J. W. LINZEE, JR.

REINFORCING CONSTRUCTION FOR CONCRETE.

APPLICATION FILED DEC. 12, 1907.

943,310. **Patented Dec. 14, 1909.**

Fig. 1.

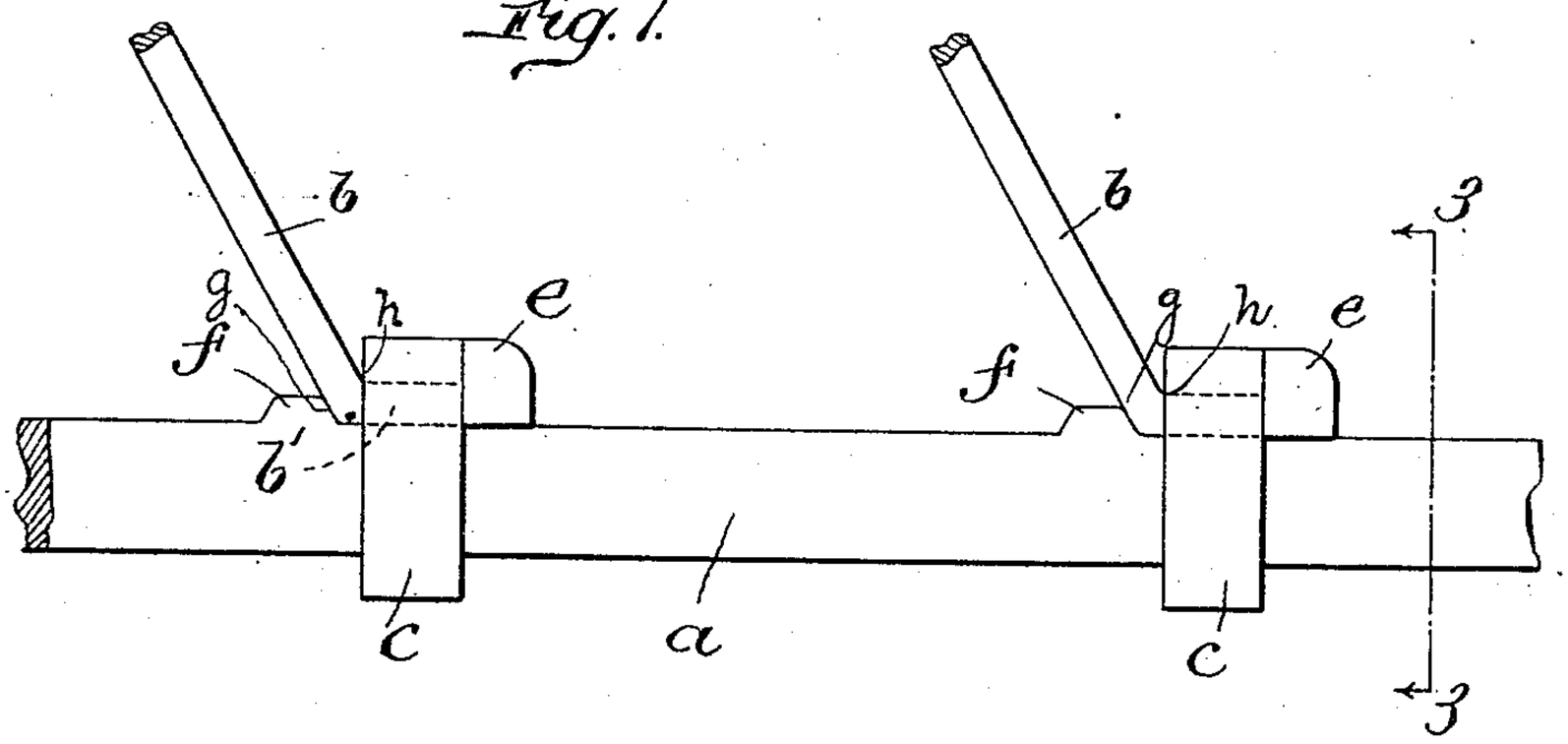


Fig. 2.

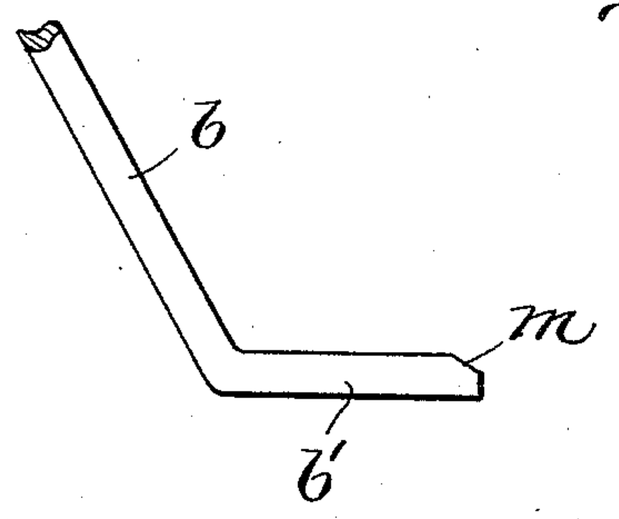


Fig. 3.

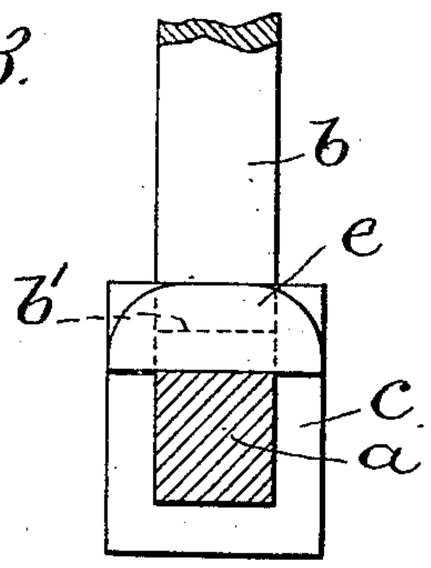
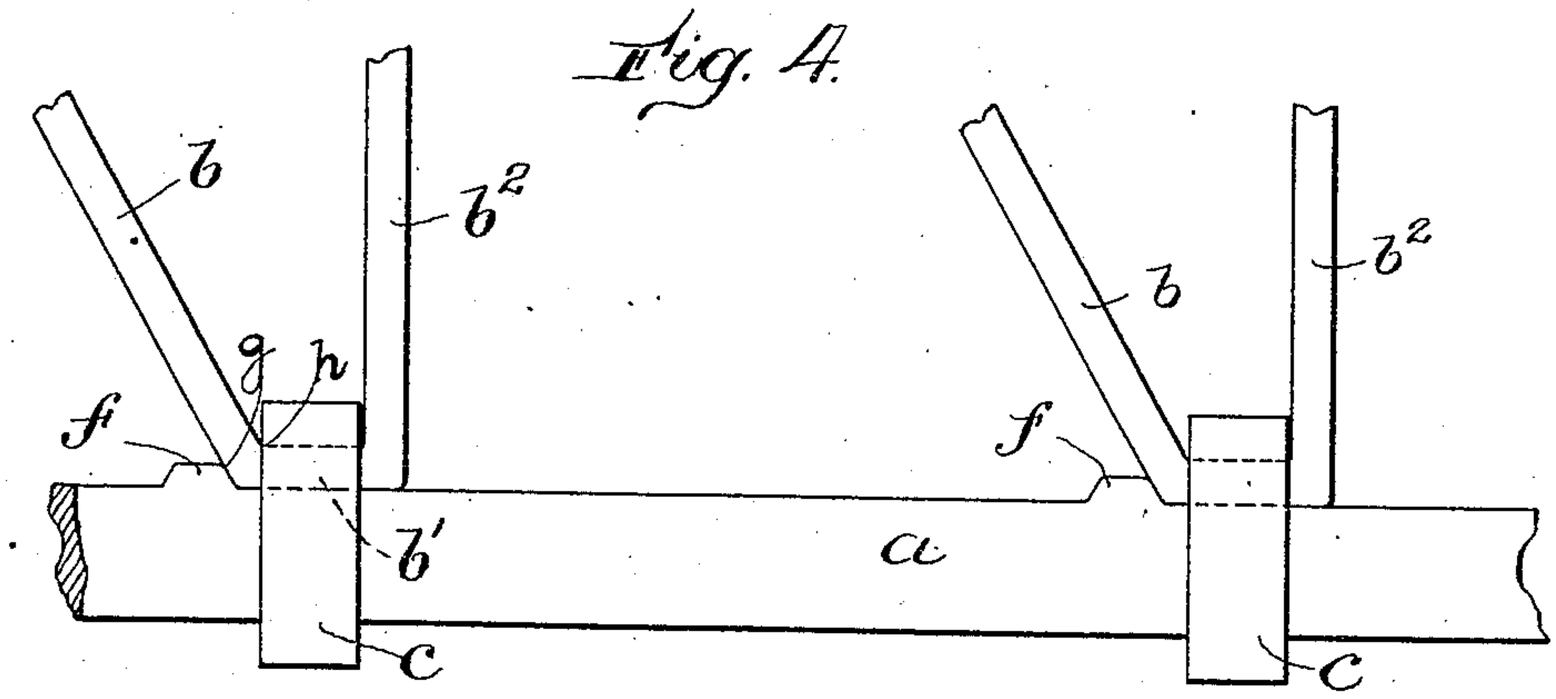


Fig. 4.



Witnesses:
A. C. Ratigan
P. H. Pezzetti

Inventor:
J. W. Linzee, Jr.
Wright Brown Quinby & May
Attorneys.

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN W. LINZEE, JR., OF BOSTON, MASSACHUSETTS.

REINFORCING CONSTRUCTION FOR CONCRETE.

943,310. Specification of Letters Patent. Patented Dec. 14, 1909.

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To all whom it may concern:

Be it known that I, JOHN W. LINZEE, Jr., of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Reinforcing Constructions for Concrete, of which the following is a specification.

This invention relates to a metal structure adapted to be used in concrete work to carry the tensile stresses in the composite structure.

The invention particularly consists in an improved form of union between the longitudinal tension bar and the inclined transverse shear bars, whereby the latter are prevented from slipping and are in fact caused to be wedged into tighter engagement with the longitudinal bar by the forces tending to cause slipping.

Of the accompanying drawings,—Figure 1 represents a portion of a metal reinforcing structure for concrete beams embodying the principles of my invention. Fig. 2 represents an elevation of one of the shear bars employed in carrying out my invention, before the same is connected with the longitudinal bar. Fig. 3 represents a sectional elevation of the structure on line 3—3 of Fig. 1. Fig. 4 represents a view similar to Fig. 1, showing a modification in the construction.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings, *a* represents a longitudinal tension bar, which, when used in a beam, is placed horizontally near the lower surface of the beam so as to take the tension of the lower section of the beam due to bending stresses. Shear bars are represented by *b*, and are shown as extending at an inclination to the longitudinal bar upwardly so as to support the longitudinal bar between its ends. These shear bars being held in the mass of concrete, are subjected to tension and shed their stresses into the body of the concrete. The shear bars are bent on an obtuse angle so as to provide a short portion *b′* which lies parallel to and in contact with the surface of the longitudinal bar. The latter and the foot portions *b′* of the shear bars are surrounded by collars *c* which preferably are applied in a heated and expanded condition, causing, when subsequently cooled and contracted, the bars to be drawn into tight engagement. Each collar surrounds its shear bar near the bend of the latter, while on the opposite side of the collar from the main body of the shear bar is an enlargement or head *e* which prevents the shear bar being pulled out from between the collar and longitudinal bar. On the longitudinal bar are enlargements *f*, each of which is arranged in the acute angle between the bars and has an inclined surface against which the inclined member of the shear bar bears. In consequence of the enlargements being so located, they lie on the opposite side of the shear bars from the collars.

When the reinforced concrete structure is loaded, the stresses applied to the metal bars tend to separate them, with a resultant impulse toward slipping of the shear bars in the direction toward which they extend. That is, as the shear bars are inclined toward the nearest end of the beam, the tendency is to cause them to slip relatively to the longitudinal bar toward that end of the beam. Any motion which is produced by this tendency of course causes the shear bars to press against or ride upon the wedging enlargements *f* and to be crowded more tightly into engagement with the longitudinal bar and the collar, since the heads or enlargements *e*, which absolutely prevent withdrawal of the shear bars from the collars, cause the latter to partake of whatever movement may be given to the shear bars and thus to wedge the shear bar *b* between the point *g* of the enlargement *f* and the point *h* of the collar. It will be seen that this form of connection makes a very secure union between the reinforcing bars, the strength of such union being limited only by the tensile strength of the shear bar itself or of the collar. Slipping of the shear bar from the collar without breakage of one of them is absolutely prevented.

Fig. 2 shows the form of the ordinary shear bar before being applied. This bar has a foot *b′* without enlargement, and in fact thinned at its end to a short, sharp wedge *m*. This enables the collar to be forced over it with little difficulty. After placing of the collar, the wedge end of the shear bar is upset by a workman's hammer to form the head, the bar preferably being heated for this purpose, although it may be upset cold if of sufficiently ductile metal.

In some cases the shear bars are made of two members *b* and b^2, of which the latter is perpendicular to the longitudinal bar, as

shown in Fig. 4. This vertical member is formed by bending up the shear bar after the collar is applied and takes the place of the head *e* previously described. The stresses in this member being perpendicular to the longitudinal bar, cause no tendency to slip, and so the shear bar when thus made, is securely held by the collar and wedge *f*.

It is to be understood that this reinforcing construction is not limited to any particular mode of application or use, since it may be applied to any concrete construction, whether the same is horizontal, inclined or vertical, in the manner best calculated to absorb the tensile stresses.

I claim:—

1. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a shear bar having one portion inclined relatively to the longitudinal bar and a second portion lying along-side and in contact therewith, a collar surrounding the adjacent portions of the bars to hold them together, and an enlargement on the longitudinal bar preventing movement of the shear bar in the direction of its inclined portion.

2. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a shear bar extending longitudinally a short distance beside said longitudinal bar and bent away from the same, a collar surrounding the adjacent portions of the bars, an enlargement on the longitudinal bar between which and said collar the shear bar extends, and an offset on the shear bar to prevent withdrawal thereof from said collar.

3. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a tension shear bar extending at an inclination to said longitudinal bar and in the same plane therewith, means for clamping said bars together, and means for preventing relative movement between the bars lengthwise of the longitudinal bar.

4. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a tension shear bar extending at an inclination to said longitudinal bar and in the same plane therewith, means for clamping said bars together, and positive means for preventing relative movement of the shear bar in one direction along the longitudinal bar.

5. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, an inclined shear bar having a bend and lying beside the longitudinal bar adjacent the bend, with the portion at one side of the bend extending at an acute angle from the longitudinal bar, a collar surrounding the adjacent portions of the bars, and a wedging enlargement on the longitudinal bar located in the acute angle between the bars.

6. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a shear bar making an oblique angle with said longitudinal bar and bent to extend beside the latter, a collar surrounding the adjacent portions of both bars, and a wedging enlargement on the longitudinal bar located on that side of the shear bar toward which the oblique portion of the latter bar extends, whereby any movement of the shear bar due to tensile stress therein in the direction of its oblique portion may cause the latter to ride up on the enlargement and be crowded into tighter engagement with the collar.

7. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a collar surrounding the longitudinal bar, a shear bar passing through the collar, being inclined away from the longitudinal bar at one side of the collar and upset at the other, whereby it is retained in contact with the longitudinal bar, and an abutment arranged to prevent movement of said shear bar along the longitudinal bar.

8. A metallic reinforcing construction for concrete work, consisting of a longitudinal tension bar, a collar surrounding the longitudinal bar, a shear bar passing through the collar, being inclined away from the longitudinal bar at one side of the collar and upset at the other, and a wedging enlargement on the longitudinal bar on that side of the shear bar toward which the inclined part of said shear bar extends.

9. In a reinforced concrete construction, a longitudinal tension bar having a plurality of sides with enlargements on one of the sides thereof, a shear bar having one end extending at an acute angle from said longitudinal bar, and a portion extending a short distance along said longitudinal bar, and the other end upset, and a collar in close contact with the longitudinal tension bar on all sides but the one which has the enlargements, the space between the face of the longitudinal tension bar and collar being filled by the shear bar, and both the shear bar and the portion of the collar above it being located between the enlargement on the longitudinal bar, and said upset end of the shear bar.

10. A metallic reinforcing concrete structure consisting of longitudinal tension bars, a set of tension shear bars, and wedging collars for each said longitudinal bar, one end of each tension bar bent at an angle with its longitudinal bar, and having a short portion extending in contact with said longitudinal bar, and between said longitudinal bar and one of said wedging collars and each of said bent portions located adjacent to an enlargement on said longitudinal bar, between such enlargement and the nearest adjacent collar, and the end of said shear bar, after

passing through the collar, being set up against said collar, said wedging enlargement on said longitudinal bar coöperating with said collar and set up portion of said shear bar, to prevent said short portion of said shear bar from sliding along the longitudinal tension bar.

In testimony whereof I have affixed my signature, in presence of two witnesses.

JOHN W. LINZEE, Jr.

Witnesses:
HENRY O. CUSHMAN,
ARTHUR H. BROWN.