

Sept. 10, 1946.

B. F. BURNER ET AL

2,407,249

CHAIR-TIES FOR REINFORCING RODS

Filed Jan. 17, 1945

2 Sheets-Sheet 1

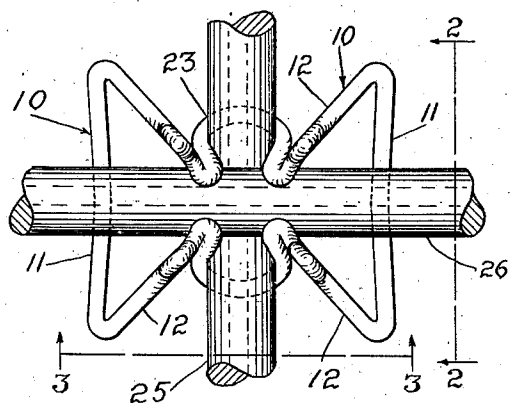


Fig. 1.

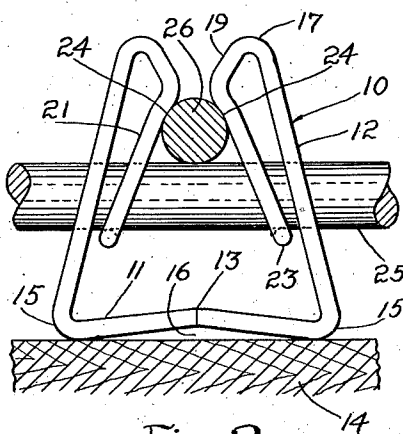


Fig. 2.

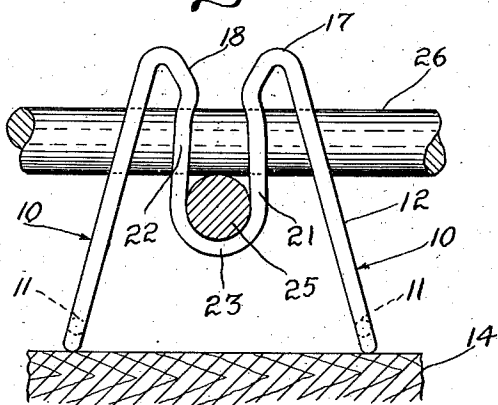


Fig. 3.

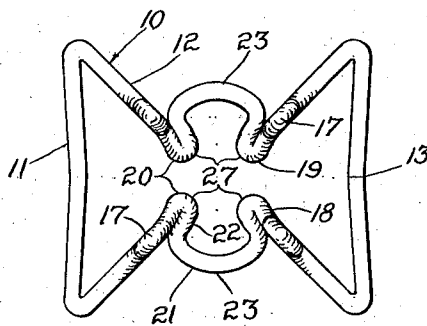


Fig. 4.

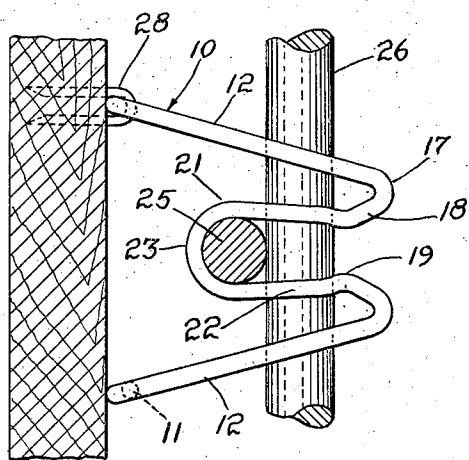


Fig. 6.

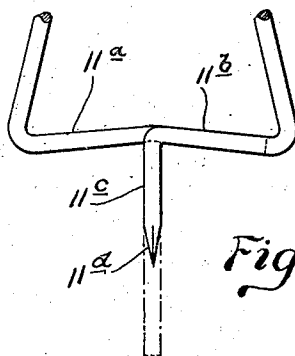


Fig. 5.

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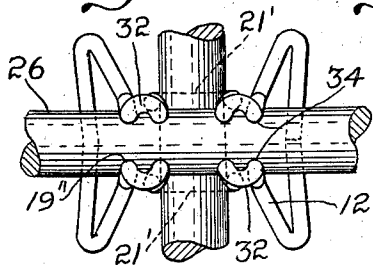
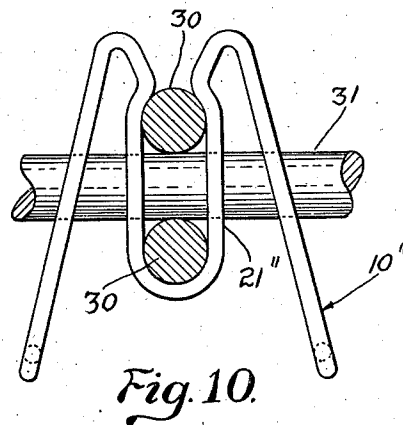
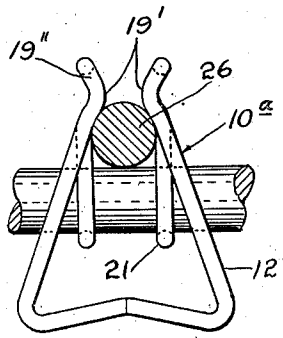
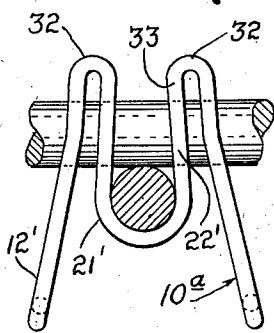
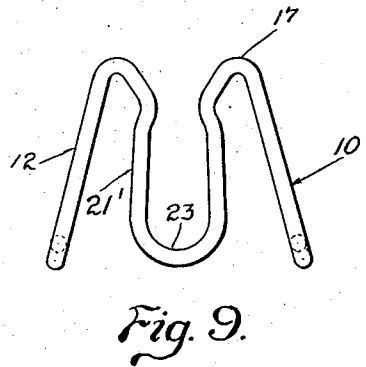
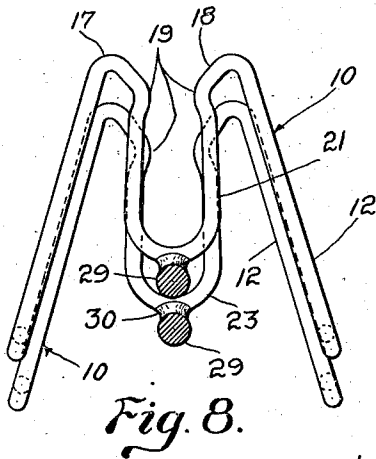
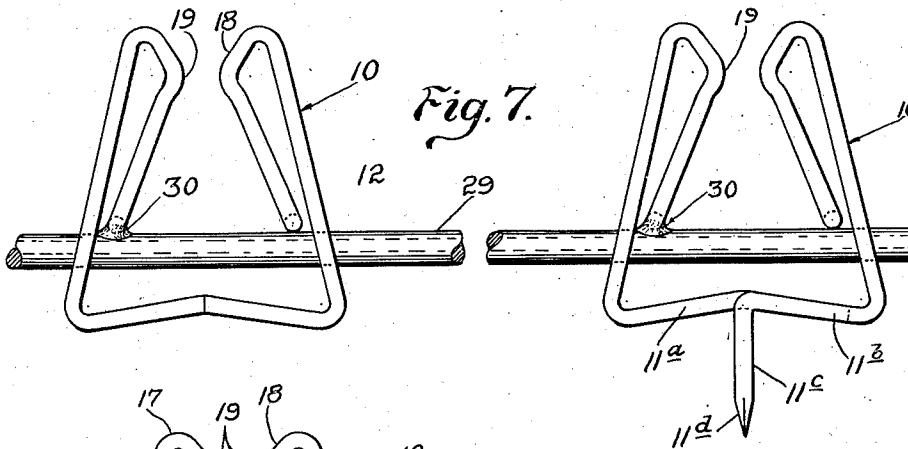
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2 Sheets-Sheet 2



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CHAIR TIE FOR REINFORCING RODS

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Application January 17, 1945, Serial No. 573,200

17 Claims. (Cl. 72-122)

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This invention relates generally to the class of masonry and concrete construction and is directed particularly to devices for supporting reinforcing rods in a desired position in the forms while the concrete is being poured thereinto.

At the present time the method in general use in connection with the securing of reinforcing rods in position in mold forms, is to wrap a wire around the rods at the crossing points, twist it and cut it off above the twist. This method takes considerable time and requires other means as well to support the rods the required distance from the form.

A principal object of the present invention is to provide an unique and simple device for supporting and retaining the reinforcing rods in position during the pouring and forming of a concrete structure, which provides a means to clamp the bars or rods together at their crossing points as well as to hold them above or away from the surface of the form the required distance in the particular application.

A further object of the invention is to provide a simple unit of low manufacturing cost and one which is quickly and easily attached to the rods without the employment of special tools.

Another object of the invention is to provide a securing unit for reinforcing rods which, when installed, will maintain the rods firmly in position so that they cannot be displaced by the pouring of the concrete or by being stepped upon, the supporting units being so constructed that the application of a load upon the crossed rods, in horizontal applications, has the effect of causing the supporting and securing units to grip and hold the rods more tightly.

A still further object of the invention is to provide a rod supporting clamp that is adaptable for use in vertical, horizontal or inclined concrete forms and which may be produced or manufactured attached in multiples to a spacer bar which properly space the crossed bars on the job, thereby eliminating the work of measuring the spaces between the same.

Still another object of the invention is to provide a rod supporting and tying chair of a novel design whereby the same may be readily nested either as single units or as spacer bar type multiple units for compact packaging, shipping and ease of handling on the job.

A still further object of the invention is to provide a reinforcing rod supporting and securing chair or chair-tie which is designed particularly for girder and beam construction in that it will accommodate two or more layers of longitudinal bars and an intermediate layer of transverse spacer bars.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of the specification, with

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the understanding, however, that the invention is not confined to a strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a top plan view of the reinforcing rod securing device or chair-tie constructed in accordance with one embodiment of the invention and showing a pair of rods in assembled relation therein.

Figure 2 is a section on the line 2-2 of Figure 1, showing the chair-tie in elevation.

Figure 3 is a sectional view taken on the line 3-3 of Figure 1, showing the chair-tie in elevation.

Figure 4 is a view in top plan of the chair-tie per se.

Figure 5 is an elevation of the lower part of a modified form of the chair-tie having a nailing member integral therewith.

Figure 6 is a view in elevation of the chair-tie showing the manner of using and securing the same in vertical forms by the use of staples.

Figure 7 illustrates the application of a plurality of the chair-ties to a spacing rod, the chair-ties being shown in elevation.

Figure 8 shows two chair-ties in elevation and assembled on spacing rods, showing the manner in which the chair-ties would be nested.

Figure 9 is a view in elevation of a modified chair-tie for use where no legs are required.

Figure 10 is a view in elevation of a modified form of the chair-tie designed to accommodate three reinforcing rods.

Figure 11 is a view in elevation of the upper part of a further modified form of the chair-tie having a different arrangement of rod clamping or tying means.

Figure 12 is a view in elevation, first angle projection, of the upper part of the chair-tie shown in Figure 11.

Figure 13 is a view in top plan of the chair-tie and rods, shown in Figures 11 and 12.

Referring now more particularly to the drawings, it will be seen that the chair-tie device may be formed of a single piece of material, preferably a continuous piece of relatively low-grade spring steel wire.

The size of wire used, the amount of spring clamping action, the size of the loops and the length of the legs of the formed chair-tie, would be governed by the particular type of concrete construction and the size of the bars or rods used. The spacing of the chair-tie units when joined to the spacer bar, as hereinafter described, would be governed by the various standards of constructions.

Referring particularly to Figures 1 to 4 inclusive, it will be seen that the chair-tie comprises or is made up to form, the two legs each of which is generally designated 10 and which comprise the bottom or base portion 11 and the two convergent side portions 12. The upper ends of the side portions 12 are unconnected and are in spaced relation as shown in Figures 1 and 4.

As previously stated the chair-tie units are formed preferably from a single piece of wire of suitable size and weight and in the embodiment as illustrated in Figures 1 to 4, the ends of the wire are brought together and welded at the central part of the base portion 11 of one leg as indicated at 13.

While the base portions 11 may be made straight, if desired, it is preferred that they be bowed or arched upwardly as illustrated most clearly in Figure 2 so that contact will be made with the surface of the form board 14 at the corners 15 only, thus forming a space 16 between the surface of the form board and the base of the leg in which the cement may flow between the base and the form board.

The legs 10 of the unit are disposed in inclined relation as shown in Figures 2 and 3 so that the upper ends are closer together than the bases. This arrangement of the legs has a particular function in increasing the locking or gripping action of the chair-tie on the rods, particularly when a weight is applied to the rods.

In the formed device the upper end of each leg portion 12 is continued or extended through the bend 17 into the downwardly and inwardly extending portion 18. These portions are generally directed towards the center of the tie unit and the two portions 18 of each leg are arranged in downwardly convergent relation, as best seen in Figures 1 and 4, each portion merging into the locking knee loop 19. These knees or knee loops 19 are positioned to form the opening 20 through which one of the tie rods is forced, as hereinafter described.

The numeral 21 generally designates a rod receiving saddle loop which is suspended from the upper ends of the side portions 12 of two legs 10 through the medium of the intermediate portions 18.

Each of the saddle loops is of substantial length and comprises the side portions 22 which are connected at their lower ends by the substantially semi-circular yoke 23. The upper ends of the side portions 22 of each saddle loop are joined to knee loops 19 and the ends of the side portions 22, where they join or merge into the knee loops, form with the knee loops the set-back or shallow recess 24 which receives a portion of a rod as illustrated and as hereinafter more fully described.

The side portions 22 of each cradle loop are tapered inwardly slightly or, in other words, are slightly convergent toward their upper ends so as to give a light retaining action on the lower bars or rods 25 which pass through the saddles and rest in the bottoms or yokes 23 thereof.

The length of the saddles is properly proportioned with respect to the diameters of the rods so that when the upper rod 26 is placed in position transversely of the lower rod 25, the top of the upper rod will come just below the gripping knee loops 19 and engages at its sides, above its center, in the recesses 24. Thus, as will be readily seen, the knees 19 will bear down upon the top rod 26 and force it firmly into position against the oppositely extending lower rod 25.

As will be readily seen upon reference to Figure 4, the openings or spaces 20 between the knees 19 in line with the bar 26 are, and preferably should be, somewhat less than the space or openings 27 at the top of each saddle loop, in line with the lower bar 25.

As best seen in Figure 2, the saddle loops 21 are arranged to converge at the top ends. Thus when the rods have been placed in position it will be readily seen that any weight applied thereto will result in a pulling downwardly upon the saddle loops so as to draw the knees 19 inwardly and at the same time, because of the inclined arrangement of the legs 10, the upper ends of such legs will also be drawn together so that the combined effect is to more firmly grip and lock the two rods in place and against relative movement.

Figure 5 illustrates the lower end of one leg of the chair-tie, modified slightly to provide an integral means for securing the chair-tie to vertical, inclined or horizontal forms. The formation of such integral securing means is accomplished by lapping the two parts 11a and 11b making up the bottom portion of the leg and bending downwardly the portion 11b at the vertical center of the leg as illustrated to form the spike extension 11c, the lower end of which is pointed as indicated at 11d. The remaining lapping parts are welded together. With this arrangement it will be readily apparent that by properly positioning or angling the chair-tie with respect to the form surface, the spike may be readily driven into the surface by striking a sharp blow against the upper end thereof.

Notching or sharp bending of the spike or of the portion 11b from which the spike is formed, facilitates the breaking off of the spike below the surface of the concrete after the form has been removed. If preferred a suitable tool may be used for breaking or clipping off the spike after the form is removed, whichever is most convenient or practical.

Figure 6 illustrates how the regular type chair-tie, that is, the embodiment illustrated in Figures 1 to 4 inclusive, may be fastened to a vertical, inclined or horizontal form by the use of staples, one of which is here illustrated and designated 28. When the chair-ties are secured in this manner to a vertical or inclined form surface, the horizontal bars or rods would first be inserted and then the vertical bar would be pressed into position which completes the clamping action.

The individual chair-ties may be placed at each cross or wherever specified. However, before the top rod or bar is pressed into final position the individual chair-ties can very readily be moved along the lower bar for proper alignment to receive the top bar.

In horizontal forms the method would be to place all lower reinforcing bars on the form in approximately the proper location with the chair-ties spaced along these bars at the intervals desired. In some horizontal forms the hereinafter described spacer bar type of chair-tie may be preferred for simplicity of installation as it automatically spaces the cross bars the correct distance without measuring for the same. After the chair-ties are properly located the cross bars are placed in the chair-ties and pressed in position, which firmly clamps together the entire layout of reinforcing elements.

Referring now particularly to Figure 7 there is illustrated an arrangement whereby a number of the chair-ties are secured to a spacer bar which is designated 29. This view shows the applica-

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tion to the spacer bar of a chair-tie of the regular type illustrated in Figures 1 to 4 inclusive together with a tie of the modified form having the spike formed as an integral part of one leg. Any desired number of chair-ties might be applied to the spacer bar and in combining the two types, the drive type, of which the base portion is illustrated in Figure 5, might be applied to the ends and to the center of the spacer bar unit for holding the unit against displacement during installation and during the pouring of the concrete.

The spacer bar 29 is preferably formed of relatively small round steel, of any desired length, generally about eight feet, and is welded to the underside of the yoke portion of one saddle loop only of each tie as indicated at 30. With this arrangement it will be readily seen that while each chair-tie is securely attached to the spacer bar, one saddle loop of each tie will be free for the necessary movement which it must have to allow for the insertion of the reinforcing rods or bars and for the increasing of the gripping action of the chair-tie upon the rods or bars when a weight is applied thereto as, for example, when a workman might step upon either of the rods.

Figure 8 illustrates the manner in which the chair-ties, together with the spacer bars, may be nested for compactness in packaging and handling. It will be readily obvious that the chair-ties without the spacer bar may also be nested as shown. In most cases the chairs would be so constructed that a slight forcing would be required to nest them.

Figure 9 illustrates a slightly modified form of the chair-tie shown in Figures 1 to 4 inclusive wherein the legs, designated generally by the numeral 10', while constructed in exactly the same manner as the legs 10, are shortened so that the lower ends of the saddle loops, generally designated 21', rest on the form. This type of chair-tie would be used where the reinforcing rods are not required to be above the form.

Figure 10 illustrates another slight modification of the chair-tie as illustrated in Figures 1 to 4 inclusive, for use in girder and beam construction where two layers of longitudinal bars, designated 30, and an intermediate layer of transverse reinforcing bars 31 are used. As will be readily apparent the modification consists in making the saddle loops 21' of sufficiently greater length to take the three bars employed and the legs 10' are correspondingly lengthened so as to maintain the three layers of bars at the desired or proper distance from the form.

Figures 11, 12 and 13 illustrate another embodiment of the invention involving a slight modification of the connection between the upper ends of the side portions of the saddle loops and the adjacent portions of the legs between and from which each saddle loop is suspended.

Each leg has formed adjacent to the upper end of each of its side portions 12', an inward bend forming a knee 19' and the terminus of the leg portion above the knee is continued upwardly and outwardly as at 19'' and is curved over toward the opposite leg as at 32 and downwardly as at 33 in a short portion paralleling and corresponding with the portion 19'. Each of these short portions merges with the inwardly bowed knee forming portion 34 which forms a continuation of the upper end of a side 22' of a cradle or hanger loop 21'.

It will thus be seen that with the arrangement shown in Figures 11, 12 and 13 the top rod or re-

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inforcing bar 26 will be engaged upon each side by two pairs of gripping knees, one knee of each pair forming a part of the upper end of a side portion of a leg and the other knee of the pair forming a part of the upper end of a side portion of a hanger or saddle loop.

In view of the foregoing it will be readily apparent that there is provided in the chair-tie unit herein disclosed, in its several modifications, a device which may be easily and quickly placed in position and with which crossed reinforcing rods or bars may be easily and quickly connected without the employment of any tools. Also, because of the unique formation of the unit the first applied reinforcing rods or bars may have the units shifted or adjusted thereon to the proper spaced positions and upon application of the second or top rods the gripping knees will engage over and press down upon the top rods to firmly bind the same in place against the underlying rods. Furthermore, because of the novel formation of the supporting saddle loops, if a workman should step upon the rods or if a heavy weight should be placed thereon, the tendency of the legs and saddle loops will be to draw together or close at their upper ends thereby imposing on the rods or applying to the same a stronger gripping or binding action.

We claim:

1. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of substantially triangular leg members each having a supporting base portion and converging side portions, said side portions being spaced apart at their convergent ends, a pair of rod supporting saddle loop members each including side portions and a connecting yoke portion at one end, the side portions of the loop members being joined at their other ends with two adjacent side portions of the two leg members, the convergent ends of the side portions of each leg member being spaced apart a distance less than the diameter of a reinforcing rod, and the said upper ends of the side portions of the saddle loop members being bowed inwardly to form pressure knees designed for contact with the upper part of a reinforcing rod extending between the loop members.

2. A rod chair-tie of the character set forth in claim 1, in which said leg members are inclined together at their upper ends.

3. A rod chair-tie of the character stated in claim 1, in which the said leg members are inclined together at their upper ends and said saddle loop members are likewise inclined together at their upper ends.

4. A rod chair-tie of the character stated in claim 1, in which said leg members are inclined together at their upper ends and the saddle loop members are likewise inclined together at their upper ends, and the side portions of the saddle loop members being joined to their respective side portions of the leg members by short upwardly and outwardly extending portions.

5. A rod chair-tie as set forth in claim 1, in which the upper end of each side portion of each leg member is inwardly bowed to form a rod contacting knee having a parallel relation with the knee of the adjacent side portion of the adjacent saddle loop member.

6. A rod chair-tie of the character stated in claim 1, in which a part of the base portion of one leg member is formed to provide a material penetrating member.

7. A rod chair-tie of the character stated in

claim 1, in which the base portion of each leg member is longitudinally upwardly bowed.

8. A rod chair-tie as set forth in claim 1, with a tie rod extending between the leg members across the lower ends of the saddle loop members, and a bonding connection between said tie rod and one of said saddle loop members.

9. As a reinforcing rod supporting unit, a plurality of chair-ties each comprising a pair of spaced substantially triangular leg members, each leg member comprising a base portion and convergent side portions spaced apart at their convergent ends a distance slightly less than the diameter of a reinforcing rod, a pair of reinforcing rod supporting saddle loop members each comprising two side portions and a yoke connecting side portions at the lower ends of the loop, at other ends of the side portions of each loop being joined to the upper ends of adjacent side portions of the two legs, the loops at their upper ends being open a distance slightly less than the diameter of a reinforcing rod, the upper end portions of each loop being bowed inwardly slightly to form gripping knees cooperating with the knees of the opposite loop for engagement against the upper sides of a rod passing between the loops, and a tie rod passing between the legs of the plurality of chair-ties beneath the yokes of the loops and having positive connection with the yoke of one loop only of each chair-tie.

10. A reinforcing rod supporting unit as set forth in claim 9, in which one of said units has a portion of the base portion thereof extended substantially perpendicular to the base portion and formed to provide a material penetrating securing element.

11. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of substantially triangular leg members each comprising a base portion and convergent side portions spaced apart at their upper ends, a part of the upper end of each side portion of each leg member being bowed inwardly, said in-bowed parts forming gripping knees and being spaced apart a distance less than the diameter of a reinforcing rod, a pair of relatively long saddle loop members disposed substantially vertically between adjacent side portions of the pair of legs, each of said loop members including vertical side portions each formed at its upper end to provide an inwardly bowed part forming a rod engaging gripping knee, the inwardly bowed part of each side portion of each loop being in spaced parallel relation with the inwardly bowed part of the adjacent leg side portion and forming an integral continuation thereof.

12. In a rod chair-tie for reinforcing rods at crossings, a pair of supporting legs, a pair of rod hanger loops, each loop being suspended between two legs and open at its top to receive a rod, and each leg being open at its top to receive a rod lying perpendicular to the first rod, the first rod forming the support for the second rod, and the legs and loops being so constructed and arranged that the weight imposed on the loops tends to close the open tops of the legs upon the upper part of the top rod to effect the clamping together of the two rods.

13. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of spaced leg members each having an upper end open to receive a rod, and a pair of saddle loop members suspended between the upper ends of the leg members and having a depth as great as the combined diameters of two rods, each saddle loop

member having an open upper end to facilitate the placing of a rod within the saddle loops to extend perpendicular to the first rod, said open upper ends of the leg members and of the saddle loop members being smaller than the diameters of the rods necessitating the spreading of the open ends for the passage of the rods there-through.

14. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of spaced leg members each having an upper end open to receive a rod, and a pair of saddle loop members suspended between the upper ends of the leg members and having a depth as great as the combined diameters of two rods, each saddle loop member having an open upper end to facilitate the placing of a rod within the saddle loops to extend perpendicular to the first rod, the said saddle loop members comprising side portions slightly convergent toward the open end of the loop.

15. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of spaced leg members each having an upper end open to receive a rod, and a pair of saddle loop members suspended between the upper ends of the leg members and having a depth as great as the combined diameters of two rods, each saddle loop member having an open upper end to facilitate the placing of a rod within the saddle loops to extend perpendicular to the first rod, the said spaced leg members being so constructed and arranged that the application of a weight to crossed rods supported by the chair-tie, will have the effect of tending to close the open upper ends of the legs against the upper part of the rod member passing therebetween.

16. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of spaced leg members each having an upper end open to receive a rod, and a pair of saddle loop members suspended between the upper ends of the leg members and having a depth as great as the combined diameters of two rods, each saddle loop member having an open upper end to facilitate the placing of a rod within the saddle loops to extend perpendicular to the first rod, each of said leg members being in the form of an open, substantially triangular frame and said leg members being inclined together at their open upper ends.

17. A rod chair-tie for supporting reinforcing rods at crossings, comprising a pair of spaced leg members each having an upper end open to receive a rod, and a pair of saddle loop members suspended between the upper ends of the leg members and having a depth as great as the combined diameters of two rods, each saddle loop member having an open upper end to facilitate the placing of a rod within the saddle loops to extend perpendicular to the first rod, each of said leg members being in the form of an open, substantially triangular frame and the leg members being inclined together at their upper ends, and said saddle loop members being inclined together at their upper ends, the saddle loop members being of such length that when one rod is disposed in the loop members and a second rod is disposed upon the first rod and between the loop members, the inclined upper ends of the loop members will engage against the upper sides of the second mentioned rod.