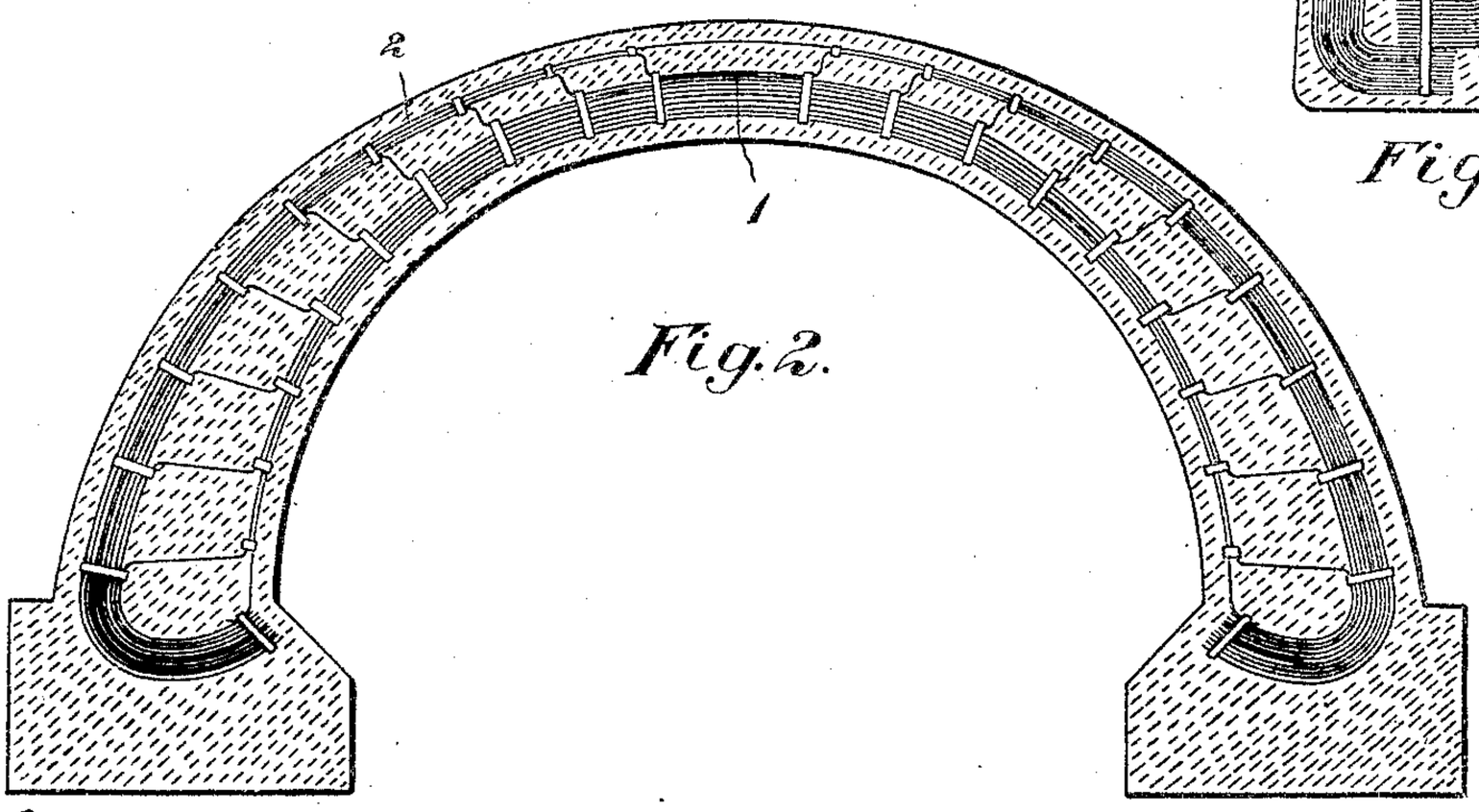

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

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REINFORCED CONCRETE CONSTRUCTION.

953,368. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed May 9, 1908. Serial No. 431,899.

To all whom it may concern:

Be it known that I, SIDNEY BURROWES, a subject of the King of Great Britain, resident of Niagara Falls Centre, in the county of Welland, in the Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Reinforced Concrete Construction, of which the following is a specification.

The invention relates to improvements in concrete reinforcements as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel arrangement of a plurality of flat bars or strips of metal, whereby the sectional area of metal is distributed in proportion to the strains to which the reinforced member may be subjected, and whereby the shear members form a continuous part with the tension members, and are arranged at varying angles according to the nature of the member.

The objects of the invention are to devise a reinforcement for concrete structures, which may be disposed economically in various forms of structures with scientific accuracy, to add the greatest sustaining strength to the structure, to eliminate the necessity of special machinery in the formation of the reinforcing members, to eliminate all joints in the said members, and to provide a reinforcement of cheap construction not readily injured in transportation.

In the drawings Figure 1 is a perspective view of my reinforcement adapted to a plain form of beam. Fig. 2 is a sectional view showing the arrangements of the reinforcing members for an arch. Fig. 3 is a sectional view showing the adaptation of my form of reinforcement to an abutment wall. Fig. 4 is a sectional view showing the arrangement of reinforcing members for a vertical pole.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 and 2 are the lower and upper chords respectively of a plain straight beam extending between and over the uprights 3 and 4.

5 is the bottom strip of the lower chord 1 having one end turned upwardly at 6.

7 is the second strip of the lower chord 1, extending therealong and resting on the top thereof for the major portion of its length and secured to said lower strip near the ends thereof by the bands 8 snugly surrounding both strips. The strip 7 is bent upwardly beyond the bands 8 and at the end is doubled over the upturned end 6 of the strip 5. Each succeeding strip of the lower chord is bent upwardly at shorter distances from the center of the beam and bound to the other strips by the bands 9 and the upwardly bent portions forming the shear members and are arranged at suitable angles to pass through the planes of shearing tendency at each portion of the beam, that is to say, the upwardly extending portions 10 of the center strip 11 are almost perpendicular and the succeeding portions are bent to gradually approach the horizontal as they approach the points of support so that the said angular portions are disposed to utilize the full benefit of their tensile strength in supporting the beam and substantially at right angles to the lines of shearing strains. The succeeding strips, from the ends of the beam inwardly are bent parallel to the bottom strip 1 and at the end of the beam bent downwardly and all of said strips are bound together and to the top upper chord strip 12 by the bands 13. It will thus be seen that a beam reinforcement is formed with the lower chord member having the greatest cross sectional area in the center of the beam where the greatest tensile strength is required and that the area of the said chord decreases toward the points of support, while the upper chord member has the least cross sectional area at the center where there is practically no tension, and the greatest sectional area over the points of support. Thus the minimum amount of metal is used to give the maximum amount of support. The angularly arranged shear members form a continuous part with the longitudinal tension members and are therefore held from drawing through the concrete, and their angular arrangement and disposition may be varied according to the requirements of each particular beam or structure and all strains but those of compression, taken by the reinforcement.

In the form of beam shown in Fig. 1 the reinforcement is shown extending over the support 4 and it will be readily seen that the remaining portion of the said reinforcement will be constructed precisely the same as the span shown, the strips of metal extending from one end of the beam to the

other without a break. Any length of beam may therefore be constructed without a joint of any kind in the reinforcing strips, the length only being limited by the length of material obtainable. The strips may be joined however, if desired but it is preferable that they be all of one piece. The down-turned ends of the strips are all rigidly secured together by suitable bands 14 and the said ends may extend downward any desired length in the upright supports to form a secure anchor. Almost any form of reinforcement desired may be formed in a similar manner to that described and on account of the flexibility of the thin strips of metal they may be bent to any desired shape.

The arch construction shown in Fig. 2 is made up almost identically the same as for a straight beam, being curved to the arch as shown, and the shear members arranged to divide the structure into a number of divisions equivalent to the ordinary keystone and beveled stone formation of arch.

In the form of reinforcement shown in Fig. 4 the strips of metal are formed in doubled lengths of increasing length, said double lengths being secured together by bands as shown and all the ends secured together at the bottom.

Reinforcements constructed in the manner described, that is to say, with laminated members formed of continuous strips of metal, may be easily made up where the structure is being erected and no stamping, shearing, punching or forging is required and consequently all special machinery and tools are entirely dispensed with. The metal strips used are ordinary strips of commercial steel and may of course, be transported with ease and without special care and moreover the same size of stock may be used for all forms or sizes of members and therefore mistakes cannot occur through misunderstanding of sizes of material to be used.

The forms, shapes and sizes of reinforcements which may be devised are innumerable and it must be understood that the scope of the invention is not limited to the constructions shown, as the essential feature is in forming the reinforcement of laminations of metal strips and arranging such strips to make the sectional area of the reinforce proportional to the tensional and shearing strains in the structure.

What I claim as my invention is:—

A concrete reinforcement, comprising, a plurality of thin flat strips of metal secured together by flat metal bands and bent outwardly in succession from said bands and forming a reinforcing member of gradually decreasing sectional area, said outwardly bent portions being again united and bound at their points of juncture by flat bands encircling the flat strips and forming a secondary reinforcing member of gradually increasing sectional area, said secondary reinforcing member being bent at its terminal end and connected to the first mentioned member.

Signed at the city of Niagara Falls, in the county of Welland, in the Province of Ontario, Dominion of Canada, this 16th day of April, 1908.

SIDNEY BURROWES.

Witnesses:

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