Dec. 20, 1927. 1,653,055

S. MACOMBER

SKELETON METAL ELEMENT FOR REENFORCED CONCRETE COLUMNS

Filed Jan. 30, 1926 3 Sheets-Sheet 1

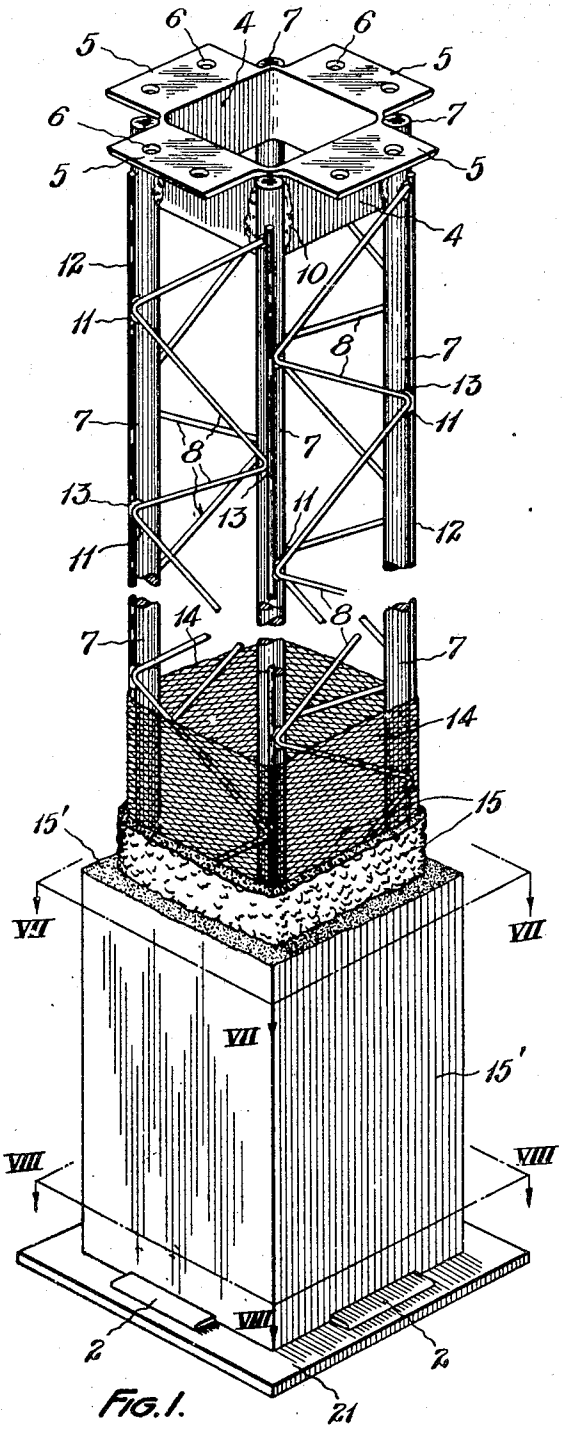


FIG. 1.

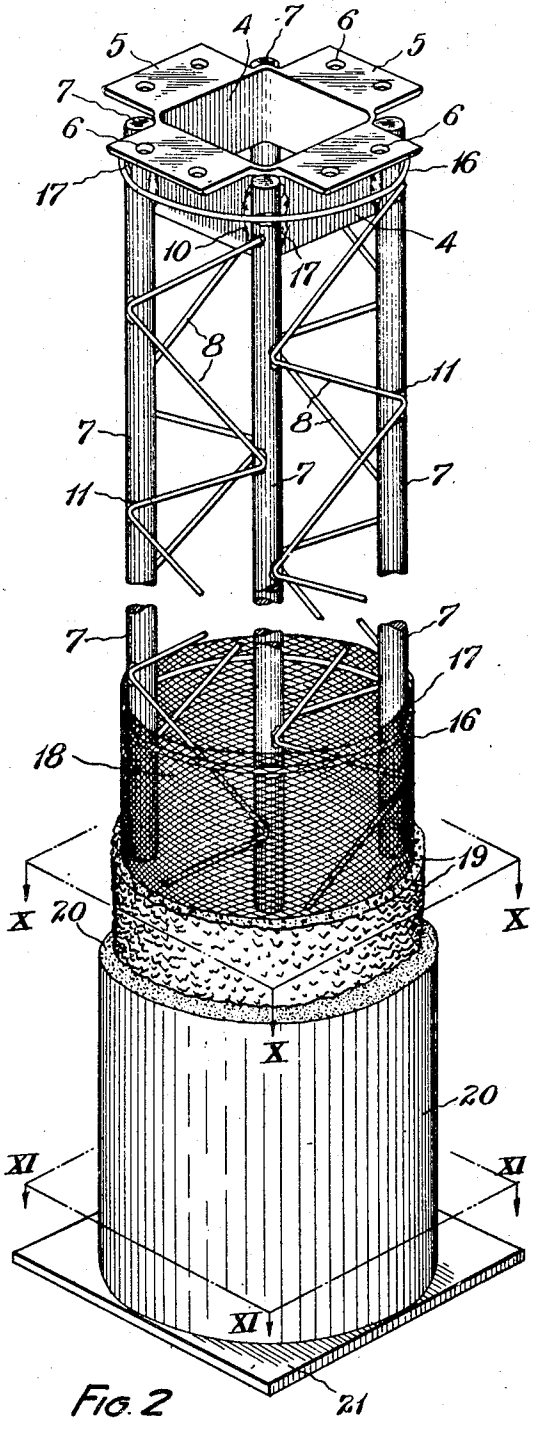


FIG. 2

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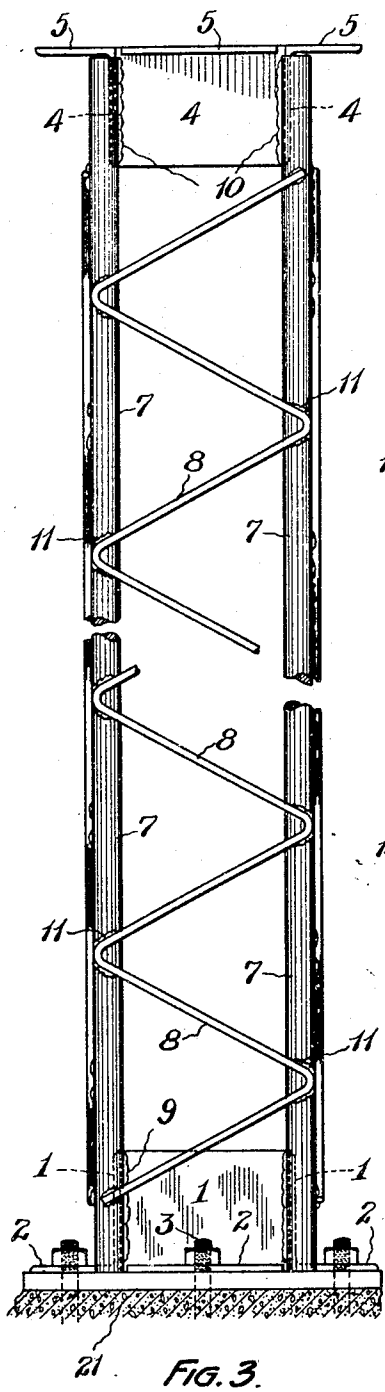


FIG. 3.

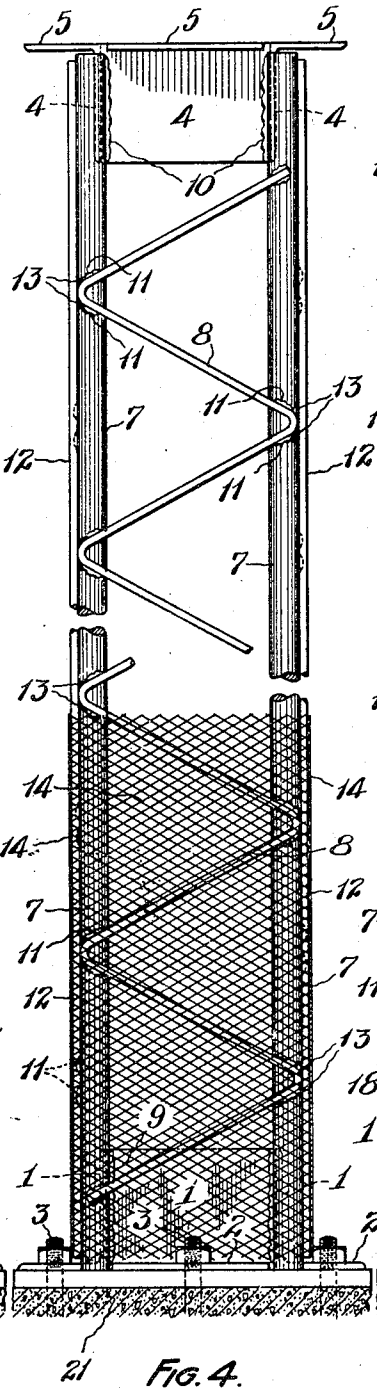


FIG. 4.

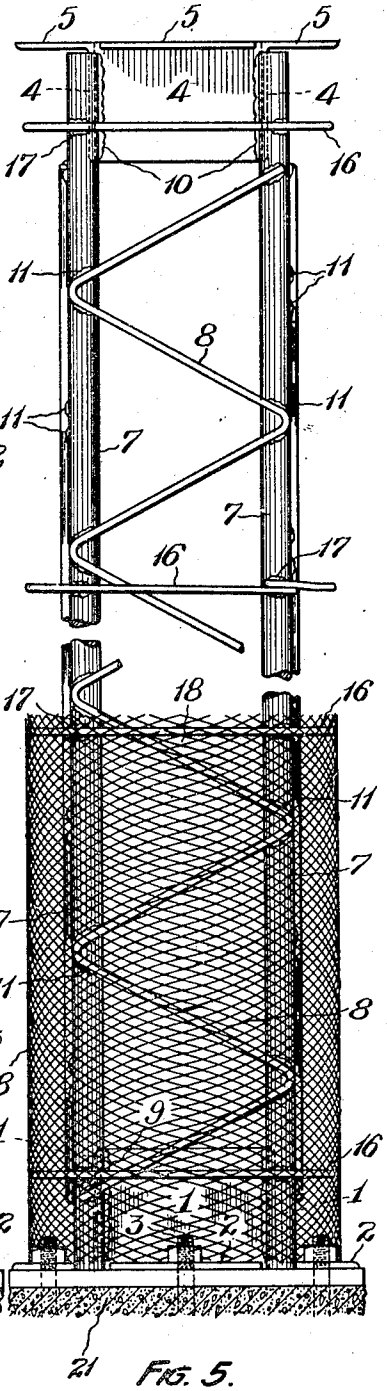


FIG. 5.

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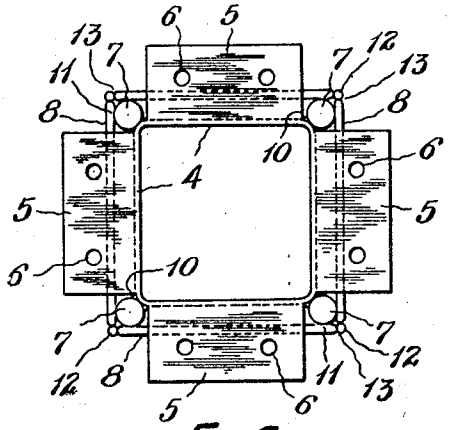


FIG. 6.

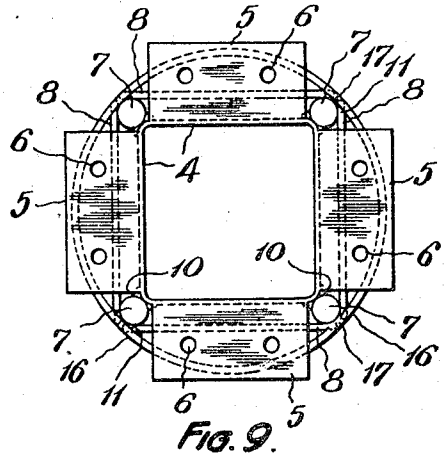


FIG. 9.

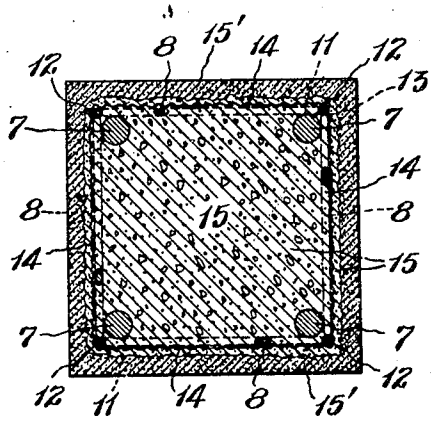


FIG. 7.

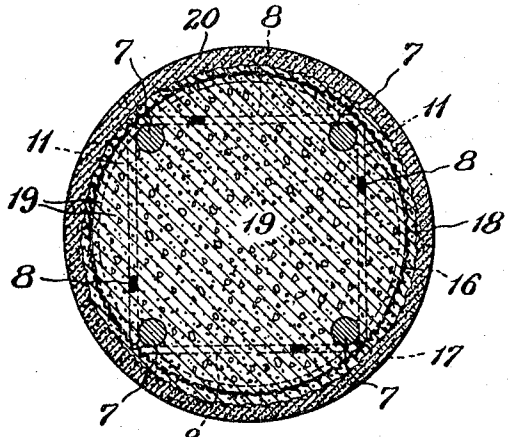


FIG. 10.

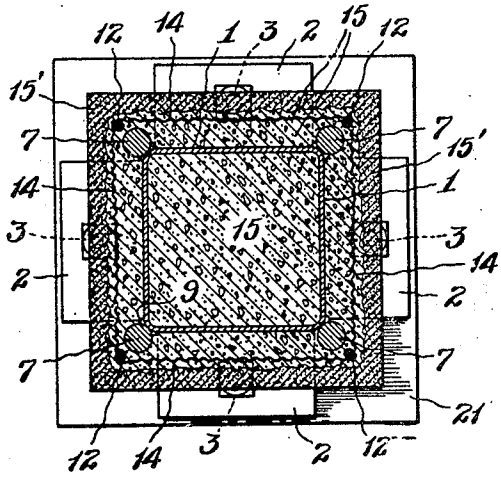


FIG. 8.

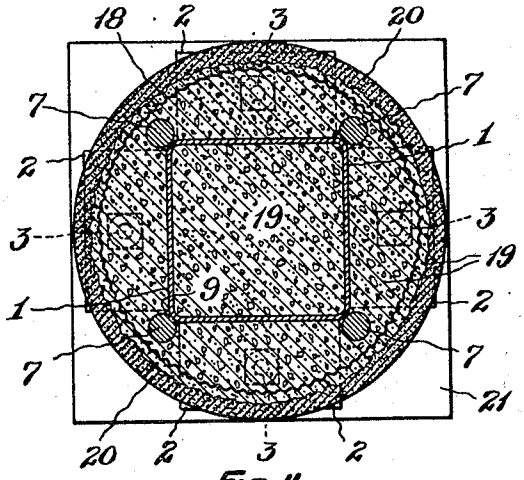


FIG. 11.

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Patented Dec. 20, 1927. 1,653,055

UNITED STATES PATENT OFFICE.

STANLEY MACOMBER, OF MASSILLON, OHIO, ASSIGNOR TO THE MACOMBER STEEL COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

SKELETON METAL ELEMENT FOR REENFORCED-CONCRETE COLUMNS.

Application filed January 30, 1926. Serial No. 84,821.

My invention relates to structural elements and particularly to a skeleton metal element adaptable for use as a core for reenforced concrete columns of different cross-sections. The invention is designed to provide a maximum area of column by the use of a minimum amount of steel in the skeleton support, thus effecting a great saving in steel. A further saving is effected by obviating the necessity of using the usual concrete pouring forms.

The annexed drawings and the following description set forth in detail certain means embodying my invention, such means disclosing, however, but a few of the various forms by which the principle of the invention may be illustrated.

In said annexed drawings:

Figure 1 represents a broken perspective view of a complete column of rectangular cross-section, the metal reenforcement of which comprises one of my improved skeleton elements;

Figure 2 is a similar view of a column of circular cross-section;

Figure 3 is a broken elevation of the skeleton metal element adaptable for use as a core for columns of various cross-sections;

Figure 4 is a similar elevation of this skeleton element after there have been added thereto some further metal elements adapting the same for use in a column of rectangular cross-section;

Figure 5 is a view similar to Figure 3 of this metal core after there have been added thereto some other metal elements adapting the same for use in a column of circular cross-section;

Figure 6 is a top plan view of the elements shown in Figure 4;

Figures 7 and 8 are transverse sections, taken, respectively, in the planes indicated by the lines VII—VII and VIII—VIII, Figure 1;

Figure 9 is a top plan view of the elements shown in Figure 5; and

Figures 10 and 11 are transverse sections, taken, respectively, in the planes indicated by the lines X—X and XI—XI, Figure 2.

Referring to the annexed drawings, in the several views of which the same parts are indicated by the same respective ordinals, I show a hollow metal base member for my improved metal core for concrete columns, having the horizontal flange members 2 and vertical flange members 1, the flanges 2 being formed with holes adapted to receive anchor bolts 3 for mounting the element upon any suitable main support 21. Similarly, I provide a hollow metal cap having the vertical flanges 4 and horizontal flanges 5, the latter of which are formed with bolt holes 6, adapting the cap for attachment to any suitable load which it is desired to carry upon the column. In the forms of invention shown, the base and cap are rectangular in cross-section, preferably square, and are secured together by means of vertical bars 7 preferably secured at their lower and upper ends to the corners of the vertical flanges 1 and 4 of the base and cap, respectively, and preferably exteriorly of the latter. The vertical bars 7 may be of any desired suitable shape and the cross-section of the base and cap may be other than rectangular, if desired. My preferred method of securing together the vertical bars 7 and the base and cap is by welding the same together, preferably arc-welding, as indicated by the ordinals 9 and 10. I rigidly secure together each adjacent pair of vertical bars 7 by means of tie-rods 8 provided throughout substantially the whole height of the metal core. Preferably, I provide one such tie-rod 8 for each adjacent pair of bars 7 and string the same sinuously from the cap member to the base member of the core, securing together the tie-rods 8 and the bars 7 at the points of contact, preferably by arc-welding the same together, as indicated by the ordinal 11.

Thus I have formed a core for the finished reenforced concrete column, such as indicated in Figure 3, which can be conveniently shipped to the job and there utilized as a metal core for reenforced concrete columns of varying cross-sections. I shall now describe by reference to the accompanying drawings the means and methods of forming a reenforced concrete column of rectangular

cross-section and one of circular cross-section through the medium of the one type of core unit shown in Figure 3.

Referring particularly to Figures 1, 4, 6, 7 and 8, I shall describe the construction of a reenforced concrete column of rectangular cross-section.

To the tie bars 8 and exteriorly of the latter, preferably between the ends of each adjacent pair of tie-bars, and substantially throughout the height of the core, I secure small rods 12, one rod 12 for each bar 8, the method of securing the same preferably being by means of arc-welding, such as indicated by the ordinal 13. Around the rectangle formed by the tie-rods 8 and the vertical rods 12, as plainly shown in Figures 1 and 7, I string and secure expanded metal 14. Thus I have formed a special skeleton element for a rectangular column. The concrete is poured from the top in and around the metal elements hereinbefore described, as indicated by the ordinal 15, Figure 7, the expanded metal 14 forming a tie for the exterior plaster coat 15' which can be applied to the rough exterior of the concrete 15.

In the construction of a column of circular cross-section, referring particularly to Figures 2, 5, 9, 10 and 11, I first string lengths of wire around the metal core shown in Figure 3 to form a series of vertically-spaced rings 16 secured to the vertical bars 7 and preferably connected thereto by means of arc-welding, as indicated by the ordinal 17. Around these rings 16 I string and secure expanded metal 18. Then, I pour the concrete 19 within and extending through the expanded metal 18, and apply an exterior plaster coat 20, as hereinbefore described with reference to the construction of the rectangular column shown in Figure 1.

The design of the skeleton element hereinbefore described, shown in the accompanying drawings and hereafter claimed, permits the obtaining of a column of maximum area with a minimum amount of steel. In fact, the same amount of steel in solid form would not be sufficient for a column of practicable size whatever.

I direct attention also to the ease of manufacture and rigidity of the metal core shown in Figure 3; to the fact that this core can be conveniently and safely shipped under usual transportation conditions; that the core is then readily adaptable for the addition thereto of suitable expanded metal holding means and suitable expanded metal to form columns of varying cross-sections; and that the concrete can be poured in and through and around the core without the necessity of any concrete pouring forms.

What I claim is:

1. A skeleton metal element for reenforced concrete columns comprising, a base member; vertical bars secured at their lower ends to said base member; a cap member secured to the upper ends of said bars; tie-rods connected to each adjacent pair of bars; expanded metal retaining means connected to said bars; and expanded metal secured to said retaining means.

2. A skeleton metal element for reenforced concrete columns comprising, a vertical hollow metal base member; vertical bars secured at their lower ends to said base member; a hollow metal cap secured to the upper ends of said bars; tie-rods and expanded metal retaining means connected to each adjacent pair of bars; and expanded metal surrounding said tie-rods and retaining means.

3. A skeleton metal element for reenforced concrete columns comprising, a vertical hollow metal base member formed with means adapted to secure the element to and mount the same upon a main support; vertical bars secured at their lower ends to said base member; a hollow metal cap secured to the upper ends of said bars and formed with means adapting the same for attachment to a load; tie-rods and expanded metal retaining means connected to each adjacent pair of bars; and expanded metal surrounding said tie-rods and retaining means.

4. A skeleton metal element for reenforced concrete columns comprising, a rectangular vertical hollow metal base member formed with means adapted to secure the element to and mount the same upon a main support; vertical bars secured, respectively, at their lower ends to, and exteriorly of, the corners of said base member; a hollow rectangular metal cap secured at its corners to, and within, the upper ends of said vertical bars and formed with means adapting the same for attachment to a load; sinuously strung tie-rods, and expanded metal retaining means secured to each adjacent pair of vertical bars; and expanded metal surrounding said tie-rods and retaining means.

5. A skeleton metal element for reenforced concrete columns comprising, a rectangular vertical hollow metal base member; vertical bars welded, respectively, at their lower ends to, and exteriorly of, the corners of said base member; a hollow rectangular metal cap welded at its corners to, and within, the upper ends of said vertical bars; sinuously strung tie-rods, and expanded metal retaining means welded to each adjacent pair of vertical bars; and expanded metal surrounding said tie-rods and retaining means.

6. A skeleton metal element for reenforced concrete columns comprising, a vertical hollow metal base member; vertical bars secured at their lower ends to said base member and exteriorly of the latter; a hollow metal cap secured to the upper ends of said bars and interiorly of the latter; tie-rods connected to each adjacent pair of bars and securing the same together throughout the height of the

element; a plurality of spaced metal rings secured to and surrounding said vertical bars; and expanded metal shaped to and surrounding said rings.

7. A skeleton metal element for reenforced concrete columns comprising, a rectangular vertical hollow metal base member; vertical bars welded, respectively, at their lower ends to, and exteriorly of, the corners of said base member; a hollow rectangular metal cap welded at its corners to, and within, the upper ends of said vertical bars; tie-rods sinuously strung from top to bottom of each adjacent pair of vertical bars and welded thereto at the points of contact; a plurality of vertically-spaced metal rings welded to and surrounding said vertical bars; and expanded metal shaped to and surrounding said rings.

Signed by me this 28 day of Dec., 1925.

STANLEY MACOMBER.