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(71)(72) Applicants and Inventors: TIEGS, Del, V. [US/US]; TIEGS, Randy, G. [US/US]; 15878 E. Wind Circle, Sunrise, FL 33326 (US).

(74) Agent: MALIN, Eugene, F.; Malin, Haley & McHale, One Financial Plaza, Suite 2110, Fort Lauderdale, FL 33394 (US).

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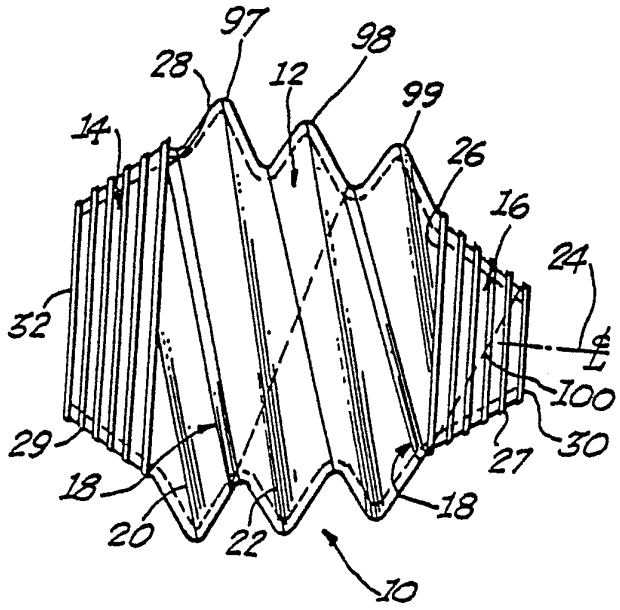
(54) Title: ONE-PIECE SPLIT BOOT FOR UNIVERSAL JOINT



(57) Abstract

A split boot (10) formed from a unitary, flexible body (12) shaped to be helically wrapped around a universal joint or the like. Once the flexible body (12) is wrapped around the joint with the mating edges (17) and (19) engaged, a main body (12) is formed having a generally hollow truncated conical configuration with a corrugated or helical shape. One end (16) of the main body (12) has a smaller circular cross section than the other end (14). Each end portion of the main body (12) has cutting guide ridges (27) and (29) such that the diameter of the aperture in the end may be varied by removing some of the material from the body.

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ONE-PIECE SPLIT BOOT FOR UNIVERSAL JOINT

BACKGROUND OF THE INVENTION

The present invention relates to boots for covering universal joints and the like and more particularly to unitary, flexible body having a first mating edge and second mating edge and shaped to be helically wrapped about a universal joint, coupling or other type of structure without disassembling the structure in which the first mating edge is engaged with the second mating edge thereby forming a removable boot for the universal joint or the like.

In the past, a structure such as a C.V. joint on front wheel drive vehicles had to be disassembled to replace a damaged boot. Such procedures prove to be both costly and time consuming. Furthermore, boots having cracks, tears or loose clamps or other types of damage may lose lubricant, or allow water or dirt to enter the boot, causing eventual deteriation of the joint. Other procedures have been attempted to replace damaged boots. For example, a boot may be cut down the side and placed over the C.V. joint and glued back together. However, this procedure is difficult to perform because the cut area must be clean and the reglued area must be further supported using extra clamps. The work area is usually greasy and almost impossible to keep clean. Any grease on the cut area of the boot will prevent it from being properly sealed. Any cracks left in the seal will allow dirt and water to enter and the lubricant to leak out.

require a clean area, and in fact the boot will be sufficiently sealed even if some grease accumulates in the sealing area. Furthermore, the present invention does not require additional clamps to attach it to the joint or the like and by providing truncated conical end portions with cut away portions thereon the invention allows for alterations of the boot to fit structures of varying size. In addition, the present invention may be removed and replaced without disassembling the mechanical unit it covers.

SUMMARY OF THE INVENTION

The present invention provides a split boot formed from a unitary, flexible body shaped to be helically wrapped around a universal joint or the like. Once the flexible body is wrapped around the joint with the mating edges engaged a main body is formed having a generally hollow truncated conical configuration with a corrugated or helical shape. In the preferred embodiment one end of the main body has a smaller circular cross section than the other end. Each end portion of the main body has cutting guide ridges such that the diameter of the aperture in the end may be varied by removing some of the material from the body, to accomodate different sized joints or mechanical units. The corrugations or the helical shape in the main body are diagonally disposed relative to the longitudinal axis of the main body to provide longitudinal flexibility and for providing the recirculation of lubricating oils during rotational movement of the boot with a rotating mechanical unit and to equalize rotational forces on the boot to prevent premature rupture and cracking thereof.

It is an object of the present invention to provide a novel split boot that is easily used and sealingly connects or mates around a universal joint or the like without disassembly of the joint.

It is another object of the present invention to provide a novel split boot having helical overlapping snap sealing means for making it easy to install and remove the boot from a universal joint or the like.

It is a further object of the present invention to provide a novel split boot having a corrugated shape with the corrugations being generally diagonally disposed relative to the longitudinal axis of the boot which facilitates recirculation of the lubricating oil contained therein.

It is an additional object of the present invention to provide a split boot having a sealing means positioned so that the sealing means is not subject to premature cracking, rupturing and opening thereof.

In accordance with these and other objects which will be apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1A is a plan view of the split boot of the present invention disassembled;

Figure 1B is a plan view of the split boot partially assembled;

Figure 2 a side view of the split boot of present invention in final sealed and assembled form;

Figure 3 is a right end view of the split boot of the present invention in final sealed form;

Figure 4 is a partial cross sectional view of the main body 10 of Figure 1; and

Figure 5 is an enlarged view of the sealing means of Figure 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Figures 1A, 1B and 2, the split boot 10 covers a mechanical unit such as joint or rotating C.V. joint. The split boot 10 includes a unitary main body portion 12, two end portions 14 and 16, a grooved mating edge 17 and a male mating edge 19 in Figure 4. The grooved mating edge 17 may be engaged by the male mating edge 19 to form a connecting means 18 in Figures 2 and 3. The connecting means is positioned so that centrifugal force from rotation about the center line 24 does not pull male member 19 directly out of female member 17. The boot 10 may be constructed entirely out of Ethylene-Neoprene rubber such as that sold under the trademark VAMAC by DuPont. When the interlocking sealing means 18 is disengaged the entire boot 10 may be laid down in a flat configuration as shown in Figure 1. This allows the boot to be installed about a structure such as a universal joint, coupling or other type of structure without disassembling the structure.

Referring now to Figure 2, the body 10 has a main body portion 12 of a generally hollow truncated conical corrugated configuration or helical when assembled. As can be seen the plane of each protruding

corrugated portion 20 and 22 is diagonally disposed relative to the longitudinal axis 24 of the main body 10. (i.e. The plane of each protrusion is not normal to the axis). The corrugated configuration provides for recirculation of the lubricating oils when rotational movement of the universal joint or the like occurs. The oil moves in the screw-like threads. The corrugated configuration also provides for equalization of forces caused by rotational movement of the boot thus preventing premature cracking or rupturing of the boot. In Figure 3 the size of the corrugated portions are illustrated by numerals 97, 98 and 99.

The main body 12 has a smaller circular top 26 and a larger circular base 28. The two truncated conical end portions 14 and 16 emanating from the circular bases 28 and 26 respectively have circular top openings. The end portions include sizing guides 27, 29 that allow accurate trimming of the boot 10 to specific sizes, such that the one boot will accomodate the needs for most vehicles.

Referring now to Figures 4 and 5, the first grooved mating opening or edge 17 and the complementary male mating bulb or edge 19 is shown in the removably engaged position and may be referred to as a connecting means. When the grooved mating edge 17 is not engaged by the male mating edge 19, the edge portions of the main body 10 are separated from each other allowing the main body 10 to be wrapped around a structure without disassembling it. Numeral 100 shows the separation line in Figures 2 through 5. The grooved mating edge 17

includes an end portion 34 and a flat portion 38, while the male mating edge 19 includes the end portion 36 and the flat portion 40 all which together form the removable connecting means 17, 19. The male mating edge 19 includes a flange 42 and a bulbus end 44 that fits in the grooved mating edge 17 of a complementary shape. The configuration of the connecting means 17, 19 resists opening forces in the directions shown by the arrows AA', while the material around the bulbous end 42 provides for resistance to opening in the direction of arrow B. The connecting means 17, 19 also provides for periodic non-destructive removal of the boot 10 in Figure 2 for inspection of the structure thereunder and regreasing if necessary, and resealing of the boot. The split boot may be made out of rubber or neoprene type material.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious modifications will occur to a person skilled in the art.

What is claimed is:

1. A boot for a universal joint or the like comprising:

a split unitary main body, said body sized and shaped for wrapping about said universal joint or the like;

connecting means, connected to said body, for non-destructive removal and sealingly connecting said body along said split about said universal joint or the like in a sealed position.

2. A boot, according to claim 1, wherein:

said body in the sealed position is generally hollow and conical with a corrugated portion.

3. A boot, according to claim 2, wherein:

said corrugated portion includes protruding portions, the plane of each said protruding portion being diagonally disposed relative to the longitudinal axis of said body in the sealed position whereby recirculation of lubricating oils inside said body is facilitated.

4. A boot, according to claim 3, wherein:

said body further includes a first conical end portion integral with one end of said body and a second conical end portion integral the other end of said body.

5. A boot, according to claim 4, wherein:

said first and second end portions include sizing guides for facilitating accurate trimming of said boot to accomodate different sized said universal joints or the like.

6. A boot, according to claim 1, wherein said connecting means comprising:

a first mating portion integral one edge of said body;

a second mating portion integral the other edge of said body;

said second mating portion non-destructively, removably engageable with said second mating portion whereby said sealed main body is formed.

7. A boot, according to claim 6, wherein:

said first mating portion includes a substantially circular-shaped groove with a longitudinal slot therein;

said second mating portion includes a bulbous protruding portion sized and shaped for engagement with said substantially circular-shaped groove.

8. A boot, according to claim 3, wherein said connecting means comprising:

a first mating portion integral one edge of said body;

a second mating portion integral the other edge of said body;

said second mating portion non-destructively, removably engageable with said second mating portion whereby said sealed main body is formed.

9. A boot, according to claim 8, wherein:

said first mating portion includes a substantially circular-shaped groove with a longitudinal slot therein;

said second mating portion includes a bulbous

protruding portion sized and shaped for engagement with said substantially circular-shaped groove.

10. A boot, according to claim 9, wherein:

said second mating portion engages said first mating portion in a direction normal to the plane of each said protruding portion of said corrugated portion whereby separation of said connecting means is prevented during rotation of said boot.

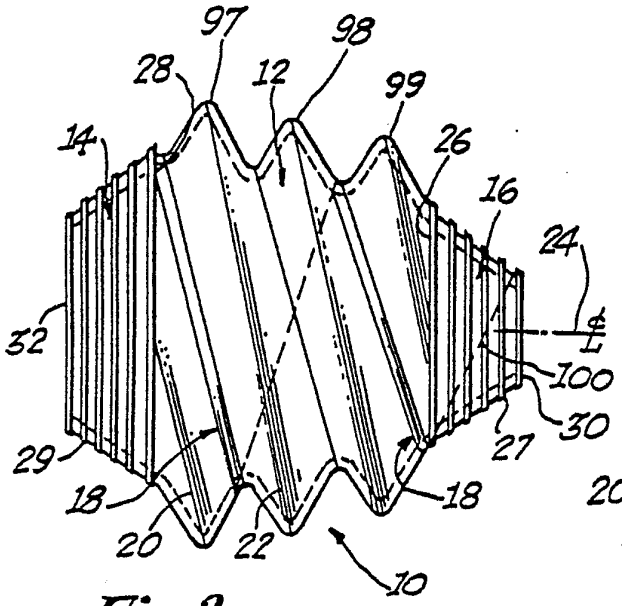

Fig.2.

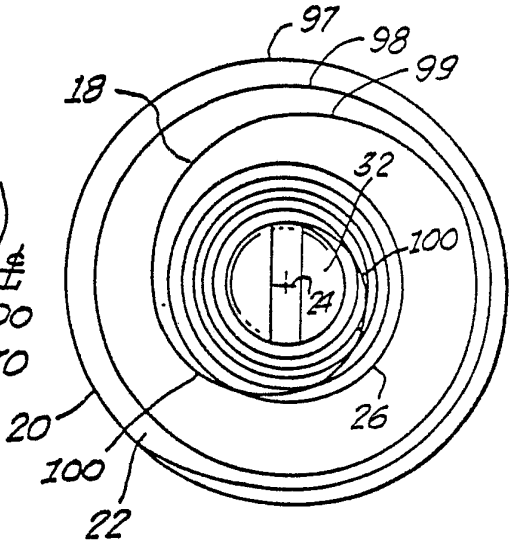

Fig.3.

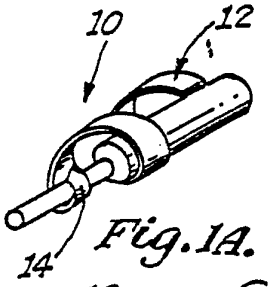

Fig.1A.

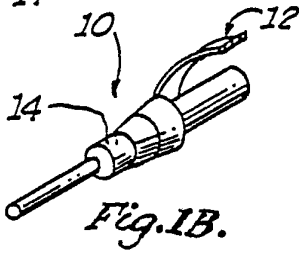

Fig.1B.

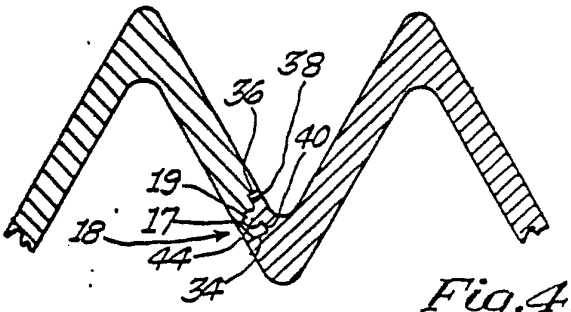

Fig.4.

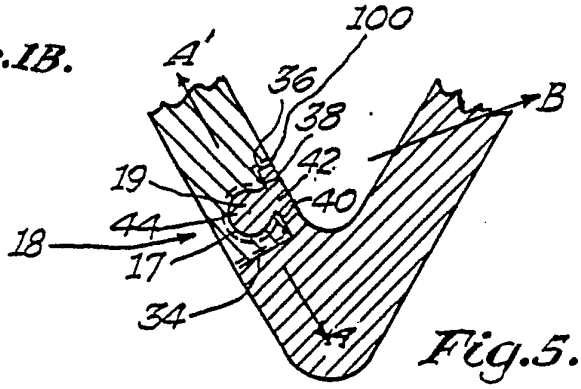

Fig.5.

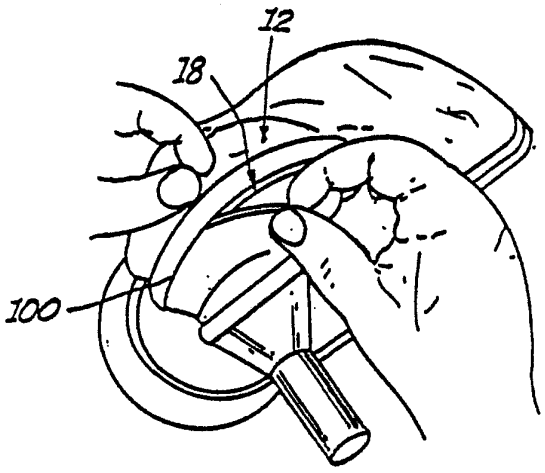

Fig. 6.

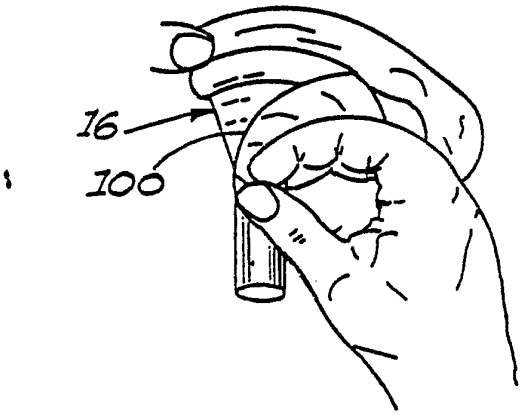

Fig. 7.

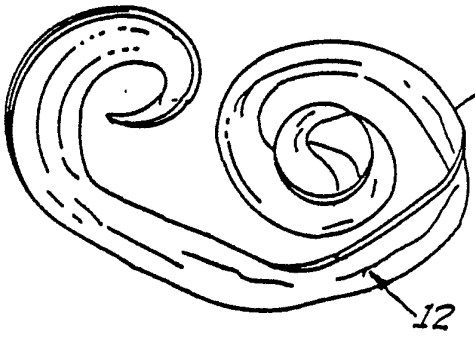

Fig. 8.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US87/00579

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL.[4] F16J 3/04; F16J 15/52

U.S. CL. 277/212FB, 199; 74/18; 403/50

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	277/192, 197, 199, 212R, 212FB 285/381; 74/18, 18.1, 18.2; 403/50, 51

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	US, A, 2,226,388 PUBLISHED 24 DEC. 1960 RICHTER	1-10
A	US, A, 2,768,036 PUBLISHED 23 OCT. 1956 GREENOUGH	1-10
A	US, A, 3,638,503 PUBLISHED 1 FEB. 1972 STIPANOVIC ET AL	1-10
A	US, A, 3,660,213 PUBLISHED 2 MAY 1972 MOSELEY	1-10
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A	US, A, 4,211,423 PUBLISHED 8 JUL. 1980 RESECH	5
A	US, A, 4,396,656 PUBLISHED 2 AUG. 1983 STILL ET AL	1-10
A	US, A, 4,558,869 PUBLISHED 17 DEC. 1985 GROVE ET AL	1-10
Y	FR, A, 684,106 PUBLISHED 11 MAR. 1930 GALLAND	5
Y	DE, A, 1,775,265 PUBLISHED 19 AUG. 1971 TONNIES	1, 2, 6-10
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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
01 JUNE 1987	24 JUN 1987
International Searching Authority [1]	**Signature of Authorized Officer** [20]
ISA/US	Robert S. Ward, Jr.

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