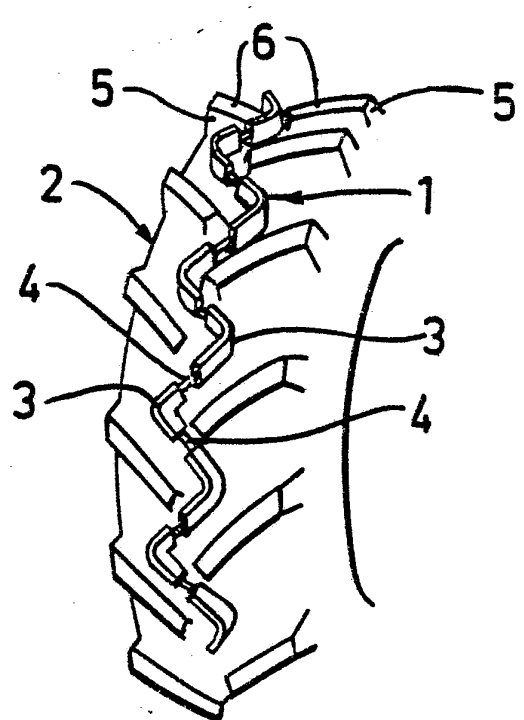




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification<sup>3</sup> : <b>B60C 27/10</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 84/ 04902</b></p> <p>(43) International Publication Date: 20 December 1984 (20.12.84)</p>
<p>(21) International Application Number: PCT/SE83/00234</p> <p>(22) International Filing Date: 8 June 1983 (08.06.83)</p> <p>(71)(72) Applicant and Inventor: LINDMARK, Peter [SE/SE]; Box 10017, S-900 10 Umeå (SE).</p> <p>(74) Agent: AB STOCKHOLM PATENTBYRÅ, ZACCO &amp; BRUHN; Box 3129, S-103 62 Stockholm (SE).</p> <p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), NO, SU, US.</p> <p><b>Published</b> <i>With international search report. In English translation (filed in Swedish).</i></p>		
<p>(54) Title: ANTI-SKID DEVICE</p> <p>(57) Abstract</p> <p>An anti-skid device (1) for vehicle tires, especially for example so-called agricultural tires (2), comprises a plurality of gripping members (3) and members (4) for holding them together relative to each other. The gripping members (3) are designed to be placed in depressions in the tread of the tire and to project radially outside the tread, and by means of the holding-together members (4) they form a coherent chain in the longitudinal direction of the tread. The distance between the gripping members (3) is adjustable by the holding-together members (4), and thereby length adjustment to the pattern and circumference of the tire (2) in question can be effected.</p> <div style="text-align: right;">  </div>		

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Anti-skid device

This invention relates to an anti-skid device for vehicle tires, especially for example for so-called agricultural tires, comprising a plurality of gripping members and members for holding the gripping members together relative to each other, which gripping members are formed so as to be placed in depressions in the tread and to project radially outside the tread.

When for example tractors and loading machines are driven on ice- and snow-covered ground, there is great demand of an anti-skid device which improves the gripping engagement of the tire with the ground and thereby improves the advance of the vehicle.

It was tried to solve this problem by mounting non-skid chains on the drive wheels of the vehicle, which chains were or were not provided with spikes of various types, but all of said chains show many disadvantages. Examples of such disadvantages are troublesome mounting, due a.o. to the great weight of the non-skid chains and length adjusting problems in pace with the wear of the tire, and substantial wear of both tire and non-skid chain. The wear is particularly troublesome at tires with sparse pattern, for example so-called agricultural tires, because there only that portion of the non-skid chain is really active which intersects the projecting tread portions



in the form of so-called ribs/studs. This has a detrimental effect on the service life of the chain, because the chain thereby is worn in spots, and the wear of the ribs/studs of the tire also is high. Due to the fact that the chains are located outside the periphery of the tire, the wheel run is bouncing. This is inconvenient for the driver, especially at high vehicle speeds, and also can negatively affect the durability of the vehicle. Conventional chains also give rise to a high sound level, because the links continuously strike one against the other.

To provide the tires only with spikes is in most cases an unsatisfactory measure.

The present invention has the object to bring about a device, which does not show the aforesaid disadvantages. This object is achieved in that the device has been given the characterizing features defined in the attached claims.

The invention, compared to previously known solutions, offers an anti-skid device, which abuts only the bottom of recesses in the tire pattern. Several advantages are obtained hereby. The anti-skid device according to the invention does not wear vital parts of the tire, because it does not abut projecting portions of the tire pattern. The wear of the bottom of the recesses, besides, is low, because the gripping members are oriented relatively fixed in relation to the tire and because the contact area of the device on the tire is relatively large and adapts well to the form of the pattern bottom of the tire. The anti-skid device, furthermore, by its design



yields a good gripping effect in all directions, i.e. also in lateral direction. Owing to the fact that all gripping members abut the pattern bottom and project radially outside the tread of the tire, the anti-skid device is active in each link. The anti-skid device per se in principle is noiseless, and its weight is substantially lower than the weight of conventional non-skid chains, The possibility of inward resilience of the anti-skid device into the tire is favourable, which a.o. results in a gentle behaviour of the anti-skid device toward a hard ground. The vehicle combination, due to the continuity and position of the anti-skid device, runs more comfortably and less jerky than is the case at the use of conventional chains. The anti-skid device, further, can be easily extended and shortened and thereby renders possible a good fit on the tire. The flexibility allows the application of the same anti-skid device on different tire dimensions. Still another advantage of the location of the gripping members in the depressions between the ribs/studs is that the distance to vehicle parts located close to the tire, such as fenders, running boards and the like, increases.

Embodiments of the invention are described in greater detail in the following, with reference to the accompanying drawings, in which

Fig. 1 is a partial perspective view of an anti-skid device according to the invention, comprising gripping members and holding-together members mounted on a so-called agricultural tire,



- Fig. 2 is a horizontal view on an enlarged scale of two gripping members and one holding-together member connecting said gripping members,
- Fig. 3 is a lateral view of the gripping member shown in Fig. 2,
- Fig. 4 is a horizontal view of a gripping member according to an alternative embodiment,
- Fig. 5 is a lateral view of a gripping member according to Fig. 4,
- Figs. 6-8 are horizontal views of examples of other embodiments of gripping members according to the invention,
- Fig. 9 is a section along the line IX-IX in Fig. 8,
- Fig. 10 is a section along the line X-X in Fig. 8,
- Fig. 11 is a horizontal view of still another embodiment of a gripping member according to the invention,
- Fig. 12 is a section along the line XII-XII in Fig. 11,
- Fig. 13 is a horizontal view of three gripping members according to Fig. 11 held together by means of holding-together members,
- Fig. 14 is a horizontal view of still another embodiment of an anti-skid device according to the invention,
- Fig. 15 is a section along the line XV-XV in Fig. 14,
- Fig. 16 is a schematic horizontal view of a section of a tire provided with an anti-skid device according to the invention, which is completed with longitudinal chains,
- Fig. 17 shows compared to Fig. 16 an alternative anchoring of the chains at the gripping members,



- Fig. 18 is a perspective view of a gripping member, which is completed with an auxiliary in the form of an attachable friction-increasing element,
- Fig. 19 is a perspective view only of the attachable friction-increasing element according to Fig. 18,
- Fig. 20 is a schematic lateral view of a tire provided with an anti-skid device according to the invention, where the anti-skid device is completed with chord-like drawn side chains, and
- Fig. 21 is a schematic partial horizontal view of an example that the invention can be adapted to a different tire pattern.

Fig. 1 shows an anti-skid device 1 according to the invention attached on a so-called agricultural tire 2. The anti-skid device 1 comprises a plurality of angular gripping members 3 and members 4 for holding-together the gripping members. The pattern on the tire 2 shown consists of inclined tire ribs 5. The gripping members 3 are angular for fitting in between the tire ribs 5. The gripping members 3, thus, are placed into depressions located in the tread of the tire 2 and have such a height, that they project radially outside the top surface 6 of the tire ribs 5. Also the holding-together members 4 are located in depressions in the tread.

The gripping member 3 comprises an angular steel profile 7 and two tubes 8, which are connected to the profile by welding or designed integrally therewith. The steel profile 7 is provided with recesses 9. The gripping members 3 are arranged in rows one after the other and turned so as to form a zigzag pattern.



as shown in Figs. 1 and 2, and they are held together to each other by holding-together members 4 extending through tubes, which members comprise screws or rivets. In Fig. 2 a holding-together member 4 is shown in the form of a screw 10 and a nut 11. As an alternative to a special nut, one of the tubes of the gripping member can be provided with an internal thread. The anti-skid device assembled as described above is attached on the tire 2 so that the tubes 8 abut the bottom of the recesses in the tire tread. The tension of the holding-together members 4 implies the great advantage that the distance between the gripping members 3 can be adjusted so that said members are given perfect abutment and extension to the tire, irrespective of the tire dimension and the distance between tire ribs.

It should also be mentioned that there is the possibility of placing elastic members (not shown) in the form of rubber rings, springs or the like in the boundary area 12 between the head of the screw 10 and adjacent tubes 8 and/or in the boundary area 13 between the nut 11 and adjacent tubes 8, which elastic members surround the screw 10. Thereby a so-called self-stretching of the anti-skid device can be obtained.

Figs. 4 and 5 show a different embodiment of a gripping member 20, where the tubes are divided into two parts 21,22. It appears from Fig. 5, that the nut 24 of the holding-together member 23 can be placed in the space between the tube parts 21 and 22. Hereby the advantage is obtained that the threads of the screw 25 are not exposed when they project outside the nut 24. The same advantage also is obtained with the afore-mentioned alternative where the tube 8 is entirely or partially provided

with an internal thread.

A modified embodiment of the gripping member according to the invention is shown in Fig. 6. The gripping members 30,31 have another angle and form, which proves that the gripping members according to the invention not necessarily must be symmetric.

Fig. 7 shows another embodiment of the gripping members according to the invention. The gripping members 40,41 in this case have T-shape. The holding-together member, which extends through a hole in the gripping member, here is a screw 42, which is anchored in an internally threaded hole 43 in the gripping member in question.

Fig. 8 shows examples of gripping members 50, of which one leg 51 is formed with a round pin, and the other leg 52 of which is provided with a through hole 53 for a corresponding pin of another gripping member. Right-hand and left-hand variants of this gripping member are placed one after the other as shown in Fig. 8 and are locked in the example relative to one another by means of a screw 54, which is screwn into one of the threaded holes 55 located in the pin-shaped leg 51. Gripping members designed according to this principle can be held together in several ways different of the one shown here, for example by locking pins, grooved rings or the like.

Fig. 11 shows a gripping member 60, which is a modified embodiment of the gripping member 50 according to Figs. 8-10. The articulation hereby obtained is still better than the one obtained at other embodiments. Fig. 13 shows three gripping members designed according to this principle mounted at each other, and the holding-together members here are nuts 61.



Fig. 14 shows an embodiment of an anti-skid device according to the invention with gripping members 70, which are neither angular nor curved. The gripping member 70 is provided at one end with a transverse hole 71 and at its other end with a longitudinal threaded hole 72. A holding-together member in the form of a screw 73 extends through the transverse hole 71 of a gripping member 70 and is anchored in the threaded hole 72 of an adjacent gripping member 70. The gripping member 70 further comprises shoulders 74 in order to optimize the gripping capacity of the anti-skid device.

Fig. 16 shows that it is possible to use an anti-skid device according to the invention as holding-together member, for example, for two longitudinal chains 81 along the tread 80 of a tire. In Fig. 17 another method of attaching the chain 81 to the anti-skid device 1 is shown. The attachment here is made by means of screws 82.

Fig. 18 illustrates how an auxiliary in the form of a U-shaped profile 90 can be mounted on a gripping member 91. The U-profile 90 is intended to serve as an additional friction-increasing element, and it is fixed on the gripping member 91 by means of screws (not shown), which extend through holes 92 in the gripping member. Fig. 19 shows only the friction-increasing element 90.

Fig. 20 indicates the possibility of placing chord-like drawn side chains 101 over the outer sides of a tire 100. The chains are connected at their ends 102, 103 to some part of the anti-skid device 104. The chains 101 serve as retaining members for ensuring the orientation of the gripping members for example on tires with low pattern depth.



The anti-skid device according to the invention can be adapted to many different types of tire patterns, and Fig. 21 shows schematically examples of how this can be effected with gripping members designed in principle as shown in Figs. 2 and 3.

It applies to all embodiments that the surface of the gripping member abutting the pattern bottom of the tire preferably should be rounded. This rounding, and the fact that the gripping member is fixed relatively well in relation to the tire, imply low wear of the pattern bottom of the tire.

The gripping members preferably can be manufactured of a steel grade with good wear resistance.

When the tire pattern does not permit the gripping members and holding-together members to be placed in recesses already provided in the tread, it is possible to provide space for the same by making the necessary recesses in the tread.

The invention is not restricted to what is described and shown, but alterations and modifications thereof can be imagined within the scope of the attached claims.



Claims

1. An anti-skid device for vehicle tires, especially for so-called agricultural tires (2), comprising a plurality of gripping members (3,20,30,31,40,41,50,60,70,91) and members (4,23,42,54,61,73) for holding together said gripping members relative to each other, which gripping members (3, ...) are designed to be placed in depressions in the tread of the tire and to radially project outside the tread, characterized in that the gripping members (3, ...) by means of the holding-together members (4, ...) are arranged to form a chain coherent in the longitudinal direction of the tread, which chain is located substantially inside of the tread width, that the gripping members (3, ...) are provided with at least one hold (8,21,22,43,55,72) for a holding-together member (4, ...), and that at least some holding-together member (4, ...) or at least some gripping member (3, ...) is capable to allow adjustment of the distance between adjacent gripping members (3, ...) in order thereby to effect length adjustment to the pattern and circumference of the tire (2) in question.

2. An anti-skid device as defined in claim 1, characterized in that adjacent gripping members (3, ...) are connected to each other in an articulated and/or rotary manner.



3. An anti-skid device as defined in claim 1 or 2, characterized in that a longitudinal central line along the side remote from the tire of at least some gripping members (3, ...) intersects a longitudinal line along the tread.
4. An anti-skid device as defined in any one of the claims 1-3, characterized in that at least some gripping members (3, ...) are angular or curved in relation to the longitudinal direction of the tread.
5. An anti-skid device as defined in any one of the claims 1-4, characterized in that every gripping member (3, ...) is angular or curved in relation to the longitudinal direction of the tread.
6. An anti-skid device as defined in any one of the claims 1-5, characterized in that every gripping member (3) comprises an angular or curved steel profile (7) and two tubes (8) connected thereto or designed integral therewith.
7. An anti-skid device as defined in claim 6, characterized in that the holding-together members (4) comprise screws (10), each of which is located through one of the tubes (8) of each of two gripping members (3) located one after the other.
8. An anti-skid device as defined in any one of the claims 1-7, characterized in that the gripping members (3, ...) are located symmetrically about the longitudinal central line of the tread.



9. An anti-skid device as defined in any one of the claims 1-8, characterized in that every second gripping member (3, ...) is located substantially on one side of the longitudinal central line of the tread, and that every second gripping member (3, ...) is located substantially on the other side of the longitudinal central line of the tread.

10. An anti-skid device as defined in any one of the claims 1-9, characterized in that the portions of the gripping members (3, ...) abutting the bottom of the depressions are rounded.



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FIG. 1

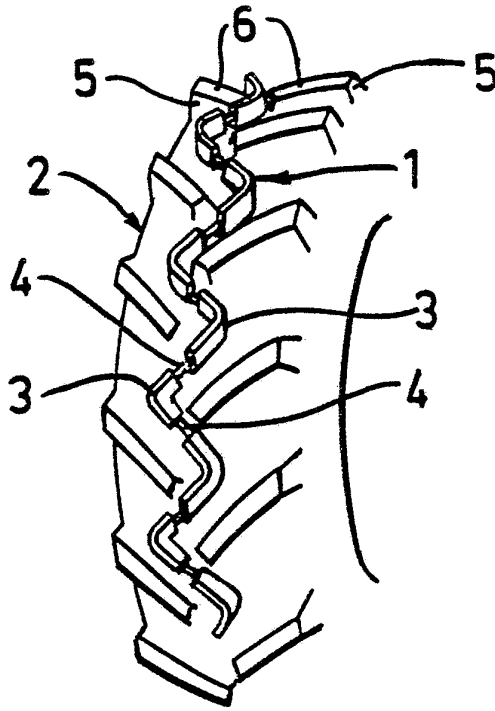


FIG. 2

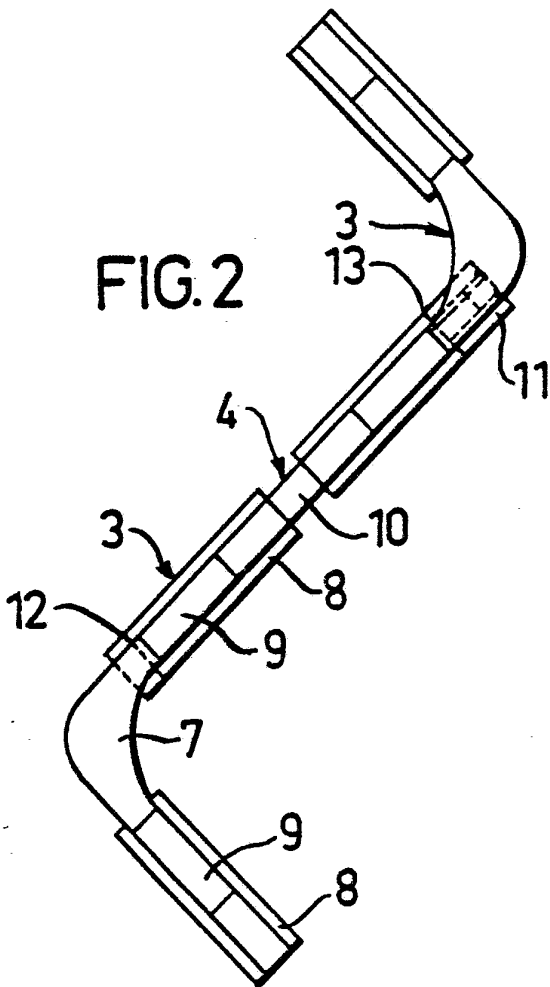
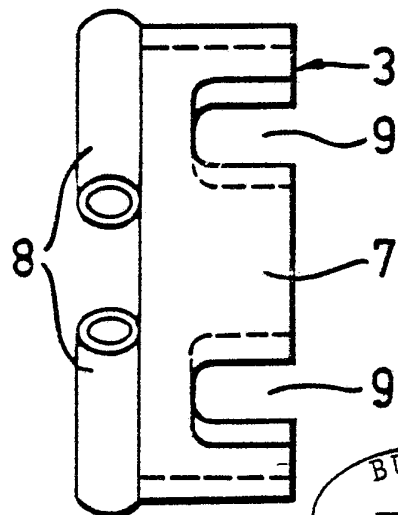


FIG. 3



SUBSTITUTE SHEET



FIG. 4

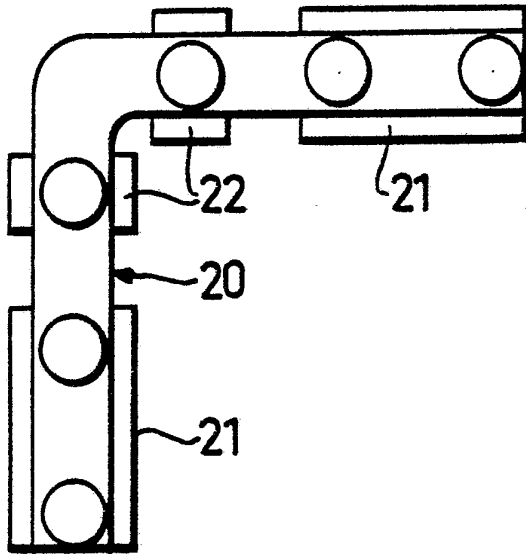


FIG. 5

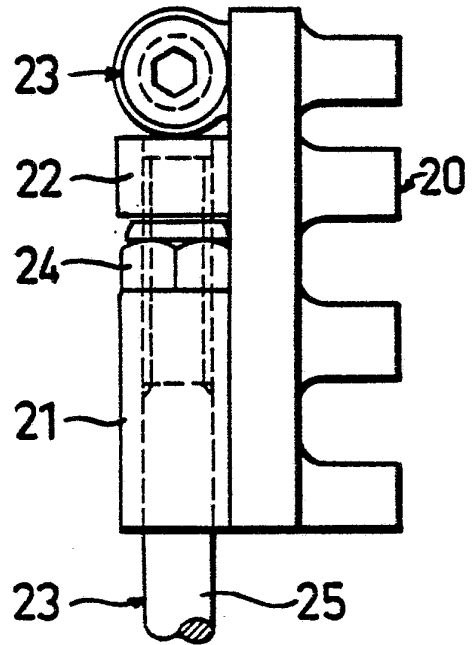


FIG. 6

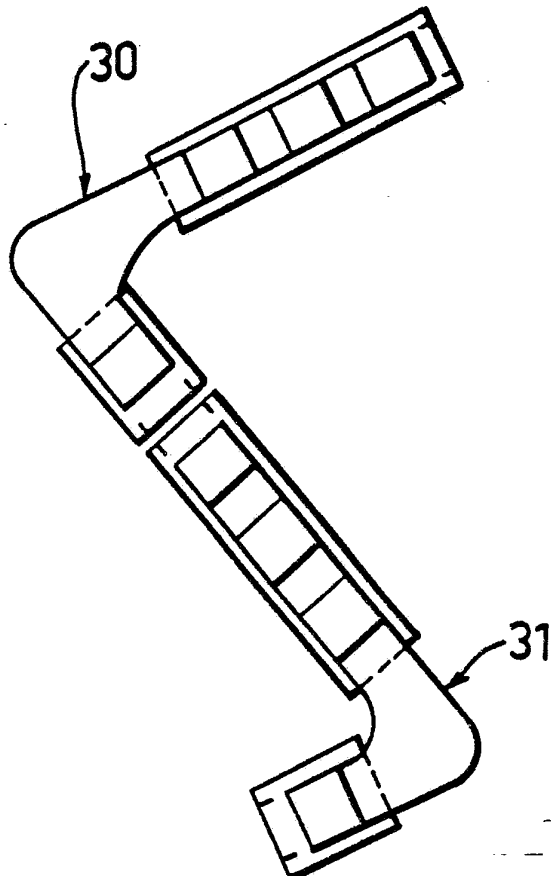


FIG. 21

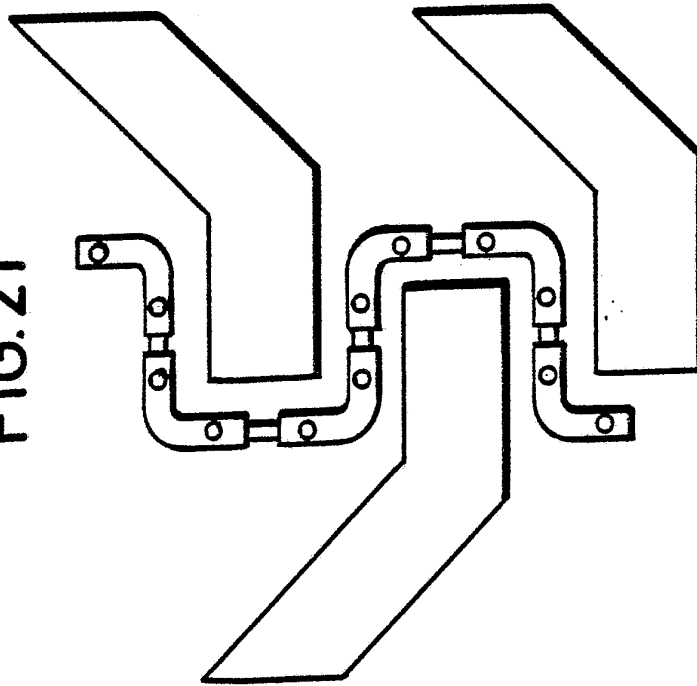
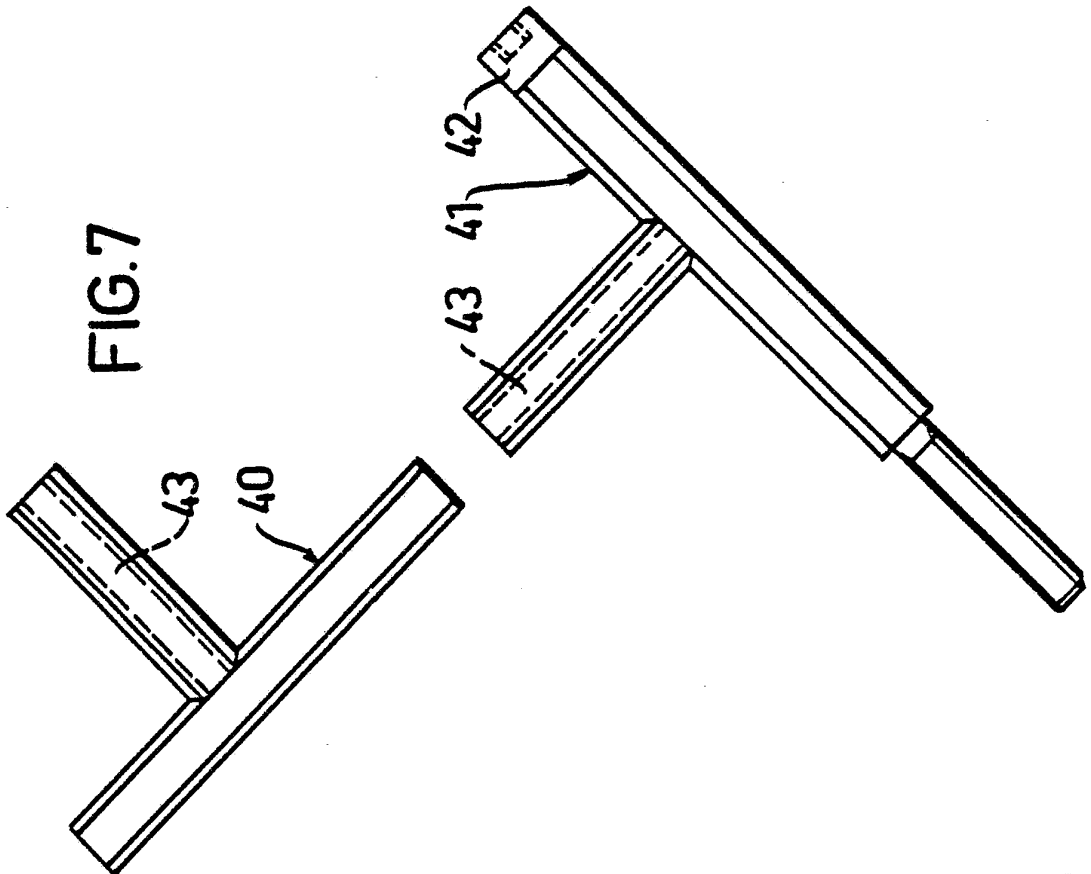


FIG. 7



**SUBSTITUTE SHEET**



FIG. 8

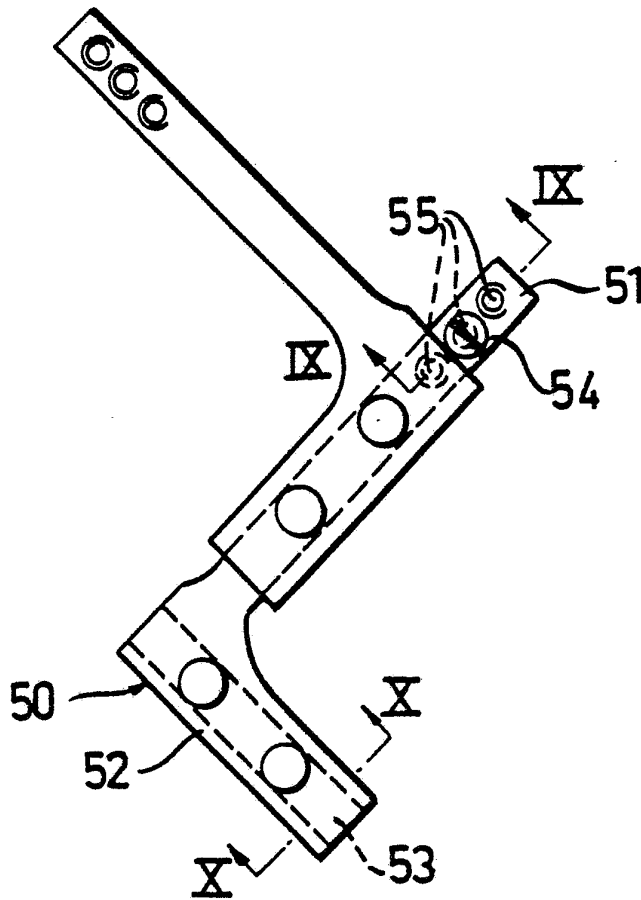


FIG. 9

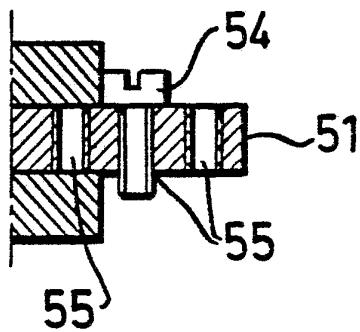
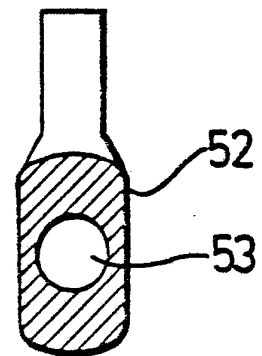


FIG. 10



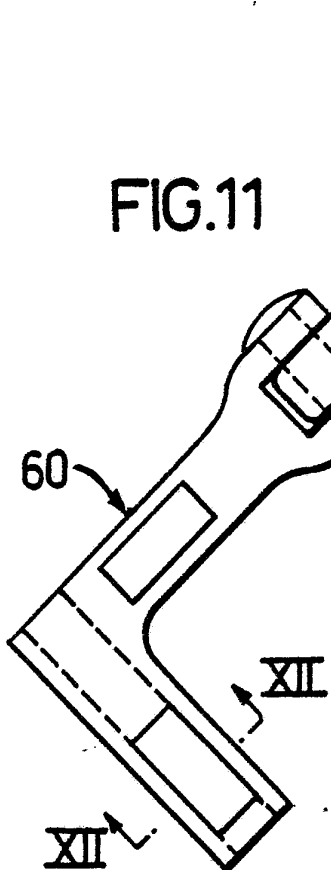
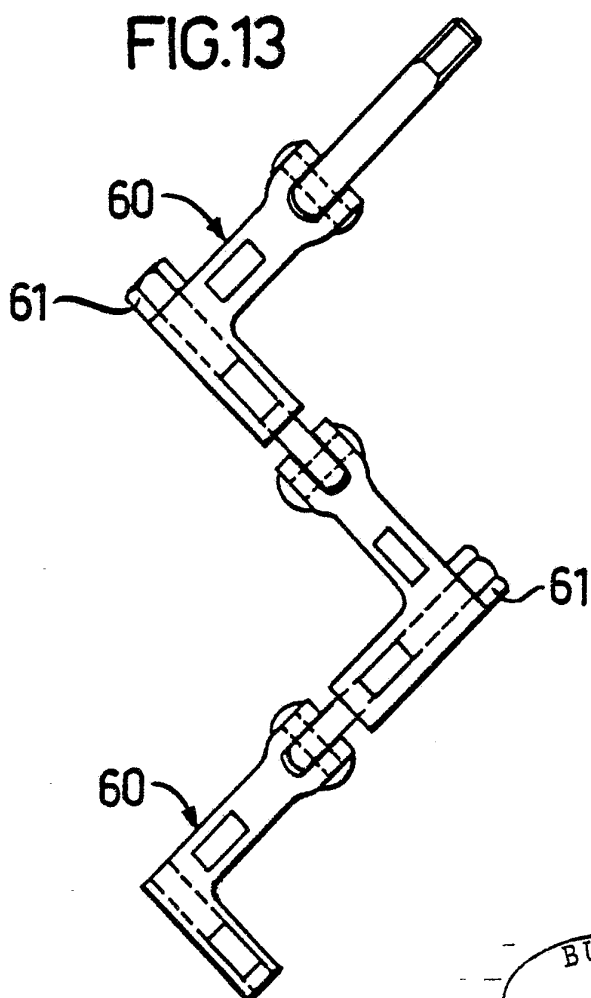


FIG.12





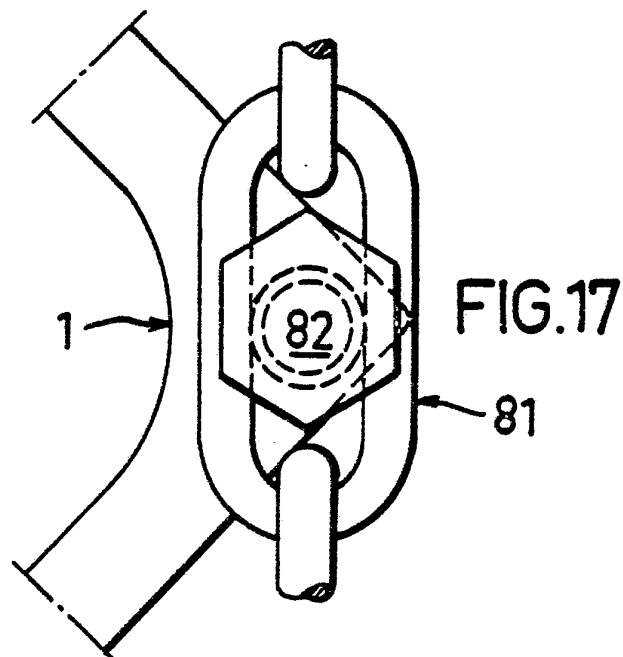
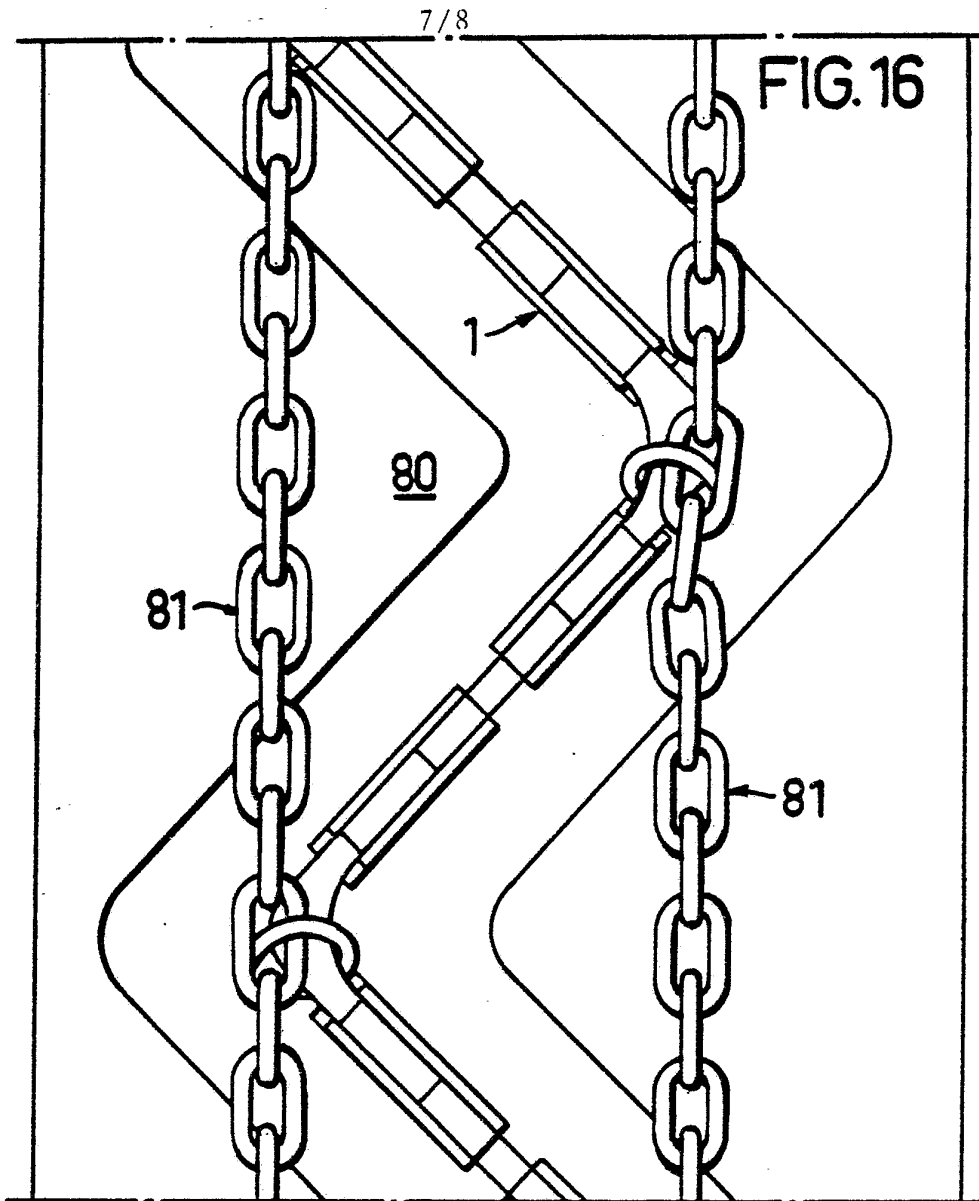


FIG.18

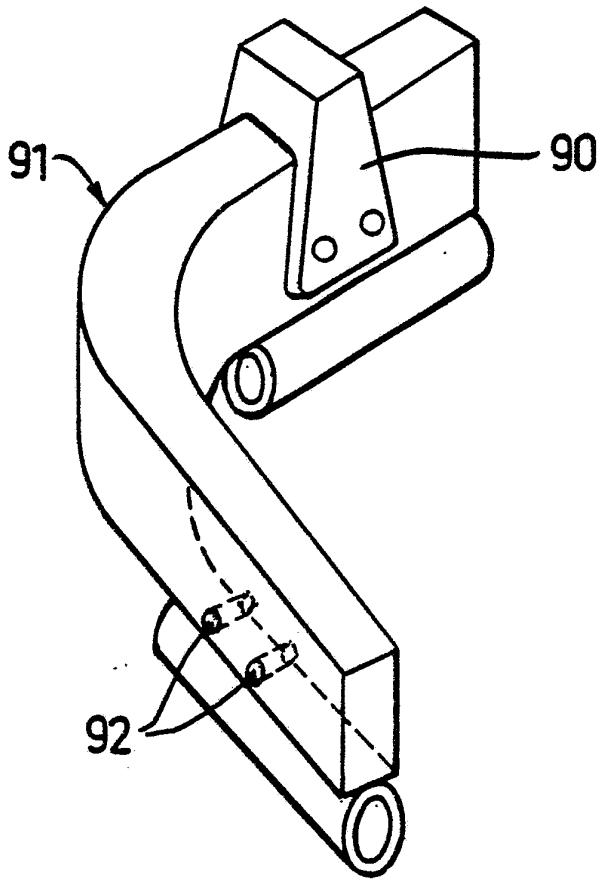


FIG.19

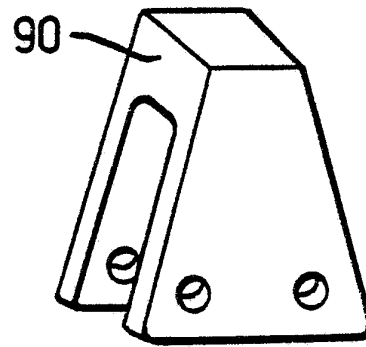
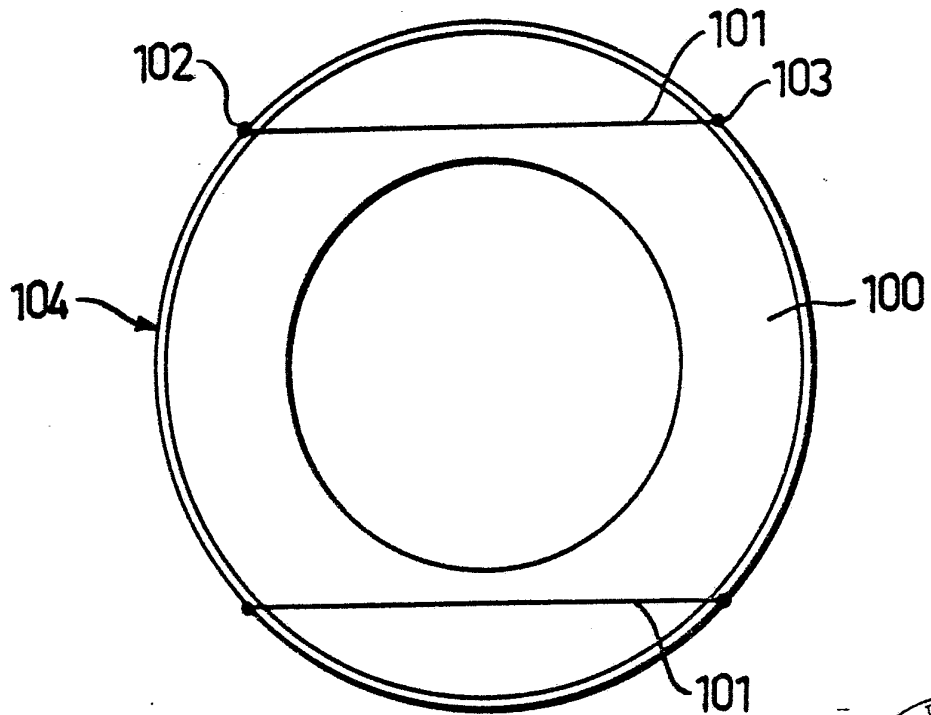
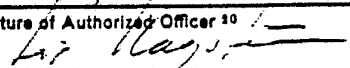


FIG. 20



# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE83/00234

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>3</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC <span style="float: right;">3</span>		
B 60 C 27/10		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>4</sup>		
<b>Classification System</b>	<b>Classification Symbols</b>	
IPC 3	B 60 C 27/00, 06-10, 20	
Nat Cl	63e:20/01	
US Cl	152:170-177, 208, 222-231, 239	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>		
<b>Category <sup>6</sup></b>	<b>Citation of Document, <sup>14</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></b>	<b>Relevant to Claim No. <sup>14</sup></b>
X	AT, B, 353 118 (GRIGAR O, GRIGAR G, PULEC J, PULEC G) 25 October 1979	1-5, 8-10
X	US, -A, 3 400 744 (A G MULLER) 10 September 1968	1-5, 8
X	DE, B1, 1 136 597 (CONTINENTAL GUMMI-WERKE) 13 September 1962	1-3, 10
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>1</sup>	Date of Mailing of this International Search Report <sup>1</sup>	
1983-11-15	1983 -12- 07	
International Searching Authority <sup>1</sup>	Signature of Authorized Officer <sup>20</sup>	
Swedish Patent Office	 Leif Hagström	