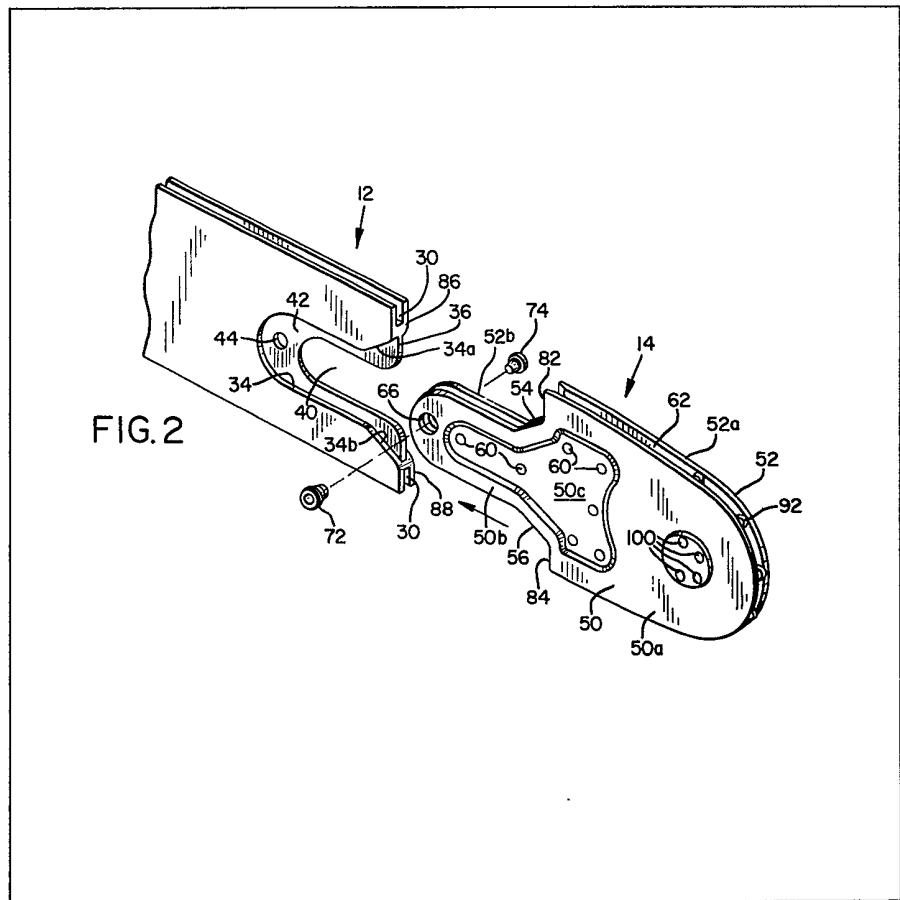


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(54) **Chain saw guide bar**

(57) The main body section (12) has a pair of opposed recesses (34,36) in

opposite faces thereof and an opening in the recesses to form a flange (42). The separate nose section (14) includes a pair of opposed plates (50,52), at least one of the plates having a central portion deformed laterally toward the other plate. The plates are secured together in the region of lateral deformation with edge margins thereof spaced apart to provide a drive chain-receiving groove (62) generally aligned with a similar groove in the peripheral edge of the main body section. The body and nose sections are secured together by a hub and expander member (72,74) assembly which extends into substantially aligned apertures in the body section and nose section. Edge margins of the recesses on the body section and nose section are disposed at diverging angles progressing toward the nose end of the bar to aid in alignment and securing of the body and nose sections.



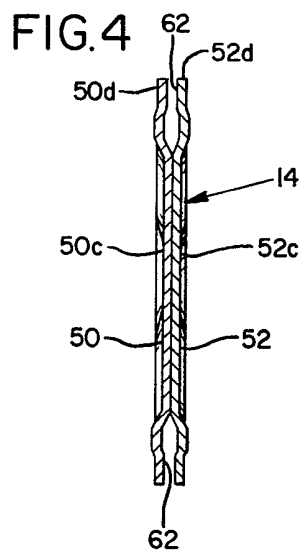
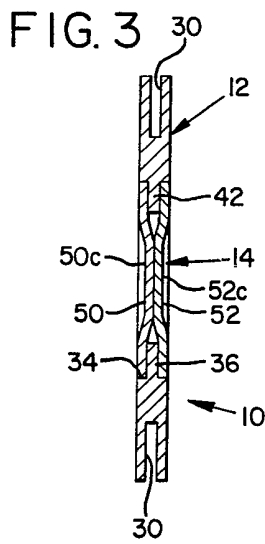
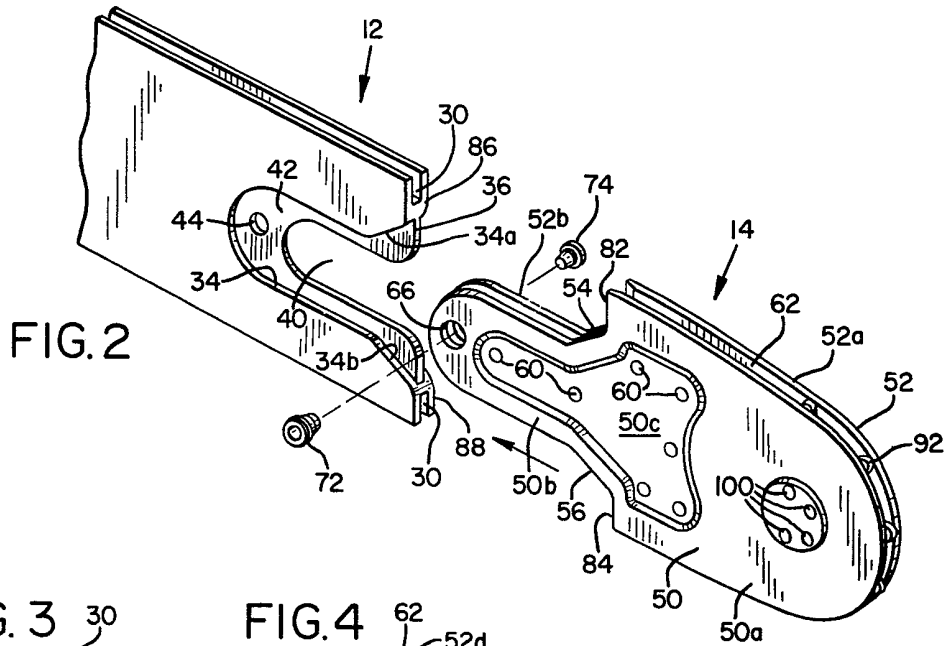
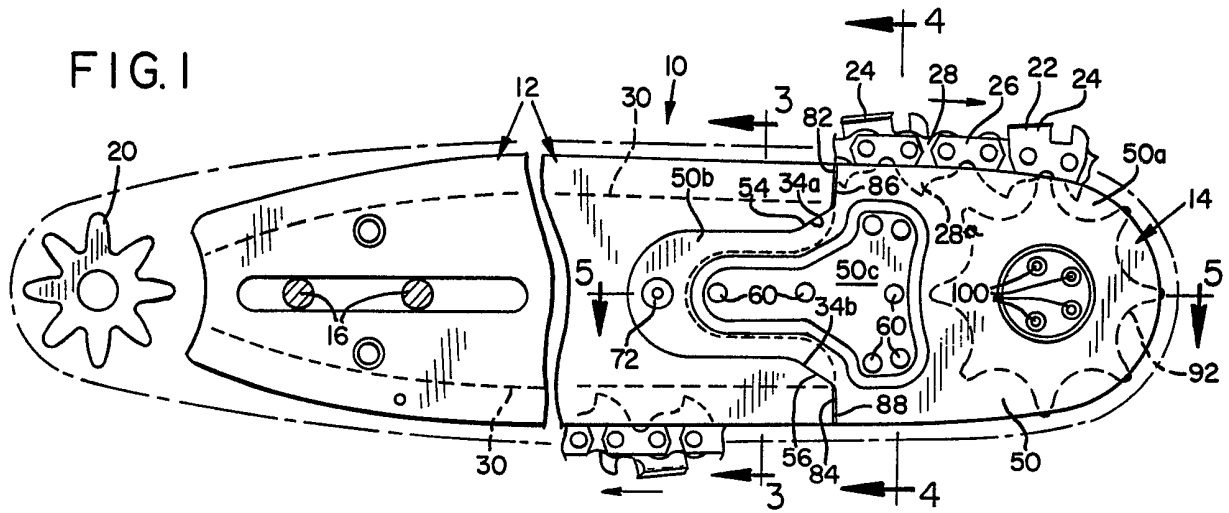


FIG. 5

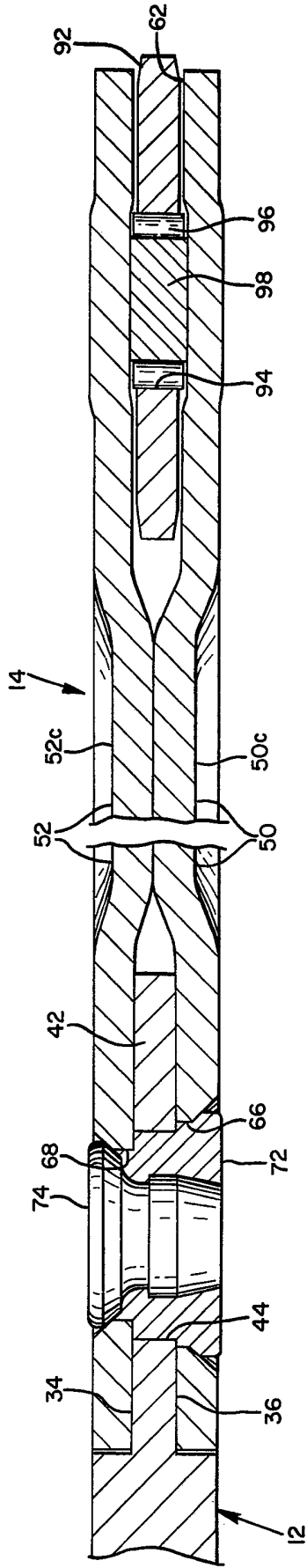
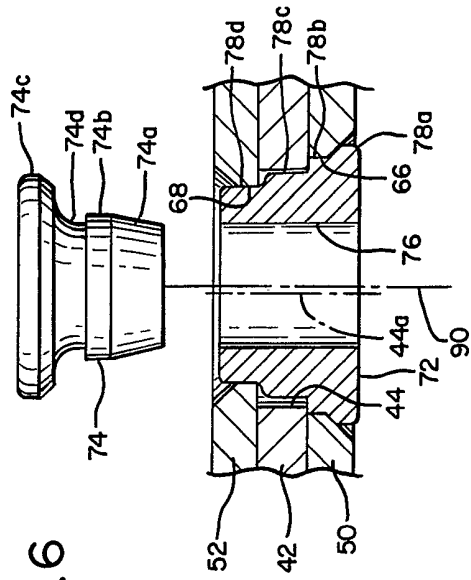


FIG. 6



SPECIFICATION

Chain saw guide bar

5 This invention relates to a guide bar for a saw chain on a chain saw and more specifically to such a guide bar having a replaceable nose section.

A guide bar for a chain saw supports a saw chain that travels at high speeds while subjected to cutting loads. A considerable force is required to pull the chain around the bar and severe wear is caused at the nose of the bar. Also, guide bars are quite commonly damaged at the nose portion. Such wear and/or damage at the nose of the bar often determines the useful life of the conventional guide bar.

The guide bar is a fairly expensive item to the chain saw user, so there have been a number of attempts to design guide bars with replaceable nose sections which can multiply the usable life of the main portion of the bar and substantially reduce the user's costs. However a number of disadvantages have been experienced in prior bars with replaceable nose sections. To obtain sufficient rigidity in the interconnection between the main body section and the nose section of such a bar, it is desirable to provide a portion of one section of the bar which slips into or onto a portion of the other section. This has generally required either that both sections be machined to provide such interfitting relationship or that one portion be provided with additional spacer elements between parts to provide a spacing therebetween.

The present invention accordingly provides a guide bar for a saw chain, the guide bar comprising an elongate main body section having a rear end attachable to a chain saw motor housing and an outer end spaced therefrom, and a separate nose section arranged to be releasably secured to the outer end of the body section, the body section having opposed peripheral edges with elongate grooves therein for receiving the drive tangs of the saw chain to guide the chain along the bar, the nose section comprising two opposed facing plates, at least one of the plates having a portion thereof spaced inwardly from edge margins of the plate deformed laterally toward the other of the plates from the plane of the remainder of the one plate, and means securing the plates together with the deformed central portion of the one plate abutting an inwardly facing surface of the other plate to space edge portions of the plates apart a selected distance to provide grooves along edge margin portions of the nose section generally aligned with the grooves in the body portion to receive the drive tangs of the saw chain.

The present invention can thus provide a novel guide bar in which a sliding interconnection or fit between the main body and nose sections can be provided with a minimum of machining or requirements for spacing elements.

Recesses can be provided in opposed faces of the main body section of the bar, the recesses having edge margins which diverge on progressing forwardly in the bar. Tongue portions of the nose section can then have complementary diverging

edge margins which cooperate with the diverging edge margins of the recesses to provide the desired alignment between the sections.

Preferably, generally aligned apertures are defined in the tongue portions of the plates of the nose section and a portion of the main body section of the bar for receiving a securing member therebetween. The securing member may be a combination hub unit of a shape to fit in the apertures and having a bore therethrough, with an expander member sized for driving into the bore in the hub member for expanding the same into the apertures and holding it securely therein. The apertures in the nose section may be slightly offset longitudinally of the bar from the aperture in the body section, so that on expansion of the hub the sections are drawn tightly together.

The invention is further described below, by way of illustration, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a guide bar with a main body section and a replaceable nose section in accordance with the invention;

Figure 2 is a perspective view of the nose end of the guide bar with the nose section ready to be assembled to the main body section;

Figure 3 is a cross-sectional view taken generally along the line 3-3 in *Figure 1*;

Figure 4 is a cross-sectional view taken generally along the line 4-4 in *Figure 1*;

Figure 5 is a cross-sectional view on a larger scale taken generally along the line 5-5 in *Figure 1*; and

Figure 6 is a view corresponding to a portion of *Figure 5* but with a securing means ready for assembly to secure the nose section to the main body section.

Figure 1 of the drawings shows a guide bar 10 embodying the invention and comprising an elongate, substantially planar, main body section 12 and a removable nose section 14. The guide bar 10 is arranged to be mounted at its rear end by mounting lugs 16 to a chain saw motor housing (not shown). A drive sprocket 20 is rotated by the drive shaft of the chain saw to move a saw chain 22 around the guide bar 10.

The saw chain 22 comprises a plurality of pivotally interconnected cutters 24, tie straps 26, and drive links 28. The drive links have depending tangs 28a which rest in and are slidably moveable along grooves 30 in the peripheral edge margins of the main body section 12. As will be described in greater detail below, the nose section 14 also provides a drive tang-receiving groove extending about its peripheral edge margin which is substantially fully aligned with grooves 30 when the guide bar is fully assembled.

Referring to *Figure 2*, the outer end of main bar section 12 has a pair of mirror-image, U-shaped recesses 34,36 defined in opposite sides thereof. As shown in *Figures 1* and *2*, the opposed peripheral edge margins 34a,34b of the recess 34 diverge toward the outer, or forward, end of the body section 12. The peripheral edge margins of the recess 36 similarly diverge.

A U-shaped opening 40 extends inwardly from the

outer end of the body section 12. A central portion of the section 12 between recesses 34,36 and extending about the opening 40 defines a flange 42 in the plane of the body intermediate the opposed faces of the bar. An aperture or bore 44 extends through the flange 42.

The nose section 14 comprises a pair of opposed, facing, mirror-image plates 50,52. Each has a nose portion 50a,52a and a rearwardly extending tongue portion 50b,52b, respectively. Each nose portion 50a,52a has a width substantially equal to the width of the outer end of main body section 12. The tongue portions 50b,52b are narrower than the nose portion, and have configurations complementing the recesses 34,36 in opposite faces of the bar. Edge margin portions 54,56 of the plates 50,52 intermediate the tongue and nose portions diverge in the forward direction at an angle complementary to the angle of edge margins 34a,34b on the main body portion. However, the spacing of the edge portions 54,56 is slightly wider than the spacing between the edge margins 34a,34b.

Each of central portions 50c,52c of the plates 50,52, spaced inwardly from edge margins of the plates, are embossed or deformed, from the plane of the remainder portions of the nose section inwardly, or laterally, toward the other plate. The plates are joined together with these embossed central portions 50c,52c in abutting facing relationship, as illustrated in Figures 3, 4 and 5, and are secured together by spot welds 60.

As best shown in Figure 4, this nose section structure provides a peripheral groove 62 arranged to receive the depending drive tangs of a drive link 28. Groove 62 is substantially aligned with the groove 30 in the main body section 12 when the nose section is assembled to this main body section.

As is also shown in Figure 4, marginal edge portions 50d,52d of the plates 50,52 may be deformed somewhat, inwardly toward each other, to further control the width of the groove 62 as needed to provide a proper fit for a specific saw chain.

Referring to Figure 3, the embossed or deformed central portions 50c,52c of the plates 50,52 extend rearwardly into the tongue portions 50b,52b whereby peripheral edge margins thereof are spaced apart a selected distance to snugly receive the flange 42. The rear ends of the tongue portions 50b,52b have aligned apertures or bores 66,68 therethrough. As shown in Figures 5 and 6, the bore 66 is somewhat larger than the bore 44, whereas the bore 68 is somewhat smaller than the bore 44, thus providing a set of bores which decrease in cross-section progressively from one side of the bar to the other.

The assembly is provided with a two-part securing means in the form of a hub member 72 and an expander member 74. The hub member has a central bore 76 extending completely therethrough. The outer surface of the hub member is cylindrical, with a plurality of stepped-down diameter sections 78a,78b,78c,78d sized to fit within the bores 66,44,68 as illustrated in Figure 6 on assembly.

The stepped diameters of the hub members are concentric but as will be seen in Figure 6 and described more fully below, the front side of bore 44

may be closer to section 78c than is the rear side of bore 44 on initial insertion of the hub member.

The expander member 74 has a first portion 74a, the distal end of which is a smaller diameter than the bore 76. Member 74 on progressing from its distal end gradually increases in diameter to a central portion 74b of a greater diameter than bore 76. Between the central portion 74b and a head 74c, there is a necked-down region 74d.

To assemble the guide bar, the tongue portions 50b,52b are slid into the recesses 34,36 with the flange 42 received in the peripheral groove between the tongue portions. As the nose section is moved almost fully into the assembled position illustrated in Figure 1, the diverging edge margins 34a,34b at the outer end of the recesses on the main body section 12 engage the diverging edge margin portions 54,56 on the nose section to guide and centre the nose section. Further, as the diverging edge margin portions of the nose section are slightly wider than the diverging edge margins of the recesses 34,36, vertical end margins 82,84 on the nose section 14 stop short of abutment with vertical end margins 86,88 on the main body section 12 to provide a slight space therebetween. In this position of initial assembly or fit-up, the bores in the tongue sections and flange 42 are positioned as illustrated in Figure 6, with the centre line 44a of bore 44 offset a slightly distance rearwardly of the bar from the centreline 90 for hub member 72 and bores 66,63. This offset may be of the order of 0.005 inch. The expander member 74 then is driven into the hub member 72 to the position illustrated in Figure 5.

On being driven into the hub member 72 the expander member 74 causes the hub member to expand into all of the aligned bores to fill the space therein and tightly secure the sections together. As the bore 44 was slightly offset rearwardly of the assembly relative to the bores in the tongue sections, the nose section 14 is drawn more tightly and securely rearwardly into the body section on expansion of the hub member 72. However, it is generally preferred that the vertical end margins 82,84,86,88 remain spaced a slight distance apart, whereby the diverging edge margin portions 54,56 of the main body section and the edge margins 34a,34b of the nose section engage to bear the load between the main body section and the nose section.

Disassembly of the device is a simple matter. The user merely inserts a pointed tool into the bore 76 of the hub member 77 and drives the expander member 74 outwardly therefrom. Although a section of metal from the hub member 72 has been deformed back into necked-down section 74d to clinch the securing members together, the expander member may be driven out, taking a small amount of metal from the hub member with it. Once the expander member is removed, the hub member can be driven out from the other side, its stepped diameters facilitating removal.

The forward end portions of the plates 50,52 are spaced apart to receive a sprocket wheel 92. The sprocket wheel has a central bore 94 extending therethrough which is supported on a plurality of roller bearings 96 running on an inner race 98. The

inner race is secured between the plates 50,52 by rivets 100 extending therethrough.

The main body section 12 and the nose section 14 of the guide bar are easy to assemble and disassemble, which adds to the convenience of the user. The embossed or deformed plates 50,52 which are secured together at their embossed sections to define the nose section provide substantial strength and rigidity with a continuous beam effect extending between the nose section and the main body section of the bar. This construction precludes the need for a spacer or third laminate section between the plates of the nose section. The diverging edge margins on the recesses in the main body section and the edge margin portions on the intermediate portion of the nose section act in conjunction with the securing means to provide proper alignment and a secure interconnection between the nose and main body sections. The assembly method and construction allow reliable preloading between the nose section and main body section from one assembly to the next. Further, this assembly of the guide bar is more resistant to loosening during use than previous assemblies.

The hub and expander members used in securing the two sections together provide both easy assembly and easy removal. Also, the flow of material of the hub member filling the apertures in the sections securely clinches them together.

CLAIMS

1. A guide bar for a saw chain, the guide bar comprising an elongate main body section having a rear end attachable to a chain saw motor housing and an outer end spaced therefrom, and a separate nose section arranged to be releasably secured to the outer end of the body section, the body section having opposed peripheral edges with elongate grooves therein for receiving the drive tangs of the saw chain to guide the chain along the bar, the nose section comprising two opposed facing plates, at least one of the plates having a portion thereof spaced inwardly from edge margins of the plate deformed laterally toward the other of the plates from the plane of the remainder of the one plate, and means securing the plates together with the deformed central portion of the one plate abutting an inwardly facing surface of the other plate to space edge portions of the plates apart a selected distance to provide grooves along edge margin portions of the nose section generally aligned with the grooves in the body portion to receive the drive tangs of the saw chain.

2. A guide bar as claimed in claim 1 wherein the other plate has a portion thereof spaced inwardly from edge margins thereof deformed laterally toward the one plate, the deformed portions of the plates being joined together in facing abutting relationship to define the desired spacing of the edge portions of the plates.

3. A guide bar as claimed in claim 1 or 2 wherein the plates are secured together in the region of the deformed portions by welding.

4. A guide bar as claimed in claim 1, 2 or 3

wherein an edge margin portion of at least one of the plates is deformed laterally from the plane of the remainder of the plate to define a preselected lateral spacing between edge margins of the plates.

5. A guide bar as claimed in claim 1, 2, 3 or 4 wherein the outer end portion of the main body section has recesses defined in opposed faces thereof, an opening extends inwardly from the outer end of the body section within the region of the recesses, and a central portion of the body section between the recesses defines a flange extending about the opening, and the plates of the nose section have bar nose portions of a width generally equal to the width of the outer end of the main body section and narrower tongue portions which project rearwardly from the bar nose portions and have outlines complementing the recesses in the opposite faces of the main body section for reception therein with surfaces of the tongue portions engaging opposite sides of the flange.

6. A guide bar as claimed in claim 5 wherein opposed peripheral edge margins of the recesses in the body portion diverge toward the outer end of the body section and the plates of the nose section have edge margin portions intermediate the tongue and nose portions which diverge at an angle corresponding to the angle of divergence of the peripheral edges of the recesses but are slightly wider, the diverging edge margin portions of the nose section being positioned to bear against the diverging edge margins of the body section when the guide bar is assembled to aid in aligning the nose section relative to the body section.

7. A guide bar as claimed in claim 5 or 6 wherein the deformed portion of the or each plate extends rearwardly into the tongue portion of the plate and is of an outline complementary to the opening between the main body section recesses.

8. A guide bar as claimed in claim 5, 6 or 7 wherein the flange has an aperture extending there-through adjacent the rearward end of the recesses and the tongue portions of the plates overlap the aperture and have apertures generally aligned with the aperture in the flange, the nose and body sections being releasably secured together by a fastening member received in the apertures.

9. A guide bar as claimed in claim 8 wherein the apertures extending through the plates are slightly offset forwardly from the aperture in the flange upon initial assembly, whereby reception of the fastening member in the apertures draws the diverging margins of the recesses and the nose section tightly together.

10. A guide bar as claimed in claim 8 or 9 wherein the fastening member comprises a hub member the hub member having an external configuration generally complementing the configuration of the apertures for receipt therein and an opening extending laterally inwardly from one side of the bar, and an expander member capable of being driven into the opening in the hub member, the expander member having a first portion with a cross section smaller than the opening to permit initial insertion into the opening and a second portion of greater cross section operable, on being

driven into the opening, to expand the hub member in the apertures to lock the sections together.

11. A guide bar as claimed in claim 10 wherein the opening in the hub member extends fully
5 therethrough, permitting engagement of the expander member by a tool to drive the expander member from the hub member to permit removal.

12. A guide bar as claimed in claim 10 or 11
10 wherein the apertures in the tongue portions are slightly offset forwardly from the aperture in the flange upon initial assembly, whereby when the expander member is driven into the opening in the hub member to expand the hub member, the nose section is urged rearwardly into closer engagement
15 with the body section.

13. A guide bar as claimed in claim 1, 2, 3 or 4 wherein rearly projecting portions of the nose section are positioned on opposite sides of and overlap a central portion of the main body section
20 when assembled, substantially aligned apertures extend through the rearwardly projecting portions and the central portion with the apertures decreasing in cross section on progressing from the plate on one side, through the body section, and through the
25 other plate on the opposite side of the body section, the nose section is secured to the outer end of the body section by an expander member and a hub member, the hub member having an external configuration for reception in the apertures having a first
30 portion of a cross section sized to fit into the minimum cross sectional aperture in the other plate, a second portion of a cross section larger than the first portion but of a cross section sized to fit within the aperture in central portion, and a third portion of
35 a cross section greater than the cross section of the second portion but of a size to fit within the aperture in the largest cross section aperture of the one nose plate, the hub member further has an opening extending laterally inwardly from one end thereof,
40 and the expander member is capable of being driven into the hub member, the expander member having a first portion of a cross section smaller than the opening to permit initial insertion into the opening and a second portion of greater cross section,
45 operable on being driven into the opening to expand the hub member in the apertures to lock the sections together.

14. A guide bar as claimed in claim 13 wherein
50 on initial assembly the centre line of the aperture in the body section is offset longitudinally of the bar from the centre line of the apertures in the nose portion, and expansion of the hub member upon driving of the expander member therein urges the nose and body sections toward positions in which
55 the centre lines are more nearly coincident.

15. A guide bar for a saw chain substantially as herein described with reference to the accompanying drawings.