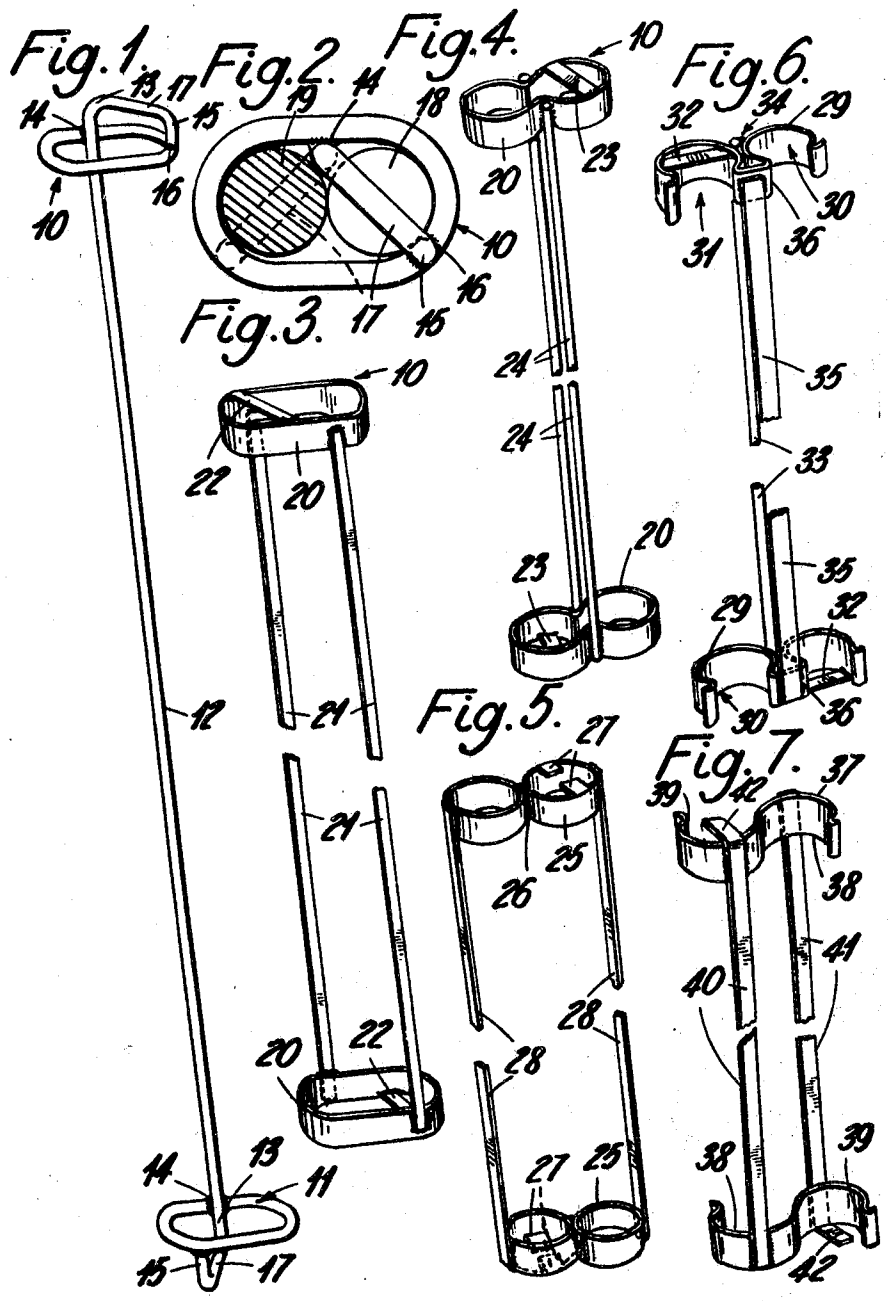
July 2, 1968 D. A. STEWART 3,390,905

HOLDING AND LOCATING DEVICES FOR OVERLAPPING STRUCTURAL MEMBERS

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Fig. 8.

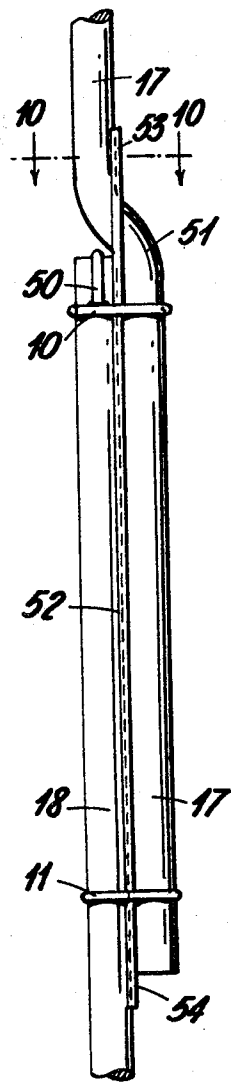


Fig. 9.

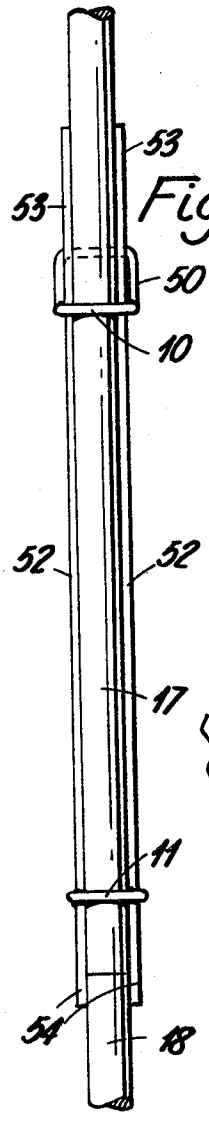


Fig. 10.

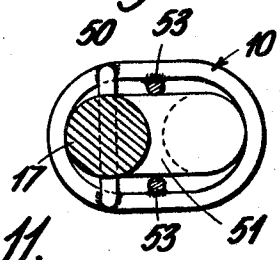


Fig. 11.

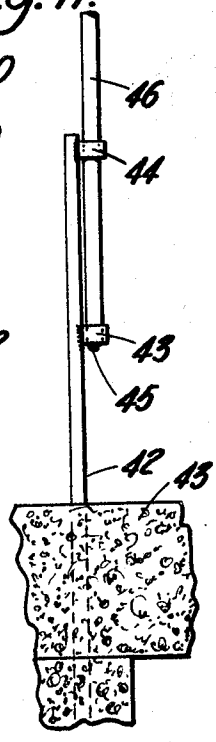
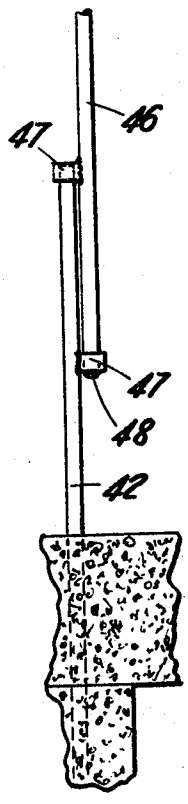


Fig. 12.



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HOLDING AND LOCATING DEVICES FOR OVERLAPPING STRUCTURAL MEMBERS

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8 Claims. (Cl. 287—189.36)

ABSTRACT OF THE DISCLOSURE

The disclosure of this invention pertains to unitary holding and locating devices for overlapping structural members in which two separately formed elements partly embrace overlapping portions of the two structural members and in which the elements are secured together by one or more separately formed tie members, the structural members being freely slidable in said element.

This invention relates to holding and locating devices for overlapping structural members and particularly for overlapping reinforcing rods for reinforced concrete.

In the case of reinforced pillars which support and are joined to floor beams it has heretofore been usual to arrange for the overlapping portions of reinforcing rods for the pillars to be disposed close to a floor beam since it is easier to effect the overlapping and maintain it during the casting of the concrete around the reinforcements. However, this results in the overlap being disposed at or close to the region of maximum bending stresses in the pillar and thus requires a considerable length of overlap to be adopted. One of the objects of the present invention is to provide a holding and locating device which will enable the overlap to be disposed and manipulated at a distance away from the floor beam where the bending stresses are lower whereby the extent of overlap may be reduced resulting in a considerable saving in reinforcing material. However, the invention is not limited to use with reinforcing rods but is applicable to other structural members, for example, can be used for locating and holding overlapping scaffolding.

According to this invention a holding and locating device for two overlapping structural members which device is either formed as a unit or is fixed to one or both said members and comprises two spaced elements arranged to encircle or partly to encircle one or both said structural members, means for limiting relative axial movement between an element and at least one of the structural members in at least one direction along that member and means for preventing relative axial movement between the two elements and means for preventing axial movement between the structural members in at least one direction.

In the case where the device is formed as a unit each said element may be adapted to encircle or partly encircle both said structural members and may be provided with said means for limiting relative axial movement between it and one of said members.

In one arrangement where the device is formed as a unit and each said element is adapted to encircle or partly encircle both said structural members, one said element is provided with means for limiting relative axial movement between it and one of said structural members and the other structural member has a shaped portion which is engageable with a part of the device or with an end of said structural member so as to prevent relative axial movement between said members in one direction.

The shaped portion of said other structural member may be such that the main portions of those members may be brought into axial alignment.

Preferably means are provided for holding said portions of the structural members in alignment.

The means for preventing relative axial movement between said two members in the direction of the length of the structural members may comprise one or more tethers having opposite ends thereof connected respectively to said two elements and the length of which tether or tethers is selected in accordance with the extent of overlap required between the structural members.

Extensions of the aforesaid tethers may be arranged opposite said shaped portion of one of said structural members and constitute the means for holding the main portions of the structural members in axial alignment.

The said tether or each said tether may be formed from a strip, rod or wire.

One part of each of said elements may be so formed as to permit relative axial movement in either direction between it and one of the structural members which it encircles, or partly encircles and the other part of which element may be provided with an abutment or abutments adapted to engage an end face of the other structural member.

A part of each element may be provided with means for locating a structural member in one part of the element so as to leave the other part of the element clear for insertion of the other structural member.

In one form of construction each of said elements may comprise a closed loop arranged to extend around both structural members when arranged in overlapping relationship one portion of which loop may be provided with said abutment or abutments arranged to engage an end face of one of the structural members.

In such an arrangement an abutment may extend between opposite sides of a loop and opposite an end of one of the structural members.

The means for preventing relative axial movement between said two elements may comprise a single tether which may extend between and is fixed to one side of each loop.

Said single tether may be fixed to the inner side of each loop and constitutes said means for locating said structural member in that part of the loop with which is associated said abutment.

Each end of the tether may be bent into U-shape one of the limbs of which extends across and is fixed to one side of a loop and the extremity of the other limb may be fixed to the other side of the loop.

In an alternative arrangement the two elements may be attached to one of said structural members in axially spaced relationship thereby preventing said relative axial movement between those elements and that element more remote from the end of the structural member is provided with said means for limiting relative axial movement between it and the other structural member.

In yet a further alternative arrangement the said two elements may be attached respectively to the two structural members at a distance away from an end thereof and at least one of said elements is provided with said

means for limiting relative axial movement between it and the member to which it is not attached.

The following is a description of a number of embodiments of the invention as applied to reinforcements for reinforced concrete reference being made to the accompanying drawings in which:

FIGURE 1 is a perspective view of one embodiment of the invention in which the loops and tether are formed as a unit;

FIGURE 2 is an end elevation of the uint as shown in FIGURE 1 and showing two reinforcing rods in position;

FIGURE 3 is a similar view to FIGURE 1 of an alternative arrangement in which the loops and tethers are formed from strip material;

FIGURE 4 is a similar view to FIGURE 3 in which the sides of each loop are bent inwardly and the loops are secured together by two wires;

FIGURE 5 is a somewhat similar arrangement to FIGURE 4 in which each element is formed from two rings welded together;

FIGURE 6 is a similar view to FIGURE 5 in which each element is in the form of a strip bent to form sockets facing the same direction into which the reinforcements may be sprung;

FIGURE 7 is a view of an arrangement similar to FIGURE 6 but in which the sockets face in opposite directions;

FIGURE 8 is a side elevation of yet a further alternative arrangement in which the end of one of the reinforcing rods is shaped to provide an inflexion against which an end of the other reinforcing rod may abut so as to prevent relative axial movement in one direction between said rods;

FIGURE 9 is a view looking from the right of FIGURE 8;

FIGURE 10 is a section on the line **10—10** of FIGURE 9;

FIGURE 11 is a side view of two overlapping reinforcements above floor level and in which one of the reinforcements has fixed to it two rings for accommodating the other reinforcements; and

FIGURE 12 is a similar view to FIGURE 11 but in which one of the sockets is on one of the reinforcements and the other is on the other reinforcement.

Referring to the arrangement shown in FIGURES 1 and 2 the holding and locating device is formed as a unit and comprises two closed loops indicated generally at **10** and **11** having straight sides and rounded ends, the radius of curvature of which are slightly greater than the radius of a reinforcing rod. The loops are formed from circular section wire and are spaced apart and secured together by a tether **12** formed from wire.

The wire **12** at each end is bent into U-formation and one of the limbs **13** crosses and is welded at **14** to one of the straight sides of a loop on the inner side thereof and the end of the other limb **15** abuts and is welded at **16** to the other straight side of the loop, the bend **17** of the U being disposed out of the plane of the loop.

It will be seen from FIGURE 2 that the bend **17** of each U-shaped portion of the loop is inclined to the major axis of the loop and may therefore lie across an end of the reinforcement when the latter is placed in the loop abutting one rounded end. In placing the device in position that end of the lower loop **11** which is not restricted by the U-shaped portion **17** is slid downwardly over the upper end of a reinforcement extending upwardly away from a reinforced concrete structure being built until said upper end of the reinforcement enters the right hand end of the upper loop **10** and engages the bend **17** of the U-shaped portion. This end is shown at **18** and it will be seen that the portion of the tether disposed on the inner side of the loop retains the reinforcement in a position which leaves the other portion of the loop unobstructed.

The lower end of another reinforcement **19** can then be introduced into the left hand end of the loop **15** and slid downwardly until the lower end enters the left hand end of the loop **11** and engages the bend **17**.

In the arrangement shown in FIGURE 3 each of the loops **10** and **11** are formed from flat strip metal **20** and are spaced apart and are secured to one another by tethers **21** also formed from flat strips and which are welded to the outer sides of the loops.

Secured across the upper and lower edges of the loops respectively towards one end thereof are further strips **22** against which the ends of the reinforcements abut after having been assembled in the manner described above.

In the arrangement shown in FIGURE 4 each of the loops **10** and **11** is formed from metal strips which is bent into figure of eight formation, the upper edge of one of the portions of the figure of eight having secured across it a strip **23** and the lower edge of the other portion of the lower strip having corresponding strips **23** secured across it. The two figures of eight loops are secured together by tethers in the form of two wires **24** which are located in the waists of the figures of eight and are welded thereto.

FIGURE 5 shows a somewhat similar construction to that of FIGURE 4 but the figure of eight is formed from two separate strips of metal bent into ring formation as indicated at **25** and which rings are welded together at **26**. The upper edge of one of the rings of the upper figure of eight has two inwardly bent lugs **27** and the lower edge of the other of the two rings of the lower figure of eight has similar inwardly bent lugs **27**. The two figures of eight are secured together by two tethers in the form of strips **28** welded or brazed to the two rings respectively on the outside thereof. In this arrangement the device is assembled on the reinforcements as set out with reference to FIGURES 1 and 2.

In the arrangement shown in FIGURE 6 a spring metal strip **29** at each end of the device is bent into a shape approximating to a figure of three so as to provide open stockets **30, 31** facing in the same direction. The upper edge of the upper strip is bridged at **32** over one of the sockets and the lower edge of the lower strip being similarly bridged over the other socket. The two strips are secured together by two tethers one in the form of a wire **33** which is welded or brazed in the bight **34** between the two sockets and the other in the form of a strip **35** which is welded to the dividing wall **36** between the socket. With this arrangement the sockets can be sprung on to the reinforcements avoiding the necessity of lifting a reinforcement to any appreciable extent.

The arrangement shown in FIGURE 7 is similar to that last described except that each metal strip **37** is bent into S-formation so that the resulting sockets **38, 39** face in opposite directions, and the two metal strips are joined together by two tethers **40, 41**, formed from strip metal, an extremity of each one being bent over at **42** to overlie one of the sockets.

In the arrangement shown in FIGURES 8 to 10 there are provided two spaced loops **10** and **11**. One end of the upper loop **10** is bridged on its upper side by an inverted U-shaped piece **50**, which rests on top of the reinforcing rod **18**. The other reinforcing rod **17** is shaped to provide an inflexion **51** so that when the end portions of the rods overlap the main portions of the rods may be in axial alignment. The inflexion **51** may engage the upper end of the rod **18** or even the top of the inverted U-shaped piece **50** so as to prevent relative axial movement between the two rods in one direction. There are welded to both sides of the two loops **10** and **11** on the inner sides thereof two tethering rods **52** which extend beyond the loops **10** and **11** at **53** and **54** respectively, the extension **53** serving to locate the inflexion **51** over the upper end of the rod **18**.

In the arrangement shown in FIGURE 11 one of the reinforcements **42** which projects above floor level **43**

of a structure being built has welded to it in spaced relationship two rings **43, 44** the latter being disposed near the upper end of the reinforcement. The lower ring has welded across its lower edge a cross bar **45**. With such an arrangement all that is required to do when assembling another reinforcement **46** is to introduce the lower end thereof through the ring **44** and lower it until it abuts against the cross bar **45** in the lower ring **43**.

In the arrangement shown in FIGURE 12 each of the reinforcements **42** and **46** has secured to it by welding a ring **47** disposed away from its extremity and at least one of said rings is provided with a cross bar **48** but to save selection of the suitable reinforcements preferably both rings are provided with this cross bar. The lower free extremity of one reinforcement is lowered into the ring on the other reinforcement, thus bringing the ring on the first reinforcement into engagement with the upper free extremity of the other reinforcement.

I claim:

1. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relatively to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, each of said elements being in the form of a closed loop having means for maintaining a structural member at one end thereof leaving the other end clear for insertion of the other structural member, one portion of each loop being provided with an abutment extending between opposite sides thereof so as to engage an end face of one of said structural members, said loops being secured together by a single tether fixed to the inner sides of the loops and constituting the means for maintaining said structural members at the ends of the loops, the tether being bent into U formation one limb of which extends across and is fixed to one side of the loop and the other limb is fixed to the other side of the loop.

2. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relative to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, the means for preventing movement of said other structural member relatively to the first structural member comprising a laterally extending abutting face on said other member adapted to overlie an end face of the first structural member.

3. The combination according to claim **2** wherein said laterally extending abutting face is provided by an inflexion in said one member and is also formed that the main portion of that member may be brought into axial alignment with the other structural member which alignment is maintained by said elements.

4. The combination according to claim **2** wherein the laterally extending abutting face is provided by said outer member and is so formed that the main portion of that member may be brought into axial alignment with said one structural member which alignment is maintained by said element and wherein two tethers connect said elements together and at one end have extensions lying on opposite sides of said inflexion so as to maintain the structural members in axial alignment.

5. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relative to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, each of said elements being in the form of a closed loop having means for maintaining a structural member at one end thereof leaving the other end clear for insertion of the other structural member, one portion of each loop being provided with an abutment extending between opposite sides thereof so as to engage an end face of one of said structural members, each closed loop being substantially in the shape of a figure of 8 providing waists on opposite sides thereof, the loops being connected together by two tethers, the ends of one of which being disposed respectively in the waist portions on one side of the two loops and the ends of the other of which tether being disposed in waist portions on the other side of the two loops.

6. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relatively to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, each said element comprising two rings secured side by side and encircling respectively the two structural members, tie members being provided for connecting the elements together and each of which tie members being attached at each end to a ring in that opposite side thereof to where the other ring is attached to it.

7. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relatively to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, each said element being S-shaped so that the two resulting bends partly encircle respectively the two structural members, two tie members being provided for connecting the elements together and each of which tie members being attached at each end to the center of one of the bends of an S-shaped element.

8. A holding and locating device for two overlapping structural members comprising two elements each arranged to encircle at least a part of both structural members, at least one tie member connected at opposite ends to the two elements respectively so as to space them apart, an abutment on at least one of said elements adapted to overlie an end face of one of said structural members so as to prevent movement thereof in one direction relative to the other member, means for preventing movement in the opposite direction of the other structural member relative to the first said structural member, each said element being in the shape of a figure 3 so that the two resulting bends partly encircle respectively the two structural members, two tie members being provided which connect the two elements together, one of which tie members being located and attached at each end in the bight formed between the convex faces of the bends of the

figure 3 of one of the elements and the other of which tie members at each end being attached to the apex where the two bends join one another.

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