United States Patent

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[54] SPLICER FOR REINFORCING BARS

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[52] **U.S. Cl.** **287/110,** 52/726, 287/111
[51] **Int. Cl.** **F16b 7/00**
[58] **Field of Search** 287/108–114, 118; 52/722, 726

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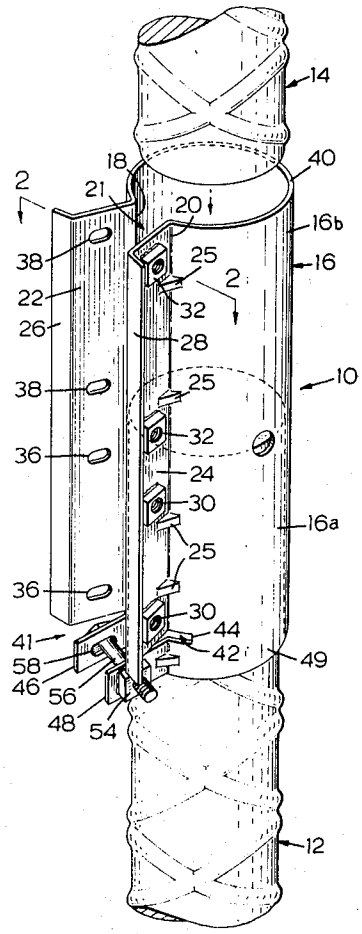
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[57] **ABSTRACT**

A splicer for connecting compression loader reinforcing bars in end to end alignment. The splicer has a sleeve portion with longitudinal edges defining a gap and a pair of flanges extending radially one from each edge. A pair of projections also extend radially from the edges below the flanges and bolts pass through the flanges and projections. The projections can be drawn toward one another by tightening a bolt in the projections to draw a part of the sleeve portion tightly about an end portion of one of the bars. A second bar is then slipped into the sleeve portion and the bolts in the flanges tightened to draw the sleeve portion tightly about the second reinforcing bar. Inspection openings are provided in the sleeve portion to ensure proper abutment of the bar ends.

2 Claims, 6 Drawing Figures



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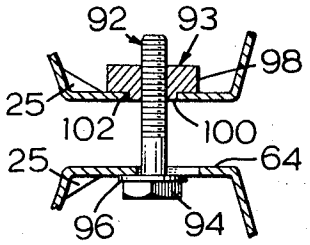


FIG. 5

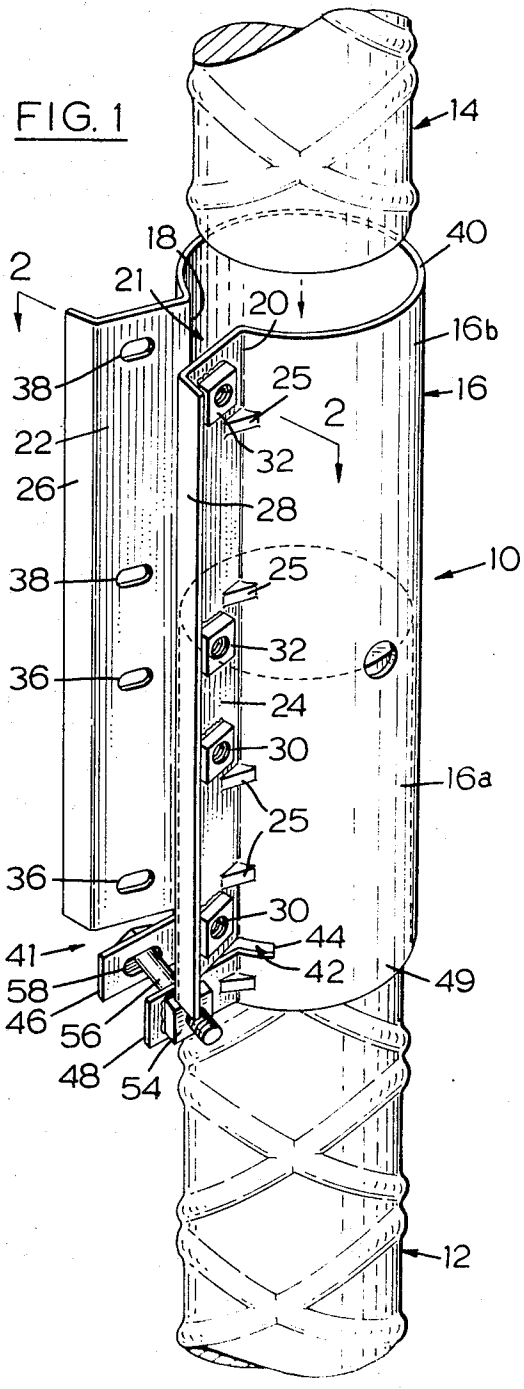


FIG. 1

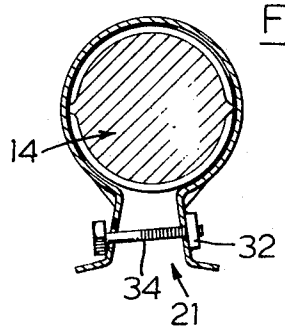


FIG. 2

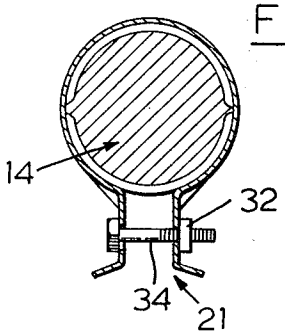


FIG. 3

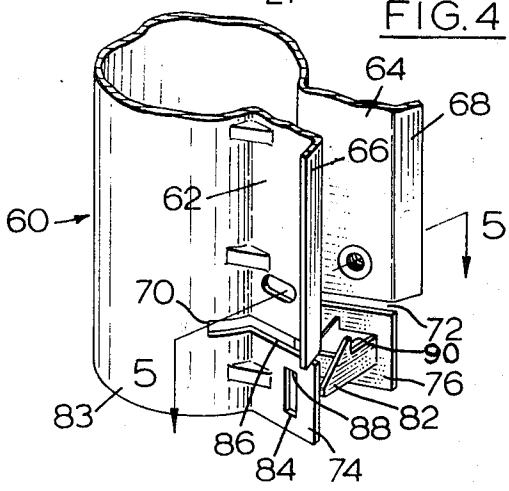


FIG. 4

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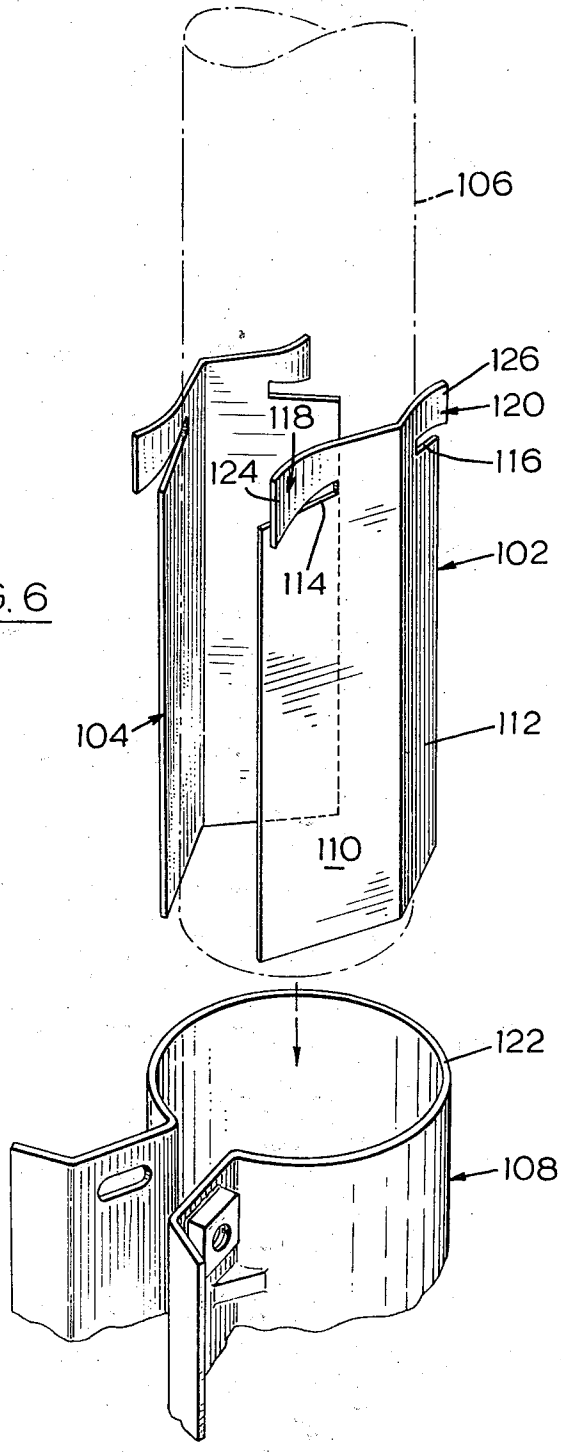


FIG. 6

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SPLICER FOR REINFORCING BARS

This invention relates to a splicer for connecting two reinforcing bars in end to end alignment.

In modern buildings of reinforced concrete, a large quantity of heavy reinforcing bar is used to prepare columns for the building. The columns are linked by floors to form a shell, and fascia panels or the like are mounted on the floors and supported by the columns. Because of the large number of reinforcing bars which have to be assembled in end to end relationship for preparing the columns, there is a great deal of time involved in connecting reinforcing bars.

Two types of splicers are commercially available for attaching adjacent reinforcing bars in end to end alignment for compressive loading of the bars. A first of the types consists of a sleeve having a generally C-shaped cross-section. A construction worker first slips the sleeve over an end of one of the bars and holds it in that position while an end of a second reinforcing bar is entered into the sleeve to abut against the lower bar. The longitudinal edges of the sleeve diverge and the construction worker drives a tapered locking member into engagement with these edges to draw the edges together in wedge fashion about the reinforcing bars. This type of splicer requires considerable dexterity on the part of the construction worker, particularly when he is supported only on the steelwork. He must assemble the splicer by holding it firmly with one hand while he drives the locking member with a heavy mallet so that his hands are not free for supporting himself.

A second type of splicer also consists of an elongated member and has a generally C-shaped cross-section. The member is adapted to engage snugly about a reinforcing bar and a plurality of curved straps are coupled to the elongated member by entering one end of each strap into a corresponding slot adjacent one edge of the member and attaching the other end of the strap by a bolt to the member adjacent the other longitudinal edge of the member. When the bolts are tightened, the elongated member and the straps are drawn against the reinforcing bars. One of the straps is used to attach the splicer to one of the reinforcing bars before entering a second reinforcing bar into the splicer. Once the second bar is in place the remaining bolts are tightened. This type of splicer has advantages over the first type in that it can be assembled without the use of a mallet. However the straps tend to engage under the end of the second reinforcing bar as this bar is being engaged in the connector so that the construction worker must be careful to ensure proper registration of the second bar in the splicer. When the bars are upright there is a possibility that a strap may prevent the second or upper, bar from entering the splicer so that the second bar may move sideways as it is being lowered into the splicer with resulting damage and possible danger to the worker.

According to the present invention, a splicer is provided having an elongated sleeve portion which is generally C-shaped in cross-section and has a pair of longitudinal edges defining a gap. A pair of diverging flanges extend outwardly one from each longitudinal edge of the sleeve portion and each flange terminates in a longitudinally extending lip to strengthen the associated flange. Captive nuts are provided on one of the flanges for engaging bolts which pass through the other of the flanges for closing the gap to tighten the sleeve portion about reinforcing bars. A pair of smaller projections also diverge outwardly from the longitudinal edges of the sleeve portion and are separated from the flanges by transversely extending slots. One projection has a captive nut for receiving a bolt which passes through an opening in the other projection. On assembling the splicer, the bolt in the projections is tightened to set the splicer on a first reinforcing bar, and then a second reinforcing bar is engaged in the splicer before the remaining bolts are tightened to close the gap and thereby tighten the splicer on the bars.

The invention will be better understood with reference to the drawings, wherein:

FIG. 1 is a perspective view of a splicer according to the invention showing the splicer partially assembled about a pair of reinforcing bars;

FIG. 2 is a sectional top view on lines 2—2 before tightening the splicer about the reinforcing bars;

FIG. 3 is a view similar to FIG. 2 after tightening of the splicer about the reinforcing bars;

FIG. 4 is a perspective view of part of a second embodiment of the splicer;

FIG. 5 is a sectional top view on lines 5—5 of FIG. 4; and

FIG. 6 is a perspective view of a pair of spacers.

Reference is first made to FIG. 1 which shows a splicer **10** engaged on a first reinforcing bar **12** and about to receive a second reinforcing bar **14**. The bars are designed to take compressive loads and will be most often found in columns although in general they can be found wherever a compressive load is to be supported.

Splicer **10** consists of an elongated generally cylindrical sleeve portion **16** having a generally C-shaped cross-section and adapted to slidably receive the reinforcing bars **12**, **14**. The portion **16** terminates in longitudinal edges or fold lines **18**, **20** which define a gap **21**. A pair of integral flanges **22**, **24** extend generally radially from respective edges **18**, **20** of portion **16** and the junctions between the flanges **22**, **24** and the portion **16** are strengthened by press-formed webs **25**. The outer longitudinal ends of the flanges **22**, **24** are integrally attached to respective longitudinally extending lips **26**, **28** for rigidifying the flanges **22**, **24**. First and second pairs of captive nuts **30**, **32** are welded to flange **24** for threadably engaging corresponding bolts **34** (FIG. 2) which are free to pass through respective first and second pairs of openings **36**, **38** in the flange **22** to attach the splicer **10** to the reinforcing bars. Two bolts **34** and nuts **30** tighten a first section **16***a* of the portion **16** about the bar **12** and two bolts **34** and nuts **32** tighten a second section **16***b* of the portion **16** about the bar **14**.

Two diametrically opposed inspection openings **39** (one of which is shown) are provided between the sections **16***a*, **16***b* for permitting a construction worker to inspect the abutment of the bar **14** on the bar **12**. This is necessary to ensure that the abutment conforms to local building regulations concerning possible gaps between the bars.

Each of the lips **26**, **28** and flanges **22**, **24** has an end which lies in a common plane with an end **40** of the portion **16** and the respective other ends of the lips **26**, **28** and flanges **22**, **24** are defined by first and second slots **41**, **42** which extend inwardly beyond the edges **18**, **20** and slightly into the body portion. The slots terminate at inner ends **44** (one of which is shown) to separate the flanges **22**, **24** from a pair of generally radial projections **46**, **48** which diverge outwardly from the edges **18**, **20** of the portion **16**. Projections **46**, **48** are originally formed as continuations of respective flanges **22**, **24** and then shaped and separated by a punching or machining operation which forms the slots **41**, **42** in the splicer. A captive nut **54** is attached to the projection **48** to combine with a bolt **56** which passes through an opening **58** in the projection **46**. When the bolt is tightened, the projections **46**, **48** are drawn together and an end part **49** below slots **41**, **42** is tightened about the reinforcing bar **12**. This procedure will be explained later in the disclosure. The sleeve portion **16** is therefore made up of the second section **16***b*, the first section **16***a* and the end part **49** which extends from slots **41**, **42** to the adjacent end of the sleeve portion **16**.

FIG. 1 illustrates the positions of flanges **22**, **24** before bolts **34** are inserted through openings **36**, **38** into respective nuts **30**, **32**. On tightening the bolts, the flanges which initially diverge as shown in FIG. 2 move into a generally parallel relationship as shown in FIG. 3 to close the gap **21** and thereby tighten the splicer on the bars **12**, **14**. The openings **36**, **38** are elongated radially to permit the bolts to remain normal to the flange **24** as the relative angular positions of the flanges change.

The splicer **10** is assembled on the reinforcing bars **12**, **14** by first slipping it over an end of reinforcing bar **12** until the upper end of the bar **12** appears as a diameter in each of the inspection openings **39** of the portion **16** with the end part **49** and first section **16**a about bar **12**. The bolts **34** and **56** (which are pre-assembled in the flanges **22**, **24** and projections **46**,

48) are loose in their respective slots 36, 38 and 58. Next the bolt 56 is tightened to draw the part 49 of the splicer 10 onto the first reinforcing bar 12. The slots 41, 42 permit the part 49 to move without significantly moving the flanges 22, 24. The second reinforcing bar 14 is then slipped into the second section 16a of the splicer 10 until an end of the second bar 14 meets an end of the first bar 12. Bolts 34 are then tightened to draw the flanges 22, 24 together thereby engaging respective first and second sections 16*a*, 16*b* about corresponding reinforcing bars 12, 14.

The construction worker is free to use a socket, impact tool or the like to tighten the bolts 34 with one hand while he holds on to the steelwork with the other hand. Once assembled, the inspection openings 39 permit inspection of the engagement of the end of the bar 14 on the end of the bar 12. This is necessary to permit the worker to insert a feeler gage between ends of the bars to ensure that the ends of the bars are in good contact as specified by building regulations. If preferred more inspection openings can be provided consistent with providing sufficient strength between the sleeve portions 16*a* and 16*b*.

The splicer 10 ensures alignment of bar 14 with bar 12 and when the bars 12, 14 are to be assembled in an upright position, the splicer 10 can support considerable lengths of reinforcing bar 14 on lower bar 12 without the need for crane support or the like.

An alternative embodiment of the splicer is illustrated in FIG. 4. In this case, a splicer 60 has flanges 62, 64 and respective lips 66, 68. Slots 70, 72 separate the flanges 62, 64 from projections 74, 76. In place of the nut 54 (FIG. 1) and bolt 56, a hook 82 is provided which extends from projection 76 towards projection 74. The hook 82 is punched out of the projection 76 and co-operates with an axially elongated aperture 84 in the projection 76 for locking the projections 74, 76 in generally parallel relation to draw an end part 83 of the splicer about a lower reinforcing bar. The hook 82 has an inclined front face 86 which co-operates with one end 88 of aperture 84 so that a construction worker can grip the projections 74, 76 between jaws of a suitable pincer-like tool to draw the projections 74, 76 together so that the hook 82 engages in the slot 84. As the hook enters the slot it engages the end 88 of the slot 84 and the projections 74, 76 are deflected in opposite directions until the inclined face 86 has passed through the slot 84. The projections 74, 76 then spring back into alignment and a back face 90 of the hook 82 engages an outer face of the projection 76 to lock the projections in generally parallel arrangement. This is sufficient to hold the splicer 60 on the first reinforcing bar 12 until the second reinforcing bar 14 is engaged and bolts 34 (FIG. 2) are tightened.

Reference is now made to FIG. 5 which shows an alternative bolt 92 and nut 93. The bolt has a head 94 which is enlarged to provide a flanged portion 96 for increasing the bearing area of the head on the flange 64 and the nut 93 is generally cylindrical having an outer portion 98 and an inner portion 100 of reduced diameter. The portion 100 is a force fit in a cylindrical opening 102 in the flange 62 so that once in place the nut 98 is prevented from turning and the bolt 92 can be threaded into the nut and tightened. This type of nut is often referred to as a clinch or plug nut.

The splicer of the present invention provides a relatively strong connection between adjacent reinforcing bars and can be assembled in place using a socket, impact tool or the like. Also, once the initial installation to locate the splicer on the first reinforcing bar is completed, the construction worker can then use one hand to support himself while he completes the assembly about the second reinforcing bar. This is particularly advantageous on high work where safety is of great importance.

The splicer is relatively cheap to make and easy to assemble. A typical splicer for a bar having a nominal diameter of approximately 2.25 inches is made from 10 gauge mild steel sheet 12 inches long and 10.125 inches wide. The flanges are 1.25 inches in radial width and they diverge outwardly defining an included angle of approximately 10°. Once in place, the flanges would be generally parallel and about 0.25 inches apart. However, this spacing would depend upon the actual diameter of the reinforcing bar and the effort applied to tighten the bolts.

Although bolts have been described to draw the sleeve portion about the reinforcing bars, any suitable fastener can be used. Also the fastener used to draw the projections toward one another can be dispensed with and the construction worker can simply wire the projections together.

Reference is now made to FIG. 6 which illustrates a pair of spacers 102, 104 for engaging about a bar 106 in a splicer 108. The spacers permit second bar 106 and a first bar (not shown) of larger diameter to be gripped in the same splicer 108.

Spacer 102 is typical of both spacers 102 and 104 and has two generally flat portions 110, 112 lying at an angle of approximately 120° to one another. Inclined cuts 114, 116 in respective portions 110, 112 define tabs 118, 120 for hooking the spacer on to an edge 122 of the splicer 108. This is particularly useful when the bars are upright. The tabs are curved outwardly so that with the bars upright, respective tab ends 124, 126 will overhang the splicer 108 and because the tabs have upwardly inclined lower edges defined by respective cuts 114, 116, the tabs will tend to remain in place on the splicer once the tabs are engaged on the upper edge 122.

To assemble the bar 106 and spacers 102, 104 in the splicer 108, the spacers are first entered into the splicer 108 and then bar 106 is moved into the splicer between the spacers. On tightening the splicer, the spacers are brought into tight registration between the bar 106 and the splicer to ensure that the splicer 108 is tight about the bar 106.

The spacers are preferably long enough to fall just short of the inspection openings 39 (FIG. 1) although if preferred the spacers can be positioned between the openings and be sufficiently long to rest on the lower bar. In this case the tabs 118, 120 can be dispensed with although it would be better to incorporate them for locating the spacers on the splicer 108 to prevent the spacers from falling into the path of an upright bar 106 when the bar is being entered into the splicer.

What I claim as my invention is:

1. A splicer for attaching a first reinforcing bar to a second reinforcing bar with the bars in end-to-end alignment, the splicer comprising: an elongated sleeve portion adapted to fit about the reinforcing bars and free to slide axially on the reinforcing bars, the sleeve portion having a pair of generally parallel axial edges defining a gap to permit the edges to move circumferentially of the reinforcing bars when the splicer is tightened about the reinforcing bars; first and second integrally attached flanges extending generally radially of the bars, one from each of the said edges of the sleeve portion, one of the flanges defining a plurality of radially extending openings and the other of the flanges defining further openings in alignment with said radially extending openings, and first and second relatively narrow projections extending generally radially from a part of the sleeve portion remote from the flanges, one of the projections defining a radially extending opening and the other of the projections defining a further opening in alignment with the radially extending opening in the projection, and adjacent edges of the flanges and the projections defining a pair of relatively narrow slots so that the projections can be drawn together for tightening said part of the sleeve portion about the first reinforcing bar substantially independently of the flanges; and fastener means comprising a plurality of nuts coupled to said other flange and said other projection, and a plurality of bolts, each of the bolts passing through a corresponding pair of said radially extending openings and said further openings and being threadably engaged in a corresponding one of said nuts for drawing the flanges and projections together to tighten the splicer about the reinforcing bars such that by tightening the bolt passing through the projections, the said part of the sleeve portion may be tightened about the first reinforcing bar to locate the splicer on the first reinforcing bar, and then, after inserting the second bar axially into the sleeve portion, the flanges may be

drawn toward one another to tighten the sleeve portion about the first and second reinforcing bars with the abutting ends of the reinforcing bars positioned substantially at the axial midpoint of the flanges.

2. A splicer as claimed in claim 1 in which the sleeve portion defines at least one opening positioned for inspecing the abutment of the end of the first reinforcing bar against an end of the second reinforcing bar.

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