CLAMP FOR A LUMBAR SUPPORT

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Publication Classification

ABSTRACT

A moulded plastics clamp (14) for attaching strap (16) of a lumbar support to an upright of a seat for a vehicle comprises two portions (20, 22) reinforced by ribs (52-53) and integrally joined by flexible portion (24). To engage clamp (14), portion (24) is flexed so that ridged concave sections (26, 28) enclose and contact the upright, projection (60) being received in a hole therein. During engagement, surfaces (34, 36) on extension sections (30, 32) are guided into proximity, if not contact, by engagement of complementary tapering webs (42) and recesses (44) so that apertures (38, 40) align to receive a bolt to tighten clamp (14). Extension section (30) includes flanges (50) between which section (32) locates to prevent relative lateral movement between sections (30, 32).
CLAMP FOR A LUMBAR SUPPORT

[0001] This invention relates to a clamp for attaching a component to an elongate member such as to a post. The clamp may form part of or be attachable to the component. In a particular application of the invention, the component is a lumbar support for use in the backrest of a seat or chair and the clamp is for attaching the lumbar support to a post portion of a frame of the seat or chair.

[0002] The invention will be particularly described with reference to the attachment of a lumbar support to a vehicle seat frame. However it is to be understood that the clamp may be used for other applications.

[0003] It is known to provide lumbar supports in vehicle seats and especially in the seat to be occupied by the vehicle driver. Such supports are usually adjustable and take a variety of forms, and the manner of achieving adjustment also varies. The adjustment, when present, is generally such that it varies the effective length of the lumbar support and/or its stiffness, and thereby influences the extent to which the support curves forwards, i.e. in response to pressure applied by the user of the vehicle seat. That is, the lumbar support may provide a relatively flat or a deeply curved support for the vehicle seat occupant, according to the level of adjustment of the effective length of the support.

[0004] It will be appreciated that relatively high forces can be imposed on a lumbar support by both the seat occupant and via an adjustment mechanism for adjusting the support. Thus the lumbar support must be securely attached to the vehicle seat frame. Additionally the cost of manufacturing a suitable attachment means for a lumbar support and its convenience of installation are significant factors for the commercial viability of a lumbar support.

[0005] The present invention seeks to provide a clamp for attaching a component to an elongate member, such as to a post, for example a lumbar support to a frame of a seat, which is relatively cheap to manufacture and convenient to install whilst enabling a firm attachment of the component to the elongate member.

[0006] According to the invention there is provided a clamp for attaching a component to an elongate member (hereinafter referred to for brevity as “a post”), the clamp forming part of or being attachable to the component and having first and second reinforced portions joined by a flexible portion for surrounding the post, the first and second reinforced portions each including a concave section and an extension section, wherein in use the extension sections are engageable for the concave sections to oppositely contact the post, and wherein the extension sections include complementary locating means for aligning an aperture in each extension section for passage of a fastener and for preventing relative lateral movement between the extension sections.

[0007] Preferably one of the extension sections includes an integrally formed flexible extension strap to which the component is attachable or attached.

[0008] Preferably the clamp is an integral structure formed, for example by moulding, from a suitably strong plastics material such as nylon. More preferably the component is a lumbar support in the form of a band or like structure which is integrally formed with a clamp of the invention at each end of the support for connection to opposite side members or post portions of the frame of a seat backrest. It will be understood that the lumbar support is of a type which is in the form of a flexible band or like structure which extends across the seat backrest. Examples of such lumbar supports are disclosed in WO 94/08492 (PCT/AU93/00521) and WO 98/09835 (PCT/ AU97/00480).

[0009] In one preferred form of the invention, the clamp is adapted to make principal contact with the periphery of the post at three locations. A first of these locations is at the flexible portion. The other two portions are closely adjacent to each other and each is at a respective one of the extension sections. With the extension sections engaged for securement of the clamp with a post, one extension may fit into the other such that respective edges overlap to define an included angle therebetween. In such case, each of the other locations is defined by such edge of the respective extension section. The arrangement is such that the first location makes contact with a side of the post which is opposite to a side contacted by the other two locations.

[0010] Preferably each concave section of the reinforced portions includes at least one ridge which extends transversely of the clamp, that is, in use the ridges extend along the post. Such clamps provide further or secondary locations at which the clamp contacts the post. As such, they can assist the rigidity of the attachment of the clamp to the post, particularly when a turning moment is applied to the clamp via, for example, a force on the component.

[0011] The clamp most preferably is able to accommodate a degree of variation in the cross-sectional dimensions and form of posts with which it is intended to be used. For this, the complementary locating means of the extension sections preferably are engaged for effective clamping over a range of relative positions. Thus, for example, with the preferred form of the invention referred to above, the extension sections can engage by the one extension fitting into the other over a range necessary to bring each of their overlapping edges into contact with the post. For this, the extension sections engage in a manner which retains the overlapping edges at a suitable included angle throughout the range of fitting of the one section into the other.

[0012] The reinforced portions may be provided by a ribbed structure which may be provided on the outwardly facing surface of the reinforced portions in which case the aforementioned ridges may be provided on a continuous inner surface. Alternatively the rib structure could be inwardly facing on at least one of the reinforced portions such that the ridge of that structure is discontinuous. Such a discontinuous ridge arrangement provides a number of pressure points in contact with the post when the clamp is attached thereto, which assists the firmness of the clamping attachment.

[0013] Preferably one of the reinforced sections includes a protrusion such as a pin or like means which extends from the concave section for engaging a complementary aperture or recess in the post. This retains the clamp at a required position along the post while, particularly with a post of substantially circular cross-section, it may also serve to prevent any relative turning of the clamp on the post in use of the clamp. The protrusion may be selected so that the clamp is “handed”, such that the protrusion of each clamp at a respective end of lumbar support will engage only in the
aperture of its respective post. Thus, the protrusion or protrusions of each clamp can ensure that the lumbar support is correctly secured to the seat-back frame.

[0014] Preferably the extension section of each reinforced portion of the clamp includes surfaces which, in use of the clamp, can be brought into facing contact by tightening a fastener which passes through the aligned apertures. Preferably these apertures through which a fastener may pass extend from each such facing surface.

[0015] The complementary locating means preferably include webs or ribs associated with the facing surface of one of the extension sections and recesses or grooves, for receiving the webs or ribs, extending from the facing surface of the other extension section. Additionally, one of the extension sections may include flanges which extend normally from each edge of the clamp and between which the other extension section is received. Such flanges are particularly suitable for guiding the other extension section as it moves towards the first for alignment of the apertures and for preventing lateral movement of one extension section relative to the other. Preferably the aforementioned flexible extension strap, to which the component is attachable or attached, extends from the extension section which includes the flanges.

[0016] For a better understanding of the invention and to show how it may be carried into effect, a preferred embodiment thereof will now be described, by way of non-limiting example only, with reference to the accompanying drawings.

[0017] In the drawings

[0018] FIG. 1 shows a perspective view of a lumbar support attached to the frame of a seat using clamps according to a first embodiment of the invention;

[0019] FIG. 2 shows a clamp of the first embodiment of the invention in an opened condition;

[0020] FIG. 3 shows the clamp of FIG. 2 in a closed condition; and

[0021] FIG. 4 is a partial perspective view of a lumbar support attached to one side of a seat frame and showing a clamp of a second embodiment of the invention.

[0022] In FIG. 1, a lumbar support 10 of the flexible band type extends between two side members, comprising posts 12, of a partially shown seat backrest frame and is attached to the posts 12 by clamps 14. The lumbar support 10 includes a band 16 and a number of curved profile sections 18 which are attached to or form part of the band 16. It also preferably includes an adjustment mechanism (not shown). The lumbar support 12 is known, see for example WO 94/08492, and will not be described in further detail herein. Also, it is to be understood the invention is applicable to lumbar supports other than the example shown in FIG. 1.

[0023] A preferred clamp 14 according to the invention is moulded from a plastics material such as nylon and preferably is integrally formed with the lumbar support 10. As shown in FIGS. 2 and 3, the clamp 14 includes a first reinforced portion 20 and a second reinforced portion 22 joined by a flexible portion 24. The reinforced portions 20 and 22 each include a concave section 26 and 28 and a convex portion 30 and 32 respectively. The concave sections 26, 28 have a profile which is complementary to the cross-sectional shape of the posts 12 of the seat frame. This cross-section is generally non-circular and, for example, it may be oval (as shown), or somewhat rectangular.

[0024] Each extension section 30, 32 of the reinforced portions 20, 22 includes a surface 34, 36 respectively. In use of the clamp 14, surfaces 34 and 36 are brought into facing proximity, if not contact, to enable a respective clamp 14 to be disposed around each post 12, as shown in FIG. 1. When so disposed, the concave sections 26, 28 and flexible portion 24 of each clamp 14 provide a passage (see FIG. 3) which substantially conforms to the cross-section of the respective post 12 such that the concave sections 26, 28 oppositely contact the post 12.

[0025] Each extension section 30, 32 includes an aperture 38, 40 respectively, which extends therethrough from each of respective surfaces 34 and 36. The extension sections 30, 32 furthermore include complementary locating means for aligning the apertures 38, 40 and for preventing relative lateral movement between the extension sections. These complementary locating means include upstanding webs 42 on extension section 30 (only one of which is visible in FIG. 2) which are receivable in recesses 44 formed in extension section 32. The recesses 44 have a relatively wide opening at surface 36 and walls which taper towards each other away from surface 36 to assist in the alignment of the extension sections 30 and 32 as they are moved relatively towards each other to assemble the clamp 14 around a post 12. The reinforced portion 20 includes an upstanding cross wall 46 which effectively defines the junction between the concave section 26 and extension section 30 of the reinforced portion 20. A shoulder 48 formed on the other extension section 32 and which defines an edge 36a of the surface 36 is able to bear against a surface of wall 46 which faces across extension section 30, to further provide for positive location of the extension sections 30 and 32 as they are moved relatively towards each other. The extension section 30 furthermore includes side flanges 50 between which the extension section 32 locates thus preventing it from moving laterally from the extension section 30.

[0026] Reinforcement of portions 20 and 22 is enhanced by a ribbed structure 52, 53 respectively for each portion. The ribbed structure 52 is located inwardly of reinforced portion 20, while the outer surface (not shown) of portion 20 may be continuous. The rib structure 53 is located outwardly of reinforced portion 22, while the inner surface 54 of portion 22 is continuous. Inner surface 54 has major portions 54a, 54b, 54c and 54d, with portions 54a, 54b and 54c substantially parallel and surface 54d recessed relative to portions 54a and 54c.

[0027] The concave section 28 of reinforced portion 22 includes two continuous transverse ridges 56 and 57. Ridge 56 is located between surface portions 54a and 54b, while ridge 57 is located between portions 54b and 54c. The concave section 26 of reinforced portion 20 includes two discontinuous transverse ridges 58 and 59, each formed partly by a mid-section of ribbed structure 52 being set back from end sections thereof. The ridges 56 and 57 and the series of ridges 58 and 59 tightly bear against the surface of a post 12 when the clamp is attached thereto. These ridges assist the rigidity of attachment of the clamp 14.

[0028] Location of a clamp 14 relative to a post 12 is by means of an inwardly directed projection 60 on the concave
section 26 of the reinforced portion 20. This projection 60 is for location in a complementary hole in a side member 12.

[0029] The band 16 of the lumbar support 10 preferably is integrally joined to the extension section 30. Alternatively, the clamp may be formed with a short, integral extension, such as the part to which reference 16 in FIGS. 2 and 3 extends, and a component such as a lumbar support attached to the clamp via that extension.

[0030] In use, the clamp 14 at each end of a lumbar support 10 is fitted around a respective post 12 and affixed thereto by passing a fastener such as a bolt (not shown) through the aligned apertures 38, 40 and tightening the bolt. As illustrated in FIG. 1, the engaged extension sections provide anchorage locations 62 for the lumbar support 10 which are located forwardly of the posts 12.

[0031] The band 16 may project beyond the end of either of extension sections 32 and which is remote from the respective one of concave sections 26 and 28. However, as indicated, extension section 32 fits partly within extension section 30 and it therefore generally is more convenient to have band 16 extend from extension section 30, as shown. In any event, it is preferred that clamp 14 be mounted on post 12 such that the extension section from which band 16 projects is on the laterally outer side of post 12 (as also shown), as this better resists tension in band 16.

[0032] As will be appreciated, each clamp 14 of the lumbar support 10 is secured to a respective post 12 of the seat back-rest frame by being presented to its post in the general orientation shown in FIG. 2. The projection 60 of the clamp 14 is located in a hole in the respective post 12. The clamp 14 then is closed, by bending of flexible portion 24, to bring it into the arrangement shown in FIG. 3 in which it is able to encircle the post. Each clamp 14 may have a projection 60 of a respective cross-section, or more than one projection 60, such that each clamp is engageable with only one of posts 12, thereby enabling lumbar support 10 to be installed in the correct orientation.

[0033] With the clamp 14 in the arrangement shown in FIG. 3, and a fastener passed through apertures 38, 40 and tightened, the clamp 14 is secured on the post 12 (not shown in FIG. 3). Post 12, as shown in FIG. 1, is of oval cross-section and clamp 14 makes contact with it at three principal locations. The first location is at flexible portion 24. As is evident from FIG. 3, portion 24 extends across one end of the generally oval opening defined by clamp 14 and in which post 12 is secured. Each of the other two locations are at the other end of that opening. One of these other locations is defined by surface portion 54d of the inner surface 54 of reinforced portion 22. The other one of these is defined by corresponding parts of the reinforced portion 20; that is, by the respective edge 50a of each side flange 50 of portion 20.

[0034] As shown in FIG. 3, surface portion 54d of reinforced portion 22 and edges 50a of reinforced portion 20 are mutually disposed symmetrically with respect to the oval opening defined by clamp 14 and, hence, with respect to a post secured in that opening. The surface portion 54d is inclined with respect to each edge 50a at an obtuse included angle such as from about 110° to 130°. The included angle is about 120° in the embodiment illustrated. A major plane of symmetry for the oval opening (and hence for the post 12 therein) substantially bisects that angle. The arrangement is such that surface portion 54d is tangential to the post 12 at one of the other locations, to one side of the major plane; while each edge 50a is similarly tangential to the post 12, but at the other side of the major plane.

[0035] With post 12 secured in clamp 14, the three principal locations of contact between the clamp and post most preferably are such that, with tightening of a fastener through apertures 38, 40, surfaces 34, 36 are slightly spaced. The spacing preferably is about 4 or 5 mm. However, the arrangement is such that this range can be increased such as up to 8 mm or decreased down to zero spacing between surfaces 34, 36. In the overall range of 0 to 8 mm, the three locations of principal contact with post 12 are maintained, although the locations of the tangential contact with post 12 vary slightly with variation in that range. As will be appreciated, variation in the range enables accommodation of over- or under-side posts within specified tolerances.

[0036] Clamp 14 makes secondary clamping contact with the post 12. The location of the contacts is along the ridges 56 and 57, and each of these sections of series 58 and 59.

[0037] In the arrangement of FIG. 4, each part corresponding to a part of the arrangement of FIG. 1 has the same reference numeral, plus 100. Thus, the lumbar support 110 is of the flexible band type which includes a band 116 and, at each end of band 116, a respective clamp 114. However, FIG. 4 shows only one end portion of band 116 and, hence, only 114 is shown. Similarly, only one post 112, of a pair of side posts of a seat backrest frame, is shown.

[0038] In this instance, the support 110 includes an adjustment mechanism, with this comprising an electric motor 70 and a drive spindle 72 coupled to the output shaft (not shown) of motor 70 by gearing (also not shown). Motor 70 is mounted on band 116, adjacent to the one clamp 114 and post 112 shown, with its drive shaft extending transversely of band 116. Spindle 72 extends from motor 70, away from the one clamp 114 and parallel to band 116. The band 116 has two portions 116a and 116b which overlaps longitudinally and are inter-fitted to enable variation in the extent of their overlap. Motor 70 is mounted on portion 116a, while the end of spindle 72 remote from motor 70 is in threaded engagement with a boss (not shown) on portion 116b. Thus, by operating motor to rotate spindle 72 in a required direction, band 116 can be shortened or lengthened whereby, with support 110 clamped at each end to a respective post 112, the curvature of band 116 and hence the degree of lumbar support can be varied.

[0039] With one exception, clamp 114 and band 116 are similar to those of support 10 of FIG. 1, although clamp 114 is shown in a simplified form. That exception is in the provision of a stiff bracket 74 on the one clamp 114 shown (although a similar bracket most preferably would be provided on the clamp 114 at the other end of band 116). The bracket 74 is shown as mounted on the end of the same extension section as band 116 extends from, in this case section 130 (in line with the arrangement of FIG. 1). While this arrangement is preferred, it is not necessary as bracket 74 could be mounted on the end of extension section 132.

[0040] The bracket 74 extends from clamp 114 such that, with clamp 114 secured on its post 112 as required for correct positioning of band 116 in relation to a seat backrest
frame, bracket 74 projects forwardly with respect to the backrest frame to facilitate provision of side bolster support for a covered and padded backrest. Thus the bracket 74 extends laterally with respect to the longitudinal extent of the passage defined by clamp 114, when closed, and through which post 112 extends. The bracket 74 preferably is inclined slightly outwardly and forwardly, so as to enable a person to position his or her torso comfortably between opposed bolster supports.

[0041] As shown, the frame 74 preferably is formed from a length of stiff wire. It has a U-shaped form providing substantially parallel legs 75, 76 and a web portion 77 which extends between a respective end of each leg 75, 76. The other end of each leg 75, 76 extends along, and is secured in a boss or clip 78 formed integrally with, a respective one of the side flanges 150 of the extension section 130. From each boss or clip 78, each leg projects substantially directly forwardly, that is, substantially perpendicularly to a plane parallel to the backrest frame. However, outwardly from the bracket 114 on which it is mounted, each leg is bent to provide the slight outward inclination of bracket 74.

[0042] In use of the lumbar support 110, its bracket 74 (as with the backrest frame on which support 110 is mounted) would be covered with padding. The padding then would be contained within an outer covering for the backrest frame which, in addition to conforming to the backrest frame, would conform to and accommodate therein the bracket 74 and its padding.

[0043] A clamp as above described for fixing a lumbar support to a seat backrest frame is particularly advantageous as it is relatively cheap to manufacture, being an integral structure formed by moulding. It is also easy to install, for example by an automated process, due to the engageable parts including complementary means for locating and aligning those parts, particularly the apertures through which a fastener is passed. Furthermore, the clamp ensures a firm attachment for the lumbar support which is assisted by the inherent resiliency of the material of the clamp in addition to the above described features such as the complementary shape of the concave sections and transverse ridges thereon.

[0044] The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall within the spirit and scope of the above description.

1. A clamp for attaching a component to an elongate member, the clamp forming part of or being attachable to the component and having first and second reinforced portions joined by a flexible portion for surrounding the elongate member, the first and second reinforced portions each including a concave section and an extension section, wherein in use the extension sections are engageable for the concave sections to oppositely contact the elongate member, and wherein the extension sections include complementary locating means for aligning an aperture in each extension section for passage of a fastener and for preventing relative lateral movement between the extension sections.

2. A clamp according to claim 1, further including an integrally formed flexible extension strap to which the component is attachable or attached.

3. A clamp according to claim 1 or claim 2, wherein the clamp is an integral structure formed by moulding from a suitably strong plastics material such as nylon.

4. A clamp according to any one of claims 1 to 3, wherein the clamp is adapted to make principal contact with the periphery of the elongate member at three locations, a first of the locations being at the flexible portion, and the other two locations are closely adjacent to each other and each is at a respective one of the extension sections.

5. A clamp according to any one of claims 1 to 4 wherein, with the extension sections engaged for securement of the clamp with an elongate member, one extension fits into the other such that respective edges overlap to define an included angle therebetween.

6. A clamp according to claim 5 as appended to claim 4, wherein each of the other locations is defined by a respective one of said edges whereby the first location is able to make contact with a side of the elongate member which is opposite to a side of the elongate member contactable by the other two locations.

7. A clamp according to any one of claims 1 to 6, wherein each concave section of the reinforced portions includes at least one ridge which extends transversely of the clamp extending along the post to provide further or secondary locations at which the clamp contacts the elongate member.

8. A clamp according to any one of claims 1 to 7, wherein the complementary locating means of the extension sections are engageable for effective clamping over a range of relative positions, whereby the clamp is able to accommodate a degree of variation in the cross-sectional dimensions and form of elongate members with which it is intended to be used.

9. A clamp according to claim 8, wherein the extension sections can engage by the one extension fitting into the other over a range necessary to bring each of their overlapping edges into contact with the elongate member.

10. A clamp according to any one of claims 1 to 9, wherein the reinforced portions are provided by a ribbed structure on an outwardly facing surface of each reinforced portion.

11. A clamp according to any one of claims 1 to 10, wherein one of the reinforced sections includes a protrusion which extends from the concave section of the one reinforced section for engaging a complementary aperture or recess in the elongate member for retaining the clamp at a required position along the elongate member and for preventing relative turning of the clamp on the elongate member in use of the clamp.

12. A clamp according to any one of claims 1 to 11, wherein the extension section of each reinforced portion of the clamp includes surfaces which, in use of the clamp, can be brought into facing contact by tightening a fastener which passes through the aligned apertures.

13. A clamp according to claim 12, wherein the complementary locating means include webs or ribs associated with a surface of one of the extension sections which faces the other extension section; and wherein, recesses or grooves, for receiving the webs or ribs, extend from a surface of the other extension section which faces said surface of the one extension section.
14. A clamp according to claim 13, wherein the one of the extension sections includes flanges which extend from each edge of the clamp and between which the other extension section is received.

15. A clamp according to any one of claims 1 to 14, wherein the component is a lumbar support for a seat, and the clamp forms part of or is attachable to one end of a strap portion of the lumbar support, with the clamp adapted for clamping engagement with a side member of frame for the seat for securing the one end in relation to the frame.

16. A clamp according to claim 15 as appended to claim 2, wherein the clamp is attachable to the one end of the strap portion of the lumbar support by engagement between the flexible extension strap and said one end of the strap portion.

17. A clamp according to claim 15 as appended to claim 2, wherein the one end of the lumbar support is defined by said flexible extension strap.

18. A lumbar support for a vehicle seat, including an elongate band and, at each end of the band, a respective clamp according to any one of claims 1 to 14 whereby the lumbar support is adapted to be mounted between respective elongate members each comprising a side member of a frame for the vehicle seated by engagement of each clamp around a respective one of the side members.

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