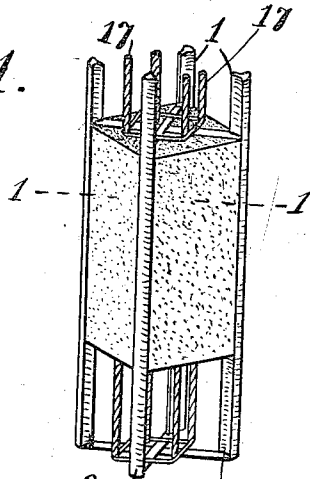
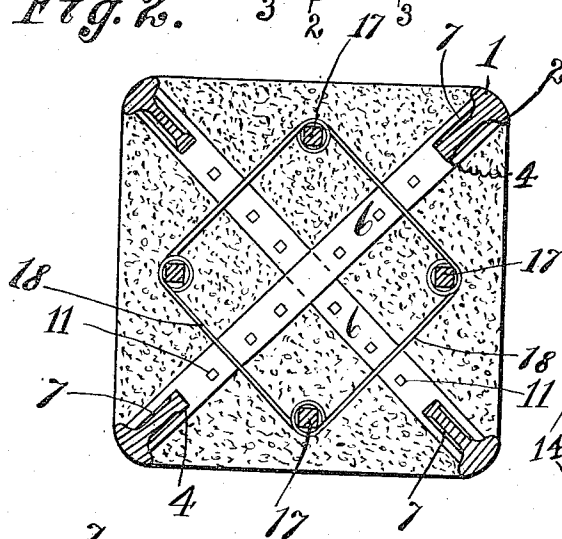


966,274.

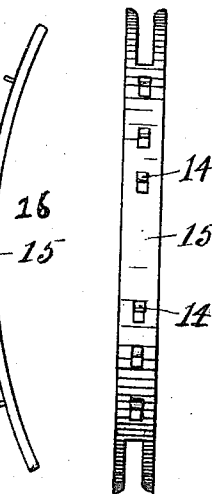
*Fig. 1.*



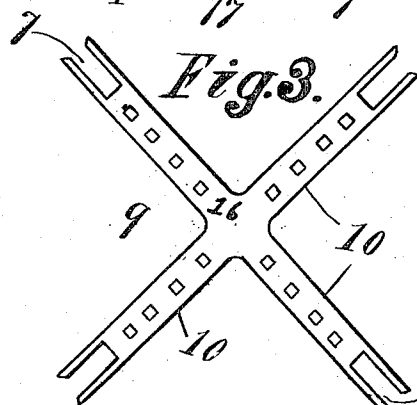
*Fig. 2.*



*Fig.4.*



*Fig. 3.*



*Fig. 5.*

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# UNITED STATES PATENT OFFICE.

HENRY H. WAINWRIGHT, OF PHILADELPHIA, AND HOWARD A. MINER, OF NORRIS-TOWN, PENNSYLVANIA.

## REINFORCED COLUMN OF CONCRETE.

966,274.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed September 15, 1909. Serial No. 517,829.

*To all whom it may concern:*

Be it known that we, HENRY H. WAINWRIGHT and HOWARD A. MINER, both being citizens of the United States, and said  
5 HENRY H. WAINWRIGHT residing in the city and county of Philadelphia, State of Pennsylvania, and HOWARD A. MINER residing at Norristown, county of Montgomery, State of Pennsylvania, have invented new and  
10 useful Improvements in Reinforced Columns of Concrete, of which the following is a specification.

This invention relates to improvements in reinforced columns of concrete and similar  
15 materials.

The invention relates as well to providing means for protecting the corners or other portions of the exposed surface of the column, as to providing means for increasing  
20 the strength of the column, and the invention particularly relates to the combination with the material of which the mass of the column is composed of metal protectors so formed and arranged that they are solidly  
25 interlocked or connected with the mass of the column.

The invention also relates to the combination with said metal protectors of transverse metal members hereinafter termed  
30 "spreaders" which both serve to accurately position the said protectors while the column is in process of construction, and greatly add to the strength of the column; to the longitudinal metal reinforcements  
35 embedded in the mass of the column; to the means for holding said reinforcements in position; and to the several combinations of the said parts and elements, as will be further set forth in the description and claims  
40 hereinafter contained.

As heretofore constructed, columns of concrete and like materials have been constructed without metal protectors for the corners or other parts of the outer exposed  
45 surface of the column; and, particularly when the column is of square or other angular section, the corners have therefore been liable to injury by accidental blows.

It is, therefore, the first object of our invention to provide longitudinal metal  
50 protectors for the corners or other exposed parts of the column to prevent such injuries, which protectors consist of corner bars of steel or

other suitable metal provided with heads positioned at the exposed parts of the columns, such as the corners, to receive the blows and protect the column from injury, and also provided with means for locking the corner bars as firmly as possible with the mass of the column. But it is indispensable that the corner bars be very accurately positioned at the proper parts of the columns, as at the corners, and be held in accurate alinement in such position by some device which can be readily inserted  
65 without interfering with the construction of the column, and the difficulty of satisfactorily effecting this is increased by the fact that the columns are constructed in molds in position in the building, which  
70 molds prevent ready access to the interior, except at the top, during the construction of the mass of the column. Therefore a second feature of this invention is the "spreaders," by which the corner bars are held accurately in position and alinement, and the combination of said spreaders with the corner bars. Further, experience has shown that columns of concrete and like materials are liable to diagonal fractures when loaded,  
80 and no transverse reinforcement has yet been devised which prevents such fracture, and yet can be employed in columns constructed in molds, *in situ*; and it is therefore, another important feature of this invention that said spreaders also serve by their shape, location, etc., as will be hereinafter set forth, to so strengthen the column as to have a tendency to prevent such fractures.  
90

The invention also relates, as hereinbefore stated, to longitudinal reinforcements which are embedded in the mass of concrete, as well as to devices for retaining such reinforcements in position. For while we can construct columns with the corner bars and spreaders without the longitudinal reinforcements or the said devices, we prefer to use both the said longitudinal reinforcements and the said devices.  
95

Referring to the drawings which accompany the specification to aid the description; Figure 1 is a perspective view of a column constructed according to our invention; Fig. 2 is a transverse section of a  
100 column about on the level of the line 1—1

in Fig. 1, but on a large scale. Fig. 3 is a plan of a modified form of spreader also on large scale. Fig. 4 is a plan and Fig. 5 an edge view of another modification of a spreader.

In constructing the column, a mold of planks, not shown, but of the proper size and shape, is erected at the site of the column, a plank or two being omitted on one or more of the sides near the bottom to give access to the interior if desired. Then the corner bars 1 are set up at each corner and extending the length of the column. Each said corner bar 1 is preferably formed with an integral head 2 extending the length of the corner bar and adapted to be accurately positioned at and form a metal protection for the corner of said column, with a web 3 preferably integral with the head and extending the length thereof, and with an enlargement, or dovetail, 4, along the inner end of said web 3, forming a device to interlock with and tie the corner bars 1 solidly to the mass of the column; and we prefer to form the under side of said head 2 so as to join the sides of said web 3 with rather wide-open angular curved or straight lines, to permit of packing the concrete or other material of which the mass of the column is formed under the head 2. Said corner bars 1 being in place, the spreaders 6 are slipped over the upper ends of said corner bars 1 and dropped to place. Said spreaders 6 are of soft steel or other malleable metal preferably bent to an arc shape, as indicated in Fig. 5, where the spreader is designated by 15, and having slots 7 at the ends to admit the webs 3 and enlargements 4 of the said corner bars. The ends of the spreaders are preferably shaped to fit accurately against the under sides of the heads 2. Said spreaders are preferably arranged in pairs, each spreader consisting of a metal bar, and being arranged in pairs on diagonals of the column, as seen in Figs. 1 and 2. But we may form the spreaders as spiders 9, with a plurality of slotted arms 10, 10, as seen in Fig. 3. We may also form said spreaders with roughened or corrugated surfaces, or with teeth or projections, and we may provide said spreaders with holes 11 to receive and lock with the concrete or other material of which the body of the column is composed; and we may turn up the edges of said holes to form the lips or projections 14, as seen in Figs. 4 and 5. Said spreaders being originally arch-shaped are slid down to place at the bottom of the corner bars 1—1, with the convex sides of said spreaders up, and then by reaching in through the aforesaid opening in the mold planking which is not shown in the drawings, or by a pole inserted at the top, a sharp blow is given on the spreaders about at point 16, whereby they are flattened more

or less, and force the corner bars tightly out to the corners of the mold, the metal of the spreaders being malleable so that said spreaders retain their flattened form.

The corner bars 1—1 and the lowermost spreaders 6—6 being in position, the reinforcements 17—17 are set in place, such reinforcement being preferably steel rods of square cross section twisted or they may be of other suitable shape. To hold rods 17 in position, wires 18 are looped around them, about as shown in Fig. 2, and of course the loops might be first formed and then dropped to place over said rods 17. The corner bars and spreaders and reinforcing rods, if such are used, and the wires being in place, and the spreaders flattened, concrete or other suitable material, of which the mass of the column is to be formed is poured in from the top until the mold is filled to a height about equal to the diameter of the column, the hole or holes in the planking of the mold having been first properly closed. The concrete is properly tamped and packed, and then another pair of spreaders, or a spider, is slid down the corner bars to the concrete, convex side up, and given a smart blow by a pole or other instrument inserted from the top to flatten and spread the arms of said spreader or spider and press the said corner bars tightly out to their exact positions. Then other wires similar to 18 are looped around the reinforcing rods 17 at this point. More concrete is then poured in, packed and tamped, another set of spreaders is put in and flattened, another wire is looped around the rods 17, and so on until the column is completed to its full height. At its top the column can be secured in any suitable manner to the ceiling, girders, or other parts of the structure.

When the concrete, or other material of which the column is composed, has set, the mold planking is removed, leaving a column with metal corner protectors firmly tied to and integrally interlocked with the mass of the column, and this column also contains transverse reinforcements consisting of said spreaders and wires at such intervals as to prevent the cracking of the column under load; and it has been shown experimentally that when the spreaders are located as hereinabove described, at distances apart about equal to the diameter of the column, at least two pairs of spreaders, or two spiders, will be located within the limits within which a crack would develop, if the column should be over loaded, and that being thus located said spreaders greatly increase the strength of the column, and prevent its cracking under any proper load.

It will of course be understood that the shape of the corner bars, the spreaders, and

the reinforcing rods and wires can be varied; that strips of wire mesh or bands of metal might be used in place of wires to hold said reinforcing rods in position; and  
 5 that various other changes might be made without departing from our invention.

Now having described our improvements, we claim as our invention.

1. The combination in a column, of longitudinal metal corner protectors, and transverse flexible spreaders curved before insertion in the column and afterward straightened and extended to properly position said corner protectors, substantially as described.

15 2. The combination in a column, of longitudinal metal corner protectors and transverse flexible spreaders between opposite protectors originally curved to permit of insertion between said spreaders and straightened and extended to properly position said corner protectors during the construction of the column, substantially as described.

20 3. The combination in a column, of longitudinal metal corner protectors, flexible spreaders provided with slotted ends to receive said corner protectors and originally curved to permit of inserting said spreaders in proper position, and said spreaders being straightened and extended to properly position said protectors during the construction of the column, substantially as described.

tion said protectors during the construction of the column, substantially as described.

4. The combination in a concrete column, of metal corner bars, flexible spreaders adapted to reinforce the concrete transversely and curved before insertion, and  
 35 straightened and extended afterward to properly position said corner bars, and said spreaders being provided with means to interlock with the concrete, substantially as described.

5. The combination in a column, of longitudinal metal corner bars, longitudinal reinforcing rods and means for positioning said rods during the construction of the work, and transverse flexible spreaders  
 45 curved before insertion and afterward straightened and extended to hold said corner bars in position during the construction of the column, substantially as described.

Signed at Philadelphia, in the county of Philadelphia, and State of Pennsylvania, this 13th day of September, 1909.

HENRY H. WAINWRIGHT.  
 HOWARD A. MINER.

Witnesses:

ELIZABETH C. BUR,  
 PRICE F. NORTH.