A. E. LINDAU.

CONCRETE REINFORCE.

APPLICATION FILED FEB. 11, 1909.

1,043,782.

Patented Nov. 5, 1912.

2 SHEETS—SHEET 1.

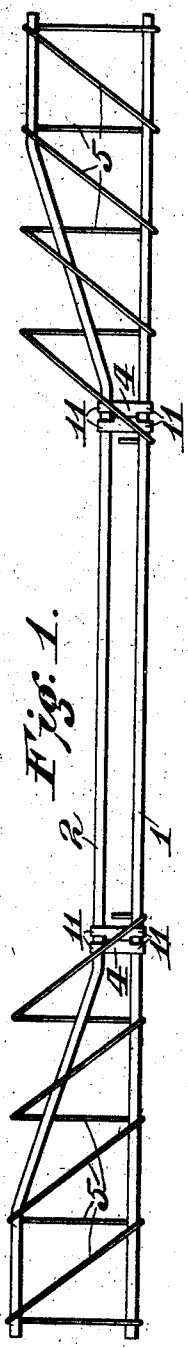

Fig. 1.

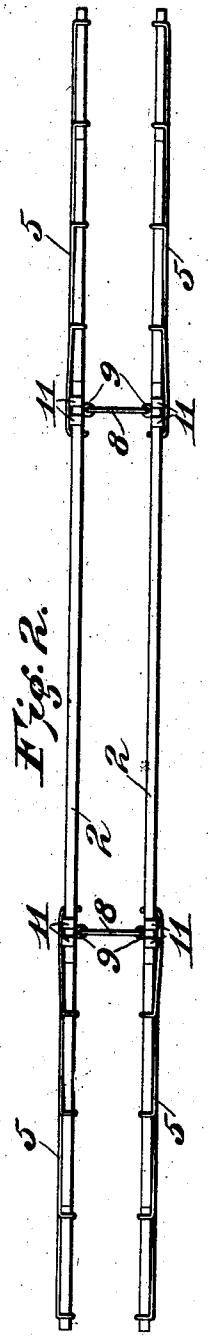

Fig. 2.

Fig. 3.

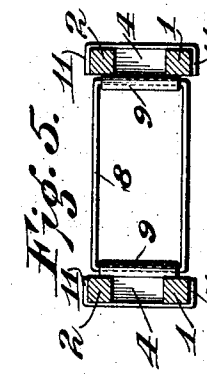

Fig. 5.

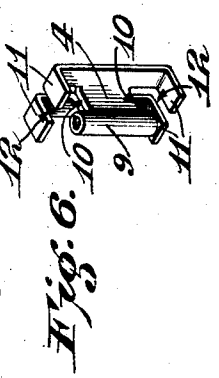

Fig. 6.

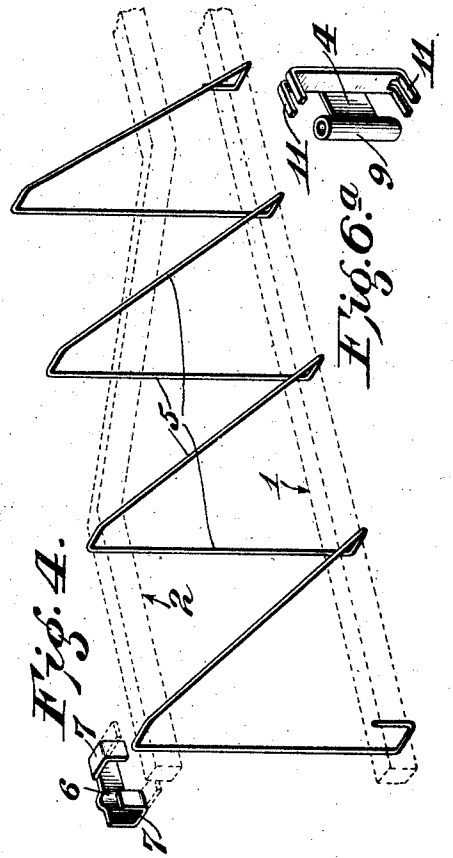

Fig. 4.

Fig. 6.a

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2 SHEETS—SHEET 2.

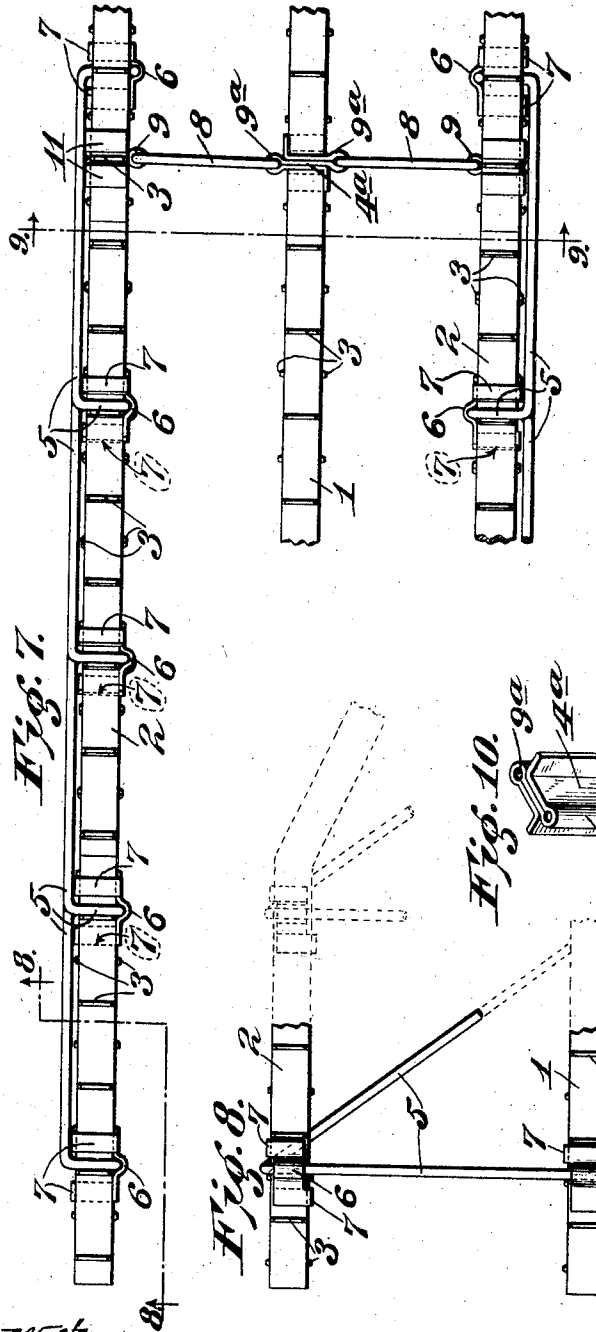

Fig. 7.

Fig. 8.

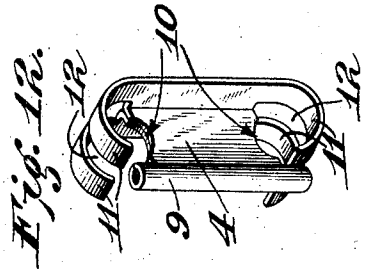

Fig. 12.

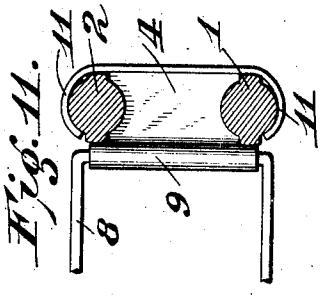

Fig. 11.

Fig. 10.

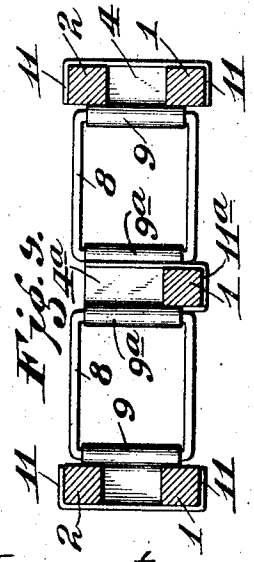

Fig. 9.

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UNITED STATES PATENT OFFICE.

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CONCRETE-REINFORCE.

1,043,782. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed February 11, 1909. Serial No. 477,386.

To all whom it may concern:

Be it known that I, ALFRED E. LINDAU, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Concrete-Reinforces, of which the following is a specification.

In the construction of reinforced concrete beams and like structures, it is the common practice to position the several bars or other reinforcing members individually at the work; and with unskilful workmen and unfavorable conditions at the work, the actual positions of the reinforcing members are liable to vary from the positions they are designed to occupy. On the other hand, if the reinforcing members are assembled at the factory, in proper relation to each other, they are liable to be bent or to be shifted with relation to each other before reaching the work.

The principal object of the present invention is to provide for the assembling of the reinforcing members into a unitary frame which will minimize the risk of having its members distorted or unintentionally shifted in relation to each other during shipment.

Another object is to make the clips or distance between the side members easily adjustable.

The invention consists principally in a collapsible and adjustable unit frame for reinforcing concrete hereinafter described and claimed.

It also consists in pivotally mounting the frame connecting or spacing links in the distance pieces which serve to position the main reinforcing members at the respective sides of the frame, and also in the particular form of such positioning members; and in the constructions and arrangements of parts hereinafter more fully appearing.

In the accompanying drawing, which forms part of this specification and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side elevation (omitting some details) of a reinforcing frame embodying my invention; Figs. 2 and 3 are similar plan views showing the unit frame in its normal condition and in its collapsed condition, respectively; Fig. 4 is a detail view of a wire constituting a series of secondary reinforcing loops, and also illustrating a fastening clip in perspective; Fig. 5 is a cross section of a reinforce or unit frame comprising two side frames linked together; Fig. 6 is a perspective detail view of a clip or spacing member adapted to coöperate with square bars; Fig. 6ª illustrates a modified form of clip or spacing member; Fig. 7 is a plan view of a part of a collapsible reinforce or unit frame consisting of three parallel members linked together; Fig. 8 is a detail elevation of the portion indicated by line 8—8 of Fig. 7; Fig. 9 is a vertical sectional view on the line 9—9 of Fig. 7, with the secondary reinforce omitted: Fig. 10 is a perspective detail view of a member adapted to pivotally connect the links to an intermediate bar or frame of a collapsible unit: Fig. 11 is a detail view illustrating a clip or spacing member cooperating with round bars having transverse ribs. Fig. 12 is a perspective view of the spacing member illustrated in Fig. 11.

In the construction illustrated in Figs. 1, 2 and 3, the main reinforcing members are framed together in two groups each of which constitutes a side of a collapsible unit frame. In this construction, the primary reinforcing members of each side comprise a straight horizontal bar 1 at the bottom and a second bar 2 located above it, both of which are preferably corrugated or provided with transverse ribs 3. The middle portion of the second bar is parallel with the first mentioned bar and, at each end of said middle portion, said second bar inclines upwardly and thence extends horizontally to each end, in conformity with common practice. The two bars thus constituting the primary reinforcing members of a side of the unit frame are firmly held together by suitable clips or spacing members 4, preferably of the kind hereinafter more fully described.

The respective side frames constituting the primary reinforce support groups of secondary reinforcing members, whose principal function is to take care of the shearing stresses and diagonal tension stresses in the beam. In the construction illustrated, all of the secondary reinforcing members of a group are made of a continuous wire 5. This wire is fastened near one end of the lower bar of a side frame of the primary reinforce and thence extends vertically upward and over the outer end of the corresponding upper bar and thence downwardly at an inclination to and around the lower

bar and thence up again and over the upper bar and down at an inclination to the lower bar and so on. Preferably, the several loops of the wire reach to the same height, the outermost loops being in contact at their tops with the upper reinforcing bar, while the remaining loops extend above the portions of the bar inclosed by them respectively. The wire thus constituting a group of secondary reinforcing members is secured by any suitable fasteners 6 to the main reinforcing bars and is preferably of a kind that has considerable rigidity. A suitable fastener or clip consists of a blank of pliable metal of a width less than the thickness of the bar and provided with elongated lateral projections 7 at diagonally opposite corners. These projections are of such length that when the body portion lies flatwise against one side of a bar and the projections are bent, they will reach around to the opposite side. A transverse groove in the body portion receives the wire, which is thus firmly clipped to the bar. An important advantage of this construction is that the number, spacing and inclination of the loops may be varied as desired, and that the continuous wire and the main reinforcing bars coöperate in stiffening the side frames and thus mutually protect each other in transit.

The side frames or members of the complete unit frame are connected together by links 8 of any suitable type that will permit such side members to come together. As illustrated in the accompanying drawing, the distance pieces or spacing clips 4 which hold together the main reinforcing bars of a side frame or member are formed with eyes or vertical openings 9 therethrough. These eyes constitute sockets for pintles formed on the links, whereby the links are pivotally connected at each end to the side members of the complete unit frame. In the construction illustrated, each link is made of a continuous strip or stiff wire bent into the form of a rectangle with the ends of the wire meeting at the middle of a short side of said rectangle. The middle portion of said wire constituting one short side of the rectangle lies in the opening of one distance piece and the two end portions lie in the opening in the distance piece on the opposite side frame. By this construction, the link offers little or no obstruction to the flow of the concrete, and its bearing is the full width of the spacing clip or distance piece. A suitable distance piece for square bars is illustrated in Fig. 6. This distance piece is made out of a blank or sheet of pliable metal. This blank comprises a middle section whose length is something more than the distance between the bars to be spaced and whose width is sufficient to be bent into an eye for the link. At each side of this middle portion is a notch 10 of proper dimensions to receive the bar with which the blank is designed to coöperate. At the outer side of each notch, the blank has an elongated lateral projection 11 which extends a distance greater than the thickness of the bar with which it is designed to coöperate. The blank is first doubled back to form the eye. Then the bars are positioned in the notches provided therefor and then the projecting marginal portions of the blank are bent over at right angles to the plane of the body portion and then the projecting portions 11 are bent down around the outside of the bar. In practice, the form of the notches is made to conform to the contour of the bar. That is to say, in the case of a square bar, the notches are rectangular, as illustrated in Fig. 6; and in the case of a round bar, the notches are concave, as illustrated in Fig. 12.

When bars having transverse ribs are used, it is desirable to proportion the marginal or corner projections of the blank so that when the blank is shaped up, there will be a slight space 12 between adjacent corner projections, whereby the transverse ribs may rest between and be interlocked by such corner portions, as illustrated in Fig. 7.

Fig. 6ª illustrates a modified form wherein the eye is formed at one edge of the blank; in this form the elongated projections are slotted lengthwise so as to adapt them to straddle transverse ribs on the reinforcing bars. With either form, the bars are prevented from slipping endwise with respect to each other.

It is noted that by reason of the parallel frames being pivotally linked together, the construction may be collapsed for shipment, in which condition it is less bulky and less liable to injury. So, too, it is noted that if the centering should be accidentally made narrower than designed, the pivotally mounted links will permit the space between the side frames to be decreased without affecting the parallel relation of said frames.

While the foregoing description relates to a unit frame having two side members, it is obvious that the invention may be embodied in a unit frame having any number of parallel frames or members, as illustrated in Figs. 7 and 9, for instance. So, too, it is obvious that it is not necessary that the parallel frames or members should be counterparts of each other. For instance, the middle member of the collapsible unit of Fig. 9 is a single bar, and likewise the side members might be single bars or more than two bars without departing from my invention. In such case, the parts hereinbefore designated as distance pieces or spacing clips serve merely to mount the links pivotally on the bars.

What I claim is:

1. A spacing clip for a concrete reinforce

comprising substantially parallel reinforcing bars, said spacing clips comprising a flanged blank having end notches adapted to receive reinforcing bars and having the flange terminating in portions adapted to be bent around the outer portions of said bars, respectively.

2. In a concrete reinforce comprising parallel reinforcing bars having transverse projections thereon, a spacing clip mounted on and adapted to hold said reinforcing bars in proper relation to each other, said spacing clip comprising a blank having notches in its ends adapted to receive said bars and having marginal extensions adjacent said notches adapted to be bent around said bars between said projections.

3. In a concrete reinforce comprising reinforcing bars arranged in a vertical plane and having transverse ribs thereon, a spacing clip adapted to hold said bars in proper relation to each other, said spacing clip comprising a blank having notches adapted to receive said bars and having portions adapted to be bent around the bar on opposite sides of a transverse rib.

4. In a concrete reinforce comprising reinforcing bars arranged in a vertical plane and having transverse ribs thereon, a spacing clip adapted to hold said bars in proper relation to each other, said spacing clip comprising a blank having notches adapted to receive said bars and marginal flanges which have narrower extensions adapted to be bent around the bar on opposite sides of a transverse rib.

5. In a concrete reinforce comprising a plurality of frames each consisting of reinforcing bars, spacing devices adapted to hold said bars and frames in proper relation to each other, said spacing devices comprising spacing clips, each clip comprising a blank having notches adapted to receive said bars and having marginal portions adapted to be bent around said bars, and a plurality of links each pivotally mounted on the spacing clips of the respective frames.

6. A spacing device for a concrete reinforce comprising a plurality of frames each consisting of reinforcing bars, said spacing device comprising a plurality of spacing clips each adapted to hold the bars of respective frames in proper relation to each other, said spacing device comprising a plurality of clips each comprising a doubled blank having an eye and having notches in its edges adapted to receive reinforcing bars and marginal extensions adapted to be bent around said bars, and a plurality of links of rectangular shape mounted in the eyes of the spacing clips of the respective frames.

7. In a concrete reinforce comprising a plurality of frames each consisting of reinforcing bars, spacing clips adapted to hold said bars in proper relation to each other, said clips each comprising a doubled blank having an eye in its middle portion and having notches in its edges adapted to receive said bars and marginal extensions adapted to be bent around said bars, and a plurality of wire links of rectangular shape mounted in the eyes of the spacing clips of the respective frames.

8. A spacing clip for parallel reinforcing bars, said clip comprising a doubled sheet metal blank having notched ends adapted to receive reinforcing bars, and extensions adjacent said notches adapted to be bent around bars positioned in the respective notches.

9. A spacing clip for parallel reinforcing bars, said clip comprising a sheet metal body portion having a notch adjacent either end, said notch being shaped to provide a seat for a reinforcing bar, and extensions adjacent said notches adapted to be bent around bars positioned in the respective notches.

10. A concrete reinforce comprising members located in parallel frames, the members of said parallel frames being held in proper relation to each other by spacing members, and parallel links collapsibly connecting said frames together, said links comprising portions which are pivoted to said spacing members.

11. A concrete reinforce comprising upper and lower members assembled in parallel vertical frames, a rigid link for collapsibly connecting said frames together at top and bottom, and means pivotally connecting said link with said upper and lower members, the members of said frames being arranged to take care of the tension stresses in the concrete structure.

12. A concrete reinforce comprising reinforcing bars, a plurality of means for securing said bars in vertical frames, and rigid parallel links each pivotally connecting said frames together at both the tops and the bottoms thereof, the bars of said frames being arranged to take care of the tension stresses in the concrete structure.

13. A concrete reinforce comprising parallel vertical frames and rectangular wire links pivotally connecting them together, each frame comprising reinforcing bars and spacing clips adapted to hold them in proper relation to each other, and said rectangular links being pivotally mounted on said spacing clips.

14. A collapsible reinforcing unit frame comprising reinforcing members in parallel planes, clips secured to and spacing apart reinforcing members lying in the same plane, and spacing links pivotally secured to said reinforcing members by means of said clips and collapsibly maintaining the respective members of said frame in parallel relation.

15. A concrete reinforce comprising rein-

forcing bars arranged in parallel vertical frames, clips fixedly secured upon and rigidly connecting the upper and lower bars of said frames respectively, and rigid parallel links pivoted to said clips at separated points in vertical alinement, the bars of said frames being arranged to take care of the tension stresses in the concrete structure.

In testimony whereof I have signed my name to this specification in the presence two subscribing witnesses this 11th day February, 1909, at Washington, D. C.

ALFRED E. LINDAU.

Witnesses:

EDWIN S. CLARKSON,

C. B. MELTON.