PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B60C 11/16	A1	(11) International Publication Number: WO 99/52721
		(43) International Publication Date: 21 October 1999 (21.10.99)

(21) International Application Number: PCT/FI99/00293

(22) International Filing Date: 8 April 1999 (08.04.99)

(30) Priority Data:
980821 9 April 1998 (09.04.98) FI

(71) Applicant *(for all designated States except US)*: TURVANASTA OY [FI/FI]; Kauratie 48, FIN-20740 Turku (FI).

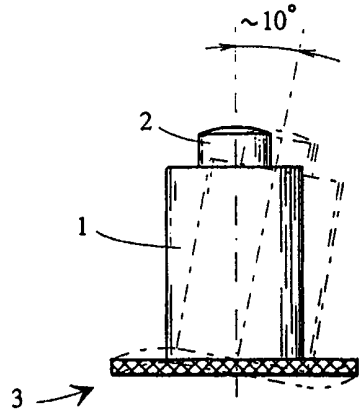
(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: SALAKARI, Heikki [FI/FI]; Rövarnäsintie 234, FIN-21630 Lielax (FI).

(74) Agent: BERGGREN OY AB; P.O. Box 16, FIN-00101 Helsinki (FI).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
In English translation (filed in Finnish).

(54) Title: STUD FOR TYRE



(57) Abstract

The invention relates to a tyre stud comprising a substantially cylindrical shank (1) with a hard metal tip (2) at its one end and a locking flange (3) at its other end, the locking flange locking the stud to the tyre. The locking flange (3) is made of a resilient material, such as rubber or resilient plastic.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

Stud for tyre

This invention relates to a tyre stud consisting of an essentially cylindrical shank with a hard metal tip at one end and a locking flange at the other end, which locks the stud to the tyre.

All winter tyre manufacturers strive to reduce the tyre material, i.e. the rubber volume, in order to provide lighter and thus improved riding qualities. In addition, winter tyres equipped with studs cause lower wear of the road surface material. Lighter winter tyres have resulted in the stud locking flange getting very close to the fabric layer within a winter tyre. The stud locking flange and the fabric layer are spaced by only 2 to 3 mm. This, in turn, has resulted in the edge of the stud locking flange having caused such strong wear of the tyre rubber under the tilting movements of the stud that the internal fabric layer has been damaged and the tyre has even burst.

The stud of the invention is characterised in that the locking flange is made of a resilient material, such as rubber or resilient plastic. By means of the invention, the locking flange is kept substantially in position despite the tilting movements of the stud. Thus, there will be none of the drawbacks and damages mentioned above.

Various embodiments of the invention are set forth in the dependent claims of the set of claims. The locking flange can receive forces exerted on the hard metal tip of the stud especially when the road surface is molten, the stud tip being incapable of penetrating into the snow mass or the icy surface.

The invention is described below by means of examples and with reference to the accompanying drawing, in which figures 1 to 4 illustrate four studs comprising different locking flange applications.

The stud consists of a cylindrical shank 1 with a hard metal tip 2 at its end. At the other end of the stud shank, a locking flange 3 is provided, which locks the stud to the tyre. The locking flange 3 is made of a resilient material, such as rubber or resilient plastic.

In figure 1 the locking flange 3 is a disc which bends as indicated with the broken line when the stud tilts approx. 10°, for instance. The locking flange 3 locks the stud

to the tyre. Owing to its resilience, the edges of the locking flange 3 do not damage the tyre rubber or the tyre fabric.

Figure 2 illustrates an embodiment in which the locking flange is equipped with a pad 4.

In figure 3, the locking flange and the pad have been combined to form a pad-like locking flange 3. The locking flange 3 has a cylindrical mantle 5, which surrounds the shank 1 of the stud. In this way, the locking flange is well fixed to the stud shank despite the tilting forces.

The locking flange and the pad shown in figure 4 make up a combination which is an open cup 3 with a bellows-like shape.

Claims

1. A tyre stud consisting of a substantially cylindrical shank (1) with a hard metal tip (2) at one end and a locking flange (3) at the other end to lock the stud to the tyre, **characterised** in that the locking flange (3) is made of a resilient material, such as rubber or resilient plastic.

2. A stud as claimed in claim 1, **characterised** in that a resilient pad (4) known *per se* has been connected to the locking flange (3).

3. A stud as claimed in claim 2, **characterised** in that the pad (4) consists of a bellows open at its end.

4. A stud as claimed in any of the preceding claims, **characterised** in that the locking flange (3) has a cylindrical mantle (5) which surrounds the stud shank (1).

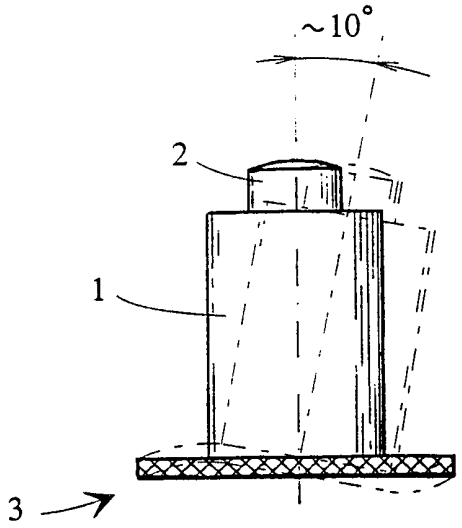


Fig.1

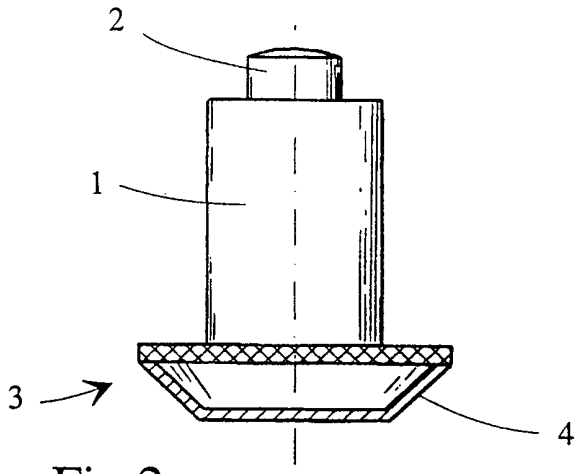


Fig.2

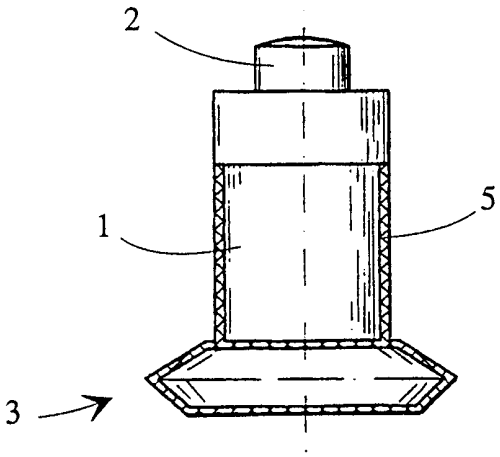


Fig.3

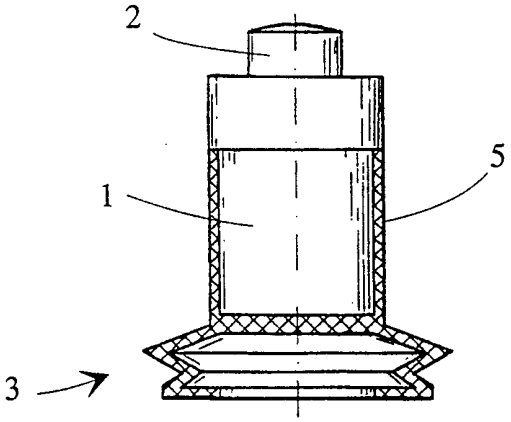


Fig.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/00293

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B60C 11/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B60C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4844137 A (EINARSSON), 4 July 1989 (04.07.89)	1,2,4
Y		3
	--	
Y	US 3831655 A (CANTZ), 27 August 1974 (27.08.74), figure 12, abstract	3
	--	
X	DE 2204074 A (DORR, KARLHEINZ), 2 August 1973 (02.08.73), page 10, figure 6	1,4
	--	
X	US 3473591 A (H. BINGHAM), 21 October 1969 (21.10.69)	1,4
	--	

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 1999	13.07.99
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Göran Carlström/CF Telephone No. +46 8 782 25 00

Form PCT ISA 210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/00293

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CH 524487 A (DR. ING. HANS-ULRICH NEIDHARDT), 30 June 1972 (30.06.72) --	1
X	US 1230508 A (J.E. PEDEN), 19 June 1917 (19.06.17) --	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/05/99

International application No.
PCT/FI 99/00293

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4844137 A	04/07/89	NONE	
US 3831655 A	27/08/74	US 3911986 A	14/10/75
DE 2204074 A	02/08/73	NONE	
US 3473591 A	21/10/69	BE 700843 A	18/12/67
		DE 1605717 A	14/01/71
		FR 1530210 A	23/10/68
		GB 1131676 A	00/00/00
		SE 336970 B	19/07/71
CH 524487 A	30/06/72	NONE	
US 1230508 A	19/06/17	NONE	