July 20, 1943. R. J. O'BRIEN 2,324,719

BAR SPACER

Filed Dec. 23, 1940

Fig. 1.

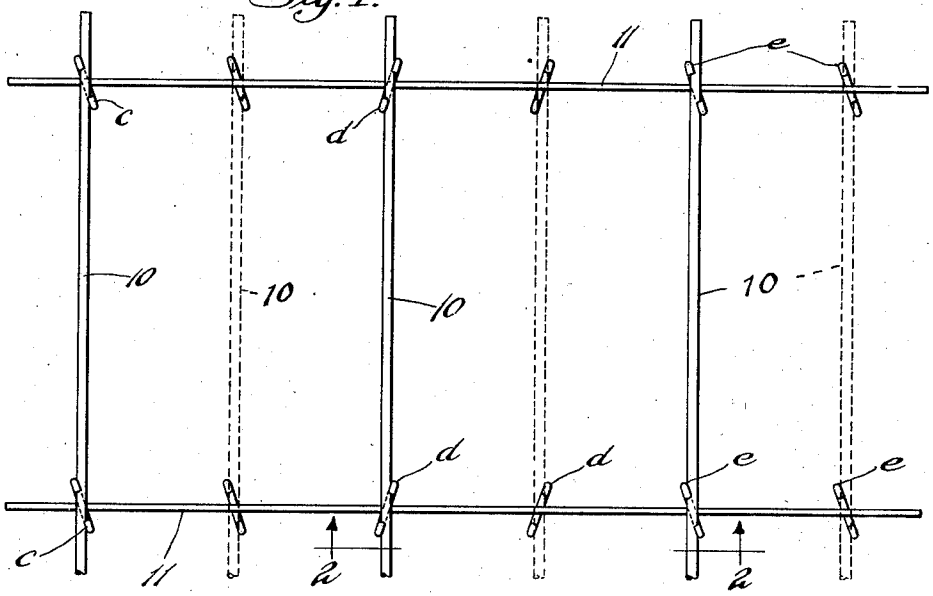


Fig. 2.

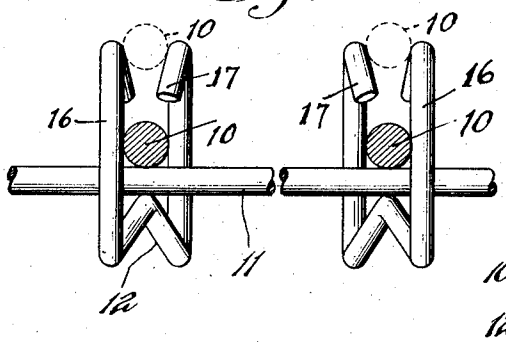


Fig. 3.

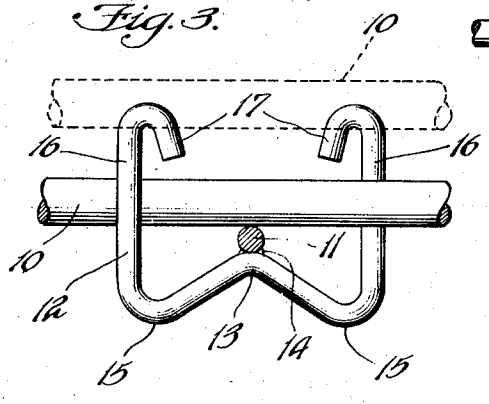
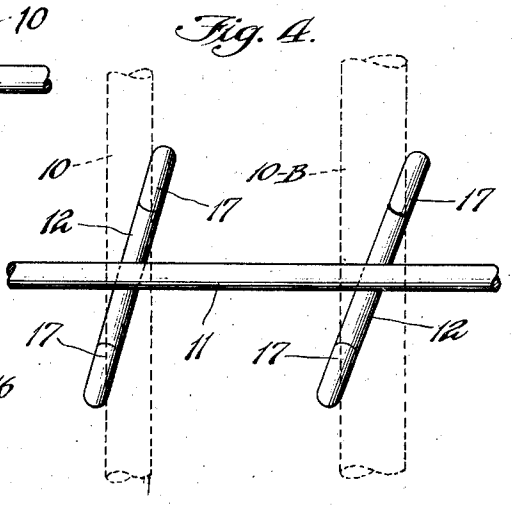


Fig. 4.



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BAR SPACER

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3 Claims. (Cl. 72—122)

This invention relates in general to a structural support and spacer for the reinforcing metal bars which are inserted in beams, joists, floors, and the like, and is more particularly described as a spacing unit and a system of reinforcing in which the supporting units and the reinforcing bars are flexibly interlocked when set up in a multiple four-post or rectangular construction.

An important object of the invention is in the provision of a concrete reinforcing structural unit and bar interlocking system for reinforced concrete slabs, joists, beams, floors, and the like, adapted to properly support and space reinforcing steel bars in such structures.

A further object of the invention is in the provision of a bar spacer in which the reinforcing bars may be pressed yieldingly in place by stepping on them, the bars being yieldingly locked in place without requiring additional wire or other ties for holding them in connection with the supports.

A still further object of the invention is in the provision of a bar spacer in which the supporting chairs are welded or otherwise attached to a common spacing rod at an oblique transverse angle thereto and in groups reversely disposed thereon with rounded legs extending below and upwardly extending sides, with reentrant angular extremities which provide a resilient interlock for reinforcing steel inserted therebetween.

Other and further objects of the invention are; to provide an improved bar support and lock having an improved four point interlocking principle; to provide a bar spacer having similar groups of supporting chairs disposed in opposite directions to nest tightly together; to provide a supporting chair in which the outer sides are free to flex for resiliently receiving a spacer bar therebetween; to provide a spacer in which the same supporting chairs may be used for bars of different sizes by varying the angle of attachment to the spacing rod; to provide means for rectangular or opposite parallel side engagement of two supporting rods and two reinforcing bars interengaged therewith to tightly engage the opposite sides of reinforcing bars by supporting chairs at an acute angle to the bars and at an acute angle to the spacing rod for the chairs; to provide chairs with supporting legs, rounded at the bottom for limited form contact to obviate ceiling marks; to provide a structure in which the chairs may be galvanized before welding attachment to the spacing rod; to provide chairs which are made from cut bar or wire stock, bent to shape in a single plane with the cut extremities reentrant or turned inwardly to avoid damaging contact with the cut extremities which may have sharp edges; to provide a simple easily formed chair of resilient metal bar stock which is easily attached at various angles to a spacing rod; and in general, to produce a simple, durable and comparatively inexpensive structure as herein shown and described which cooperates to form an interlocking four-post reinforcing system.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawing in which,

Fig. 1 is a plan view of a portion of a rectangular interlocking arrangement of bar spacers and bars in accordance with this invention;

Fig. 2 is a sectional detail taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged side elevation of one of the supporting chairs; and

Fig. 4 is a detail plan view illustrating the attachment of similar chairs at different angles for accommodating reinforcing bars of different sizes.

Bar spacers having supporting chairs of various forms attached to a spacing bar, are well known in the art. The present invention provides a novel structure arrangement by inclining the chairs at an acute angle to the spacing rod by arranging the similarly inclined chairs in groups containing a plurality of chairs and in then reversing the angle of inclination of the chairs in the next succeeding group, so that when reinforcing bars are each applied to correspondingly inclined chairs of adjacent spacer rods and the space bars are applied to oppositely inclined chairs on the same rod, a rectangular interlocking structure is provided which will maintain a rectangular form, or a parallelogram arrangement, depending upon the inclination of the chairs to the rods and bars, and if the chairs are further provided with reentrant angularly turned extremities which restrict the reinforcing bars applied thereto, the resulting structure is a four-post supporting network which maintains its rectangular (or parallelogram) position and may be lifted and transported in that position without disarranging the four-post interlocking structure.

Referring now more particularly to the drawing, a plurality of bar spacers are assembled with reinforcing bars 10 in a concrete form for floors, girders, beams, and the like, to provide a reinforcing network spaced above the bottom of the form so that the spacers and reinforcing bars will be imbedded in the concrete, in a well known manner.

The bar spacer of this invention comprises a metal spacing rod 11 with a plurality of supporting stirrups or chairs 12 secured to it, preferably by welding at certain intervals along the bar. Each chair comprises a piece of metal bar or wire stock preferably round in cross section, cut from a length of such material and bent or formed in the manner shown. Each chair has a medial indented or recessed portion 13 adapted to be rigidly attached by welding 14 or other rigid means of attachment to the underside of the spacer bar 11. Depending from the central portion at each side thereof are rounded supporting leg portions 15 adapted to contact with the bottom of a concrete form or any other suitable support. Extending upwardly from the outer sides of the leg portions are upright parallel sides 16 which extend above the spacer rod 11, and the extremities 17 of the sides are turned downwardly and inwardly in a reentrant direction toward the spacing rod therein.

These chairs are attached transversely of the spacing bars, not directly at right angles thereto, but at a slightly oblique angle, the legs and sides thereof being spaced equally on opposite sides of the spacing rod so that the chairs will be held in upright position thereby. The angle at which each chair is attached to the rod is determined by the size of the reinforcing bar which it is designed or intended to receive and support, the angle from normal for a small bar 10 being less than the angle for a corresponding larger bar 10B as evident in Fig. 4.

In providing the bar spacers for reinforcing bars of a particular size, the chairs are preferably arranged along each rod with a plurality of chairs *c* in a group at the desired oblique angle to the rod and an adjacent group of a plurality of chairs *d* at the reverse angle thereto as indicated more clearly in Fig. 1. Chairs *e* at the other side of chairs *d* are usually inclined in the same direction as chairs *c*. It is not necessary to support a bar in each pair of chairs, they may be omitted or inserted at intervals as indicated in broken outline in Fig. 1.

In assembling the bars with the bar spacers, the supporting chairs together with the spacing rods to which they are attached, are disposed in parallel relation, the chairs of similar inclination of adjacent bar spacers being parallel or opposite each other so that for any given rectangular unit, the reinforcing bars engaged by reversely inclined chairs *c* and *d* on adjacent or remote spacer rods will form an independent rectangular unit consisting of two reinforcing bars 10 and two spacer bars 11 connected and supported at the angular corners thereof by four supporting chairs 12, thus forming in effect, a four-post rectangular structure which will maintain this rectangular formation when the reinforcing bars are properly engaged in the chairs. After any connected rectangular unit is thus set up, all the remaining bars of the system are easily inserted in place and there is no danger of dislodgement or displacement of the bars, making it much easier and taking less time to set up the completed structure for a large area.

In practice, after the bar spacers are set in parallel relation, the bars are placed above and in contact with the upper ends of the chairs partially seated therein as indicated in Figs. 2 and 3, and then by simply pressing the bars downward, the sides 16 are sprung apart, allowing the bars to slip past the inwardly turned ends 17, the resiliency of the sides springing them back in place and engaging the reinforcing bars at the inner edges of the opposite sides so that they are resiliently locked in place and are interlocked with the chairs and cannot be withdrawn bodily through the open end of the chair without sufficient pressure to spring the end 17 outwardly so that these ends act as a resilient interlock for the bars. This additional interlocking structure makes it possible to bodily lift a four-post connected structure consisting of two reinforcing bars 10 rectangularly connected with chairs *c* and *d* of different spacing bars so that the entire four-post assembly may be bodily moved from one location to another without disengagement of the members thereof.

While this interlocking four-post assembly is particularly described for a rectangular arrangement, it is obvious that by properly inclining the chairs in reverse directions upon the spacing rods and connecting the reinforcing bars thereto in the same manner, a corresponding angular structure with opposite parallel sides, like a parallelogram, may have the same features of maintaining this angular structure supported by the four cornered post thereof, and such structure may be bodily moved without disengaging the parts, the resilience of the engagement of the chairs with the bars holding the parts together.

With this structure, the chairs attached to the spacing rods have the greatest resilience since the opposite sides and extremities are entirely free from restriction by the attachment to the spacing rod and since the chairs may be completely formed before attachment by welding to the spacing rod, they may be galvanized or otherwise treated to avoid rusting. Another advantage of this construction is that the bar spacers, for any length or size of bars being entirely similar, they will nest readily together to save space in packing and shipment. As the same chairs may be connected at different oblique angles to the spacing rods for receiving reinforcing bars of different sizes, there is a resulting economy in the making, using and assembling of the bar spacers and also of the system of reinforcing thus disclosed.

I claim:

1. A structural bar spacer comprising a plurality of W-shaped bar receiving chairs and a common rod to which the chairs are rigidly connected at the central upwardly extending portion of the chair, the upward extremities of each chair extending inwardly and downwardly from the sides, and each chair extending transversely of the rod and inclined at an angle to receive a cross rod closely between the opposite sides of the chair, and the inwardly extending extremities terminating short of the cross rod inserted therein, and preventing the free removal of the rod from the chair.

2. The combination with a structural spacing rod and reinforcing cross bars, of a plurality of W-shaped chairs, each with the bottom indented portion secured to the under side of the rod, the chairs being inclined to the rod a sufficient angle to receive the bars between opposite sides thereof, the upper extremities of the chair being turned inwardly and terminating short of the rod therebetween, the said extremities being spaced apart less than the size of the bar so it must be sprung into the opening of the chair for locking a bar loosely therein.

3. In a structural bar spacer, a quadrangular interlocking structure of spacing rods reinforcing cross bars and supporting chairs, comprising

similar W-shaped chairs having the indented portion of each chair attached to the lower side of the rods, the chairs being spaced apart and disposed reversely oblique on each rod, and the reinforcing bars engaging similarly inclined chairs on the spaced rods, but the chairs for different pairs of bars of the quadrangle being reversely inclined, the sides of each chair extending upwardly and at such an angle to its spacing rod as to receive the cross bars therebetween, the extremities of each chair being turned reversely inwardly so that the sides must be sprung apart to insert the cross bar into the opening of the chair; two bars, two rods, and the interengaging chairs thereon together constituting a structural bar and rod reinforcement engaged at the four corners thereof, so that it may be bodily lifted and moved without disengaging the parts.

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