No. 822,587 PATENTED JUNE 5, 1906.

R. A. CUMMINGS.

METAL REINFORCED CONCRETE COLUMN.

APPLICATION FILED JAN. 6, 1905.

FIG. 1

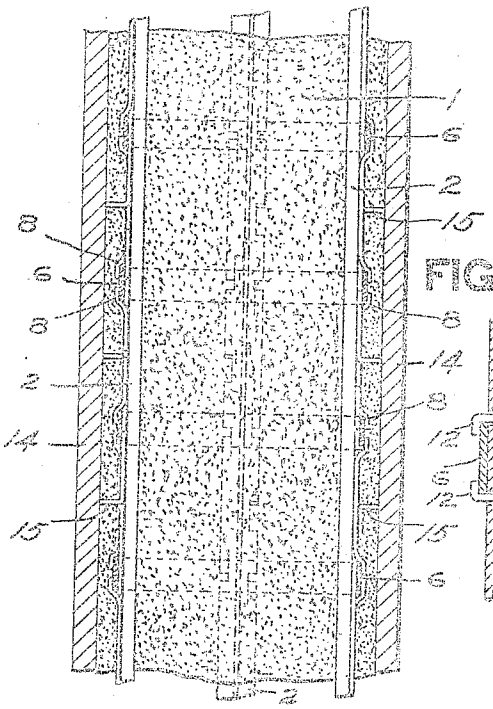


FIG. 2

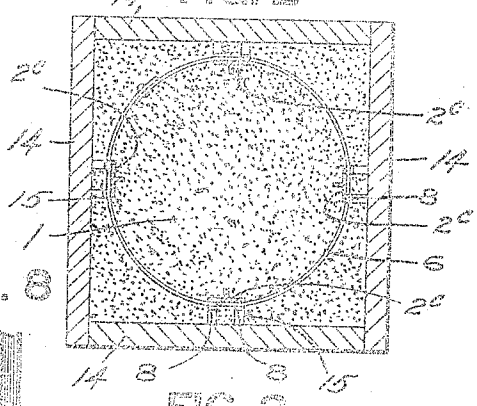


FIG. 8



FIG. 3

FIG. 5

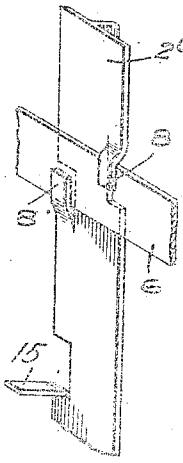


FIG. 6

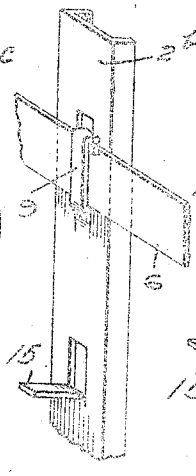


FIG. 7



FIG. 4

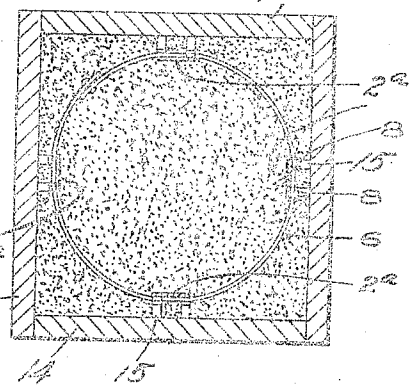
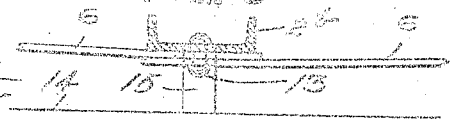


FIG. 9



WITNESSES.

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METAL-REINFORCED CONCRETE COLUMN.

No. 822,537. Specification of Letters Patent. Patented June 5, 1906.

Application filed January 6, 1905. Serial No. 239,832.

To all whom it may concern:

Be it known that I, ROBERT A. CUMMINGS, a resident of Beaver, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Metal-Reinforced Concrete Columns; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to concrete columns, piles, struts, and the like used in bridges, viaducts, docks, fireproof buildings, and other structures.

The object of my invention is to provide a column or the like which is composed mainly of cement or concrete and which will carry a very heavy load.

Concrete or cement possesses great compressive strength when properly constructed and supported and is also not affected by fire, water, or other elements. For these reasons it is highly desirable in many building constructions. It possesses, however, slight tensile strength, so that when subjected to very heavy loads the concrete will be forced apart laterally, and thus fracture the column.

In my Patent No. 764,383, July 12, 1904, I have described and claimed a column construction wherein the fracturing due to the lateral spreading of the concrete is overcome, this being accomplished by surrounding the main body of the concrete with a series of flat metallic bands which will prevent the concrete from spreading, and consequently from fracturing.

The present invention is an improvement on the column described in my aforesaid patent, one object being to increase the stability of the column by the use of vertical reinforcing members having a cross-section in which the metal is so distributed that the major portion thereof will be as far removed as possible from the center of the column, thus increasing the radius of gyration.

A further object of the invention is to provide means on the vertical members, whether of the character above described or otherwise, for holding them properly spaced from the casing, so that said members will be uniformly distributed in the concrete and be entirely embedded therein.

A further object is to provide improved means for holding the transverse bands against either downward or upward movement.

To these ends the invention consists in details of construction and arrangement hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical section through a column constructed according to my invention. Fig. 2 is a transverse section thereof. Figs. 3 and 4 are similar views showing modifications. Figs. 5, 6, and 7 are perspective views showing different manners for holding the bands against movement. Fig. 8 is a vertical section of another modification, and Fig. 9 is a horizontal detail section of still another modification.

In the drawings the concrete is shown at 1, and the vertical reinforcing members at 2. The latter may be variously arranged and located, depending upon the size and shape of the column. They will be of a cross-section, having the metal so distributed that the major portion thereof will be as far out from the center of the column as possible, so as to get the greatest radius of gyration and correspondingly increasing the stability of the column. The most advantageous cross-section to secure this result is a flat rectangular bar, strip, or band, such as shown at 2^a, Fig. 4. Preferably, however, these reinforcing members will be slightly stiffened by providing them with one or more inwardly-projecting flanges, either by using a channel-section, as shown at 2^b, Fig. 3, or a modified angle or T-section, the latter being shown at 2^c, Figs. 1 and 2. The inwardly-projecting flange or flanges of the angle, channel, or T sections greatly stiffen these reinforcing members. The metal nevertheless is so distributed that the major portion thereof is in the web of the channel or in the head of the T-bar, and as these are directed outwardly the radius of gyration is correspondingly large. In my design these vertical members are not intended to act as compression members, although they probably do so to some extent, but they act as tension members to prevent the flexing of the column. They also serve as means for supporting bands 6, which extend transversely of the column and envelop the major portion of the concrete body, these bands serving to hold the concrete against fracturing laterally, and thereby developing the greatest compressive strength of said concrete. The bands 6 therefore will preferably be flat and arranged with their flat

faces vertical; but they may be of other cross-section. They will be located comparatively closely together, so as to confine the major portion of the body of the concrete. These bands will have their ends united to form continuous bands in any suitable way, either in the manner shown in my patent aforesaid, or as illustrated in my application filed October 22, 1904, Serial No. 229,635, or by riveting the ends of the bands together, as shown in the drawings, or any other suitable way. One feature of the present invention consists in the manner of securing these bands to the vertical members, so as to prevent their movement vertically. Preferably this connection will be so arranged that the bands can neither rise nor fall, thus preventing them from becoming spaced apart irregularly or from assuming a diagonal position.

As shown in Figs. 1, 2, and 5, the vertical members have punched out from their opposite edges the tongues 8, which are arranged diagonally and engage the two edges of the bands and hold the same securely in place and against either falling or rising. The diagonal arrangement of these tongues provides for the easy insertion of both edges of the bands underneath said tongues.

In Fig. 6 there is only one tongue 19, whose upper end is bent across the top of the band to hold it from rising.

In Fig. 7 the bands are shown held in place by means of a staple 10 or the like, embracing the band and having its ends projecting through openings in the vertical member and upset or bent on the back. If desired, two such staples may be used, as indicated in the dotted lines.

In Fig. 8 the staple 11 is located on the rear of the vertical member and has its ends 12 projecting through openings in the vertical members and bent over the front face of the band.

In Fig. 9 a simple rivet 13 is shown for securing the band to the vertical member. This rivet may be one of the rivets which secures the ends of the band together.

Another feature of the invention consists in means for holding the vertical reinforcing members a proper distance away from the casing 14, so that said members will be uniformly distributed and entirely embedded in the concrete. The means for so holding these vertical members consists of projecting portions 15 on the vertical members themselves, which contact with the casing. These projecting portions preferably will be portions punched out of the reinforcing members and bent at an angle thereto to contact with the casing.

The metallic members of the column will be built up in the manner described and then inclosed in the casing and the concrete and cement filled into the same, thus entirely enveloping and embedding the metallic members. The bands 6 envelop the major portion of the body of the concrete, thus holding the same against lateral fracture, and consequently enabling the same to carry very heavy loads. The vertical reinforcing members act as tension members to resist flexing of the column. These vertical members have the major portion of their metal removed the greatest possible distance from the center of the column, thus greatly increasing the radius of gyration and giving the maximum stability to the column for the amount of metal in the vertical members. The bands are connected to the vertical members in such a manner that they will be held absolutely in place even though the workmen should use the bands as a ladder to climb up and down, as they frequently do in constructing the columns. Said bands in the completed column will be in a true horizontal position, thus giving them the maximum efficiency. The entire metallic structure will be uniformly distributed in the concrete by reason of the projecting portions 15, which contact with the casing. The resultant column possesses a very high degree of strength.

What I claim is—

1. A column or the like, comprising a series of metallic members extending vertically of the column, a series of metallic bands running transversely thereof and enveloping the main body of concrete, projections on said vertical members for holding the bands fixedly in place transversely to the axis of the column, and concrete or the like enveloping and embedding said bands and vertical members.

2. A column or the like, comprising a series of metallic members extending vertically of the column, a series of metallic bands running transversely thereof and enveloping the main body of concrete, said vertical members having projecting portions engaging the bands and holding the same fixedly in place transversely to the axis of the column, and concrete or the like enveloping and embedding said bands.

3. A column or the like, comprising a series of metallic members extending vertically of the column, a series of bands running transversely thereof and enveloping the main body of concrete, said vertical members having openings punched in their bodies, means projecting through said openings engaging said bands and holding the same fixedly in place transversely to the axis of the column, and concrete or the like enveloping and embedding said bands.

4. A column or the like, comprising a series of metallic members extending vertically of the column, a series of metallic bands running transversely thereof and enveloping the main body of concrete, staples having their ends projecting through openings in said ver-

tical members, said staples engaging said bands and holding the same fixedly in place transversely to the axis of the column, and concrete or the like enveloping and embedding said bands and vertical members.

5. A column or the like, comprising a series of metallic members extending vertically of the column, a series of metallic bands running transversely thereof and enveloping the main body of concrete, staples having their ends projecting through openings in said vertical members and bent over the front face of said bands and holding the same fixedly in place transversely to the axis of the column, and concrete or the like enveloping and embedding said bands and vertical members.

6. A column or the like comprising a series of metallic members extending longitudinally of the column, said members being provided with broad thin webs and arranged with said webs toward the outer face of the column, a series of bands connected to said vertical members and extending transversely of the column and enveloping the main body of concrete, and concrete or the like enveloping and embedding said metallic members.

7. A column or the like, comprising a series of matallic members extending longitudinally of the column, said members being provided with broad webs arranged toward the outer face of the column and with an inwardly-projecting flange or flanges, a series of metallic bands extending transversely of the column and connected to said vertical members and enveloping the main body of concrete, and concrete or the like enveloping and embedding said metallic members.

8. A column or the like, comprising a series of metallic members extending longitudinally of the column, said members having the major portion of the metal on the sides facing the outer surface of the column and being provided with projecting portions for contacting with the casing, and concrete or the like enveloping and embedding said metallic members.

9. A column or the like, comprising a series of vertical metallic members provided with projecting portions for contacting with the casing, a series of bands extending transversely of the column and engaging said vertical members, and concrete or the like enveloping and embedding said metallic members.

10. A column or the like, comprising a series of metallic members extending longitudinally of the column and having portions thereof punched out and bent at an angle to contact with the casing, and concrete or the like enveloping and embedding said metallic members.

11. A column or the like, comprising a series of metallic members extending longitudinally of the column and having portions of their bodies punched out and bent at an angle to contact with the casing, a series of bands extending transversely of the columns and engaging said longitudinal members, and concrete or the like enveloping and embedding said metallic members.

In testimony whereof I, the said ROBERT A. CUMMINGS, have hereunto set my hand.

ROBERT A. CUMMINGS.

Witnesses:
F. W. WINTER,
ROBERT C. TOTTEN.