(54) Title: STUD SYSTEM, PROTECTIVE PLUG, STUD AND SHOE

(57) Abstract: The invention relates to a stud system including at least a protective plug (2) that matches a stud hole provided into a horseshoe and can be fastened into the stud hole to protect it, and the protective plug (2) includes a thread part (3) and a cap part (6), and the cap part (6) includes a conical bevel (7).
STUD SYSTEM, PROTECTIVE PLUG, STUD AND SHOE

FIELD OF THE INVENTION

The invention relates to a stud system as defined in the preamble of claim 1, to a stud as defined in the preamble of claim 6, to a protective plug as defined in the preamble of claim 7, and to a horseshoe as defined in the preamble of claim 8.

BACKGROUND OF THE INVENTION

Known from the prior art are studs of different models, different lengths and different thicknesses for horses, and different means for screwing them into a horseshoe or out of a horseshoe. In addition, different ways are known for making a stud hole into a horseshoe and threads inside the stud hole for screwing a stud into a horseshoe.

The problem is protecting the stud hole and especially the threads thereof when the stud hole has no stud fastened therein. When there is no stud in the stud hole, the problem is wearing of the threads in the stud hole and fouling and clogging up of the stud hole. In this case, screwing a stud into an existing stud hole is difficult because the stud hole and the threads thereof are first to be cleared from dirt, and the stud is then to be screwed into often already worn threads of the stud hole.

OBJECTIVE OF THE INVENTION

The objective of the invention is to remedy the above-mentioned problems and to disclose a new type of stud assembly to be provided in connection with a horseshoe, by which assembly screwing the stud into the shoe and protecting the stud hole in the horseshoe is easier than before.
SUMMARY OF THE INVENTION

The stud system, the stud, the protective plug and the horseshoe according to the invention are characterized by what has been presented in the claims.

The invention is based on a stud system. According to the invention, the stud system includes at least a protective plug that matches a stud hole provided into a horseshoe and that can be fastened into the stud hole for covering and protecting it and correspondingly removed from the stud hole. The protective plug includes a thread part by which it is screwed into or out of the stud hole, and a cap part that protects and covers the stud hole when the protective plug is placed therein. The cap part includes a conical bevel flaring out from the thread part in a preferred embodiment. The conical bevel enhances fastening and locking of the protective plug into the stud hole. Preferably, the thread of the protective plug substantially matches a thread provided into the stud hole.

By a horse is meant in this context any equine odd-toed ungulate, such as a horse, a pony, a donkey, a mule or the like.

By a horseshoe is meant in this context any kind of shoe for the hoof of a horse, which shoe may be of any model, e.g. a normal U-shaped shoe, a bar shoe or a shoe of another model. The horseshoe may be formed from any suitable material, preferably mainly from a metal material. A desired number of stud holes for studs can be provided into the horseshoe. The stud hole can be made into the horseshoe e.g. by drilling or by other suitable manner either in connection with the manufacture of the horseshoe or to an existing horseshoe. A thread is made into the stud hole for fastening the stud and/or, in this case, the protective plug. The thread can be made by any manner and tool known per se.
In one embodiment the thread is made into the stud hole by a fluteless threading tap.

By a protective plug is meant in this context a plug protecting the stud hole of the horseshoe and of the thread thereof and used when the stud is not fastened into the stud hole. The protective plug preferably penetrates into the stud hole of the horseshoe in such a way as not to rise to a level that is clearly, e.g. more than 3mm, higher than the surface of the horseshoe when the horseshoe is fastened to a hoof. In one embodiment the protective plug is flush and nearly flush with the outer surface of the horseshoe. The protective plug may be countersunk screw type or other type of protective plug provided with a thread matching the thread of the stud hole. The size of diameter in the thread part of the protective plug preferably matches the diameter of the stud hole. The thread part of the stud hole and of the protective plug may have any diameter, e.g. 8mm, 10mm or 12mm. The diameter of the thread part and the threads normally depend on the shoeing practices of each country.

In one embodiment the protective plug or a part thereof, such as the thread part and/or the cap part, is mainly formed from a metal material. In one embodiment the protective plug or a part thereof is formed from a stainless metal material to enhance wear resistance. The metal material may contain one or more metals and different additives as desired. Alternatively, the protective plug or a part thereof is formed from any material or a mixture of materials suitable for the purpose of use. In one embodiment the protective plug is formed entirely from one material. In one embodiment the thread part and the cap part of the protective plug are formed from different materials. In one embodiment the cap part is formed from a material that is harder and/or more wear resistant than the thread part. In one embodiment the surface of the cap
part is provided with a tempered surface, e.g. from hardened steel, to enhance wear resistance.

In one embodiment the cap part of the protective plug is provided substantially round as seen from above so as not to prevent rolling of the hoof of the horse when the horse is moving. Therefore, the protective plug can be provided in connection with the shoe in such a way as to be a bit raised, yet raised by less than 3mm, in one embodiment raised by less than 2mm and in one embodiment raised by less than 1mm, from the surface of the horseshoe. In this case, the protective plug can prevent wearing of the shoe.

In one embodiment of the invention, the stud system includes a stud that is to be installed into the horseshoe and matches the stud hole provided into the horseshoe and that can be fastened into the stud hole and correspondingly removed from the stud hole. The stud includes a thread part by which it is screwed into or out of the stud hole, and the actual stud part providing grip relative to a base when the horse is moving. The stud part includes a conical bevel in a preferred embodiment flaring out of the thread part in the stud. The conical bevel enhances fastening and locking of the stud into the stud hole. Preferably, the thread of the thread part in the stud substantially matches the thread provided into the stud hole.

By a stud is meant in this context any kind of stud provided with a thread matching the thread of the stud hole. The diameter of the thread part in the stud may be of any size, yet substantially the same as the diameter of the thread part in the protective plug and of the stud hole. The diameter of the thread part may be e.g. 8mm, 10mm or 12mm. The shape and size, i.e. height, of the stud part in the stud may vary according to a desired purpose of use. The stud may be formed from any suitable material, preferably mainly from a metallic material. In one embodiment the stud part of
the stud is provided substantially round as seen from above so as not to prevent rolling of the hoof of the horse when the horse is moving. In one embodiment, fastening and removing the stud can be made by any kind of conventional stud key, adjustable wrench, open-end wrench or other such tool known per se. The tool may be provided with a T-handle to facilitate the work.

The stud according to the invention provides good grip on different base materials as the horse is moving. In addition, the stud according to the invention stays well in place and fastened in the shoe by virtue of the conical bevel.

In one embodiment of the invention the thread parts and threads thereof in the protective plug and in the stud are substantially similar, and the conical bevels of the protective plug and of the stud are substantially similar.

In one embodiment of the invention the stud system includes at least one stud hole provided into the horseshoe with a thread corresponding to the thread of the thread part in the protective plug and/or in the stud, and the top end of the stud hole, i.e. the end of the stud hole close to the surface of the horseshoe that is visible to the outside when the shoe is fastened to the hoof of the horse, is provided with a beveled surface for the conical bevel of the protective plug and/or of the stud.

In one embodiment the stud system includes a horseshoe provided with at least one stud hole, the stud hole thereof being provided with a thread corresponding to the thread of the thread part in the protective plug and/or in the stud, and the top end of the stud hole, i.e. the end of the stud hole close to the surface of the horseshoe that is visible to the outside when the shoe is fastened to the hoof of the horse, is provided with a beveled surface for the conical bevel of the protective plug and/or of the stud.
In a preferred embodiment the threads of the thread parts in the protective plug and/or in the stud and/or of the stud hole are provided with a predetermined pitch. Any preset pitch of thread can be used in connection with the invention. In one embodiment a millimeter-based thread is used. In one embodiment an inch-based thread is used. In one embodiment the thread is a fine thread with a smaller pitch than with the corresponding standard thread. The fine thread provides good locking of the conical bevel surfaces even with a small moment. In an alternative embodiment the thread is a standard thread.

In one embodiment of the invention the top surface of the cap part in the protective plug is provided with a hex socket opening by which the protective plug can be screwed out of the stud hole in the horseshoe or into the stud hole in the horseshoe. In an alternative embodiment the top surface of the cap part in the protective plug is provided with another shape of opening or socket by which the protective plug can be screwed out or in. In one embodiment the top surface of the cap part in the protective plug is provided with one coin slot or a corresponding slot or alternatively crossing coin slots or corresponding slots by which the protective plug can be screwed out of the stud hole in the horseshoe or into the stud hole in the horseshoe. In one embodiment a rubber plug can be fitted into the opening to protect it, e.g. to prevent fouling or filling up of the opening. For example, the hex socket opening is not similarly susceptible to dirt or wearing as a threaded opening or hole. In one embodiment the protective plug can be removed and fastened by using any kind of conventional tool or key known per se, e.g. a hex key.

In one embodiment the cap part of the protective plug and in one embodiment the top surface of the cap part is provided with an asphalt spike. The asphalt
spike may be fixedly fastened to the protective plug or positioned in connection with the protective plug in a removable fashion. The asphalt spike may have any shape and size, depending on the purpose of use. The asphalt spike may be formed from any suitable metal or metal alloy, preferably hard metal or metal alloy.

In one embodiment the stud system includes a tool for fastening and removing the protective plug, the tool including a key for opening and screwing in the protective plug and a handle part to facilitate the use of the tool. In one embodiment the key for opening and screwing in the protective plug is provided to a first end of the tool and the handle part is provided to a second end of the tool. In one embodiment the tool includes a hex key provided to the first end and a T-handle provided to the second end. In one embodiment the tool includes also a stud key for opening and screwing in the stud. Alternatively the stud can be opened and screwed in using a separate stud key tool.

In one embodiment the tool may include a part that is suitable for screwing the asphalt spike. In addition, a separate tool may be used to make the thread into the stud hole of the horseshoe, such as a threading tap, screwing tap or suitable drill bit. The thread may be made manually or alternatively by e.g. drilling. If the thread is made manually, it can be made into the stud hole of the horseshoe even when the horseshoe is fastened to the hoof of the horse.

In one embodiment of the invention the stud system includes a tool for making the conical bevel to the stud hole of the horseshoe. Preferably the conical bevel is made to the top part of the stud hole and/or of the thread, i.e. to the starting end of the thread from which screwing the protective plug or the stud into the horseshoe is started. The conical bevel may be made to the stud hole manually or alternatively by e.g. drilling. If the conical bevel is made manually,
it can be made to the stud hole of the horseshoe even when the horseshoe is fastened to the hoof of the horse.

In one embodiment the stud system includes a single tool for making the conical bevel to the stud hole of the horseshoe and for making the thread into the stud hole of the horseshoe.

In addition, the invention relates to the corresponding protective plug, stud and horseshoe according to the above description.

The stud system, the protective plug, the stud and the horseshoe according to the invention can be used e.g. with horses for riding, combined driving, harness racing, shows or other such applications of use.

One technical effect of the invention is the conical bevel and/or the beveled surface provided in connection with the protective plug, the stud, the horseshoe and the stud hole. Another technical effect is easy fastening and removing of the protective plug and of the stud.

The solution according to the invention provides maintenance of the stud hole in the horseshoe clear when the stud is not placed into the hole. In addition, the invention provides easier and quicker fastening of the studs into the stud holes e.g. in competitions.

In addition, the stud of the stud system according to the invention stays well fastened by virtue of the conical bevel and will not break so easily in operation, e.g. with big and/or heavy horses.

The stud system according to the invention is suitable for use in any application and conditions in different targets of application.

LIST OF FIGURES
In the following, the invention will be described with detailed embodiment examples, referring to the accompanying figures in which

Fig. 1a represents one protective plug according to the invention as shown from the side,

Fig. 1b represents the protective plug according to Fig. 1a as shown from the top,

Fig. 2a represents one stud according to the invention as shown from the side,

Fig. 2b represents the stud according to Fig. 2a as shown from the top,

Fig. 3 represents another protective plug according to the invention as shown from the side,

Fig. 4 represents another stud according to the invention as shown from the side,

Fig. 5a represents one protective plug according to the invention with an asphalt spike fastened thereto as shown from the side, and

Fig. 5b represents one protective plug according to the invention with and asphalt spike fastened thereto as shown from the top.

**DETAILED DESCRIPTION OF THE INVENTION**

Fig. 1a to 1b represent a protective plug 2 of the stud system according to the invention including a thread part 5 by which the protective plug is screwed into or out of a stud hole provided into a horseshoe, and a cap part 6 protecting and covering the stud hole when the protective plug is placed into the stud hole.

The cap part 6 includes a conical bevel 7 between the thread part 5 and the top surface of the cap part 6. The conical bevel 7 flares out from the thread part 5. The conical bevel 7 enhances fastening and locking the protective plug into the stud hole. The protective plug 2 matches the stud hole provided into the horseshoe and can be fastened into the stud hole to cover and protect it and correspondingly removed from the stud hole. The
thread of the thread part 5 in the protective plug 2 substantially matches a thread provided into the stud hole, which in this embodiment is a millimeter based and at the same time a standard thread.

In addition, the protective plug 2 includes a hex socket opening 8 provided to the top surface of the cap part 6 thereof for facilitating opening and screwing in the protective plug. The protective plug 2 can be opened and screwed in by a suitable hex key by means of the hex socket opening 8. A rubber plug can be fitted into the hex socket opening 8 to protect the opening when the protective plug 2 is placed into the horseshoe.

The protective plug 2 is formed from stainless steel. The top surface of the cap part 6 in the protective plug 2 is provided with a hardmetal coating from hardened steel to prevent wearing of the protective plug.

When the protective plug 2 is fastened into the horseshoe it remains by less than 1mm raised from the surface of the shoe.

Fig. 2a to 2b represent a stud 1 of the stud system according to the invention, including a thread part 3 by which the stud 1 is screwed into or out of the stud hole, and the actual stud part 4 providing grip relative to a base when the horse is moving. The stud part 4 includes a conical bevel 7 located at the top end of the thread part in the stud 1. The conical bevel 7 flares out from the thread part 3 of the stud.

The conical bevel 7 of the stud 1 is mainly similar to the conical bevel 7 of the protective plug 2. The conical bevel enhances fastening and locking of the stud 1 into the stud hole. The stud 1 matches the stud hole provided into the horseshoe and can be fastened into the stud hole and correspondingly removed from the stud hole. The thread of the thread part 3 of the stud matches the thread provided into the stud hole and is
similar to the thread of the protective plug 2. The stud 1 is formed from a steel material.

Fig. 3 represents another protective plug 2 of the stud system according to the invention, including parts corresponding to the protective plug of Fig. 1a.

Fig. 4 represents another stud 1 of the stud system according to the invention, including parts corresponding to the stud of Fig. 2a.

Fig. 5a to 5b represent the protective plug 2 including an asphalt spike 9. The asphalt spike 9 is fastened to the top surface of the cap part 6 in the protective plug 2. In addition, the protective plug includes the thread part 5 and the conical bevel 7. The part of the asphalt spike 9 protruding from the protective plug 2 is triangular in cross-section. The asphalt spike is removable but may alternatively be also fixedly installed to the protective plug 2. The asphalt spike may have been formed from a hard metal suitable for the purpose of use.

The stud system according to the invention with the parts thereof is suitable for use in any purpose as different embodiments.

The embodiments of the invention are not limited merely to the examples referred to above; instead, many variations are possible within the scope of the accompanying claims.
CLAIMS

1. A stud system, characterized in that the stud system includes a protective plug (2) that matches a stud hole provided into a horseshoe and that can be fastened into the stud hole to protect it, and the protective plug (2) includes a thread part (5) and a cap part (6), and the cap part (6) includes a conical bevel (7).

2. The stud system according to claim 1, characterized in that the stud system includes at least one stud hole provided into the horseshoe with a thread corresponding to the thread of the thread part in the protective plug (2), and the top end of the stud hole is provided with a beveled surface for the conical bevel (7) of the protective plug.

3. The stud system according to claim 1 or 2, characterized in that the stud system includes a stud (1) to be installed into the horseshoe and including a thread part (3) and a stud part (4), and the stud part (4) includes a conical bevel (7).

4. The stud system according to any one of claims 1 to 3, characterized in that the thread parts (3,5) of the stud (1) and of the protective plug (2) and the threads thereof are substantially similar, and the conical bevels (7) of the stud (1) and of the protective plug (2) are substantially similar.

5. The stud system according to any one of claims 1 to 4, characterized in that the top surface of the cap part (6) in the protective plug (2) is provided with a hex socket opening (8) by which the protective plug (2) can be screwed out of or into the stud hole of the horseshoe.

6. A stud that can be installed into the horseshoe, characterized in that the stud (1) includes a thread part (3) and a stud part (4), and the stud part (4) includes a conical bevel (7).
7. A protective plug, characterized in that the protective plug (2) matches a stud hole provided into a horseshoe and can be fastened into the stud hole to protect it, and the protective plug (2) includes a thread part (5) and a cap part (6), and the cap part (6) includes a conical bevel (7).

8. A horseshoe, characterized in that the horseshoe includes at least one stud hole provided with a thread corresponding to the thread of the thread part (3, 5) of a protective plug (2) and/or of a stud (1), and the top end of the stud hole is provided with a beveled surface for the conical bevel (7) of the protective plug and/or of the stud.
Fig. 2b
### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: A01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, SE, NO, DK

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
EPO-Internal, WPI

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>DE 29510236 U1 (JANSEN NINA) 24 October 1996 (24.10.1996) page 2, lines 25-39; page 3, lines 11-12; page 3, line 31 - page 4, line 18; page 5, lines 3-10; figures</td>
<td>1, 2, 4, 5, 7, 8</td>
</tr>
<tr>
<td>Y</td>
<td>DE 29909213 U1 (PLAGGE JUERGEN) 05 August 1999 (05.08.1999) page 2, line 21 - page 3, line 2; page 3, lines 8-12; figures; claims</td>
<td>1, 7, 8</td>
</tr>
<tr>
<td>X</td>
<td>US 246677 A (HOOD OTIS et al.) 30 November 0002 (30.11.0002) the whole document</td>
<td>6</td>
</tr>
<tr>
<td>Y</td>
<td>WO 2009010774 A1 (KIRKBY PAUL VINCENT ALEXANDER) 22 January 2009 (22.01.2009) page 4, lines 11-15; page 5, lines 2-4; page 7, lines 24-29; figures 1 and 5</td>
<td>3</td>
</tr>
<tr>
<td>A</td>
<td>DE 202004010771 U1 (ROCK ALEXANDER et al.) 09 September 2004 (09.09.2004) paragraphs [0034]-[0036]; figure 4</td>
<td>1-8</td>
</tr>
</tbody>
</table>

- **A**: Special categories of cited documents:
  - "A": document defining the general state of the art which is not considered to be of particular relevance
  - "E": earlier application or patent 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 of publication prior to the international filing date but later than the priority date claimed
  - "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

- **T**: Date of the international search:
  - 31 October 2012 (31.10.2012)

- **A**: Date of mailing of the international search report:
  - 01 November 2012 (01.11.2012)

- **F**: Name and mailing address of the ISA/FI:
  - National Board of Patents and Registration of Finland
  - P.O. Box 1160, FI-00101 HELSINKI, Finland
  - Facsimile No. +358 9 6939 5328

- **S**: Authorized officer:
  - Stina Kaikkonen
  - Telephone No. +358 9 6939 500

Form: PCT/ISA/210 (second sheet) (July 2009)
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family members(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE 29510236 U1</td>
<td>24/10/1996</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>DE 29909213 U1</td>
<td>05/08/1999</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>US 246677 A</td>
<td>30/11/2002</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>WO 2009010774 A1</td>
<td>22/01/2009</td>
<td>GB 2451112 A</td>
<td>21/01/2009</td>
</tr>
<tr>
<td>Int.Cl.</td>
<td>Classification</td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>A01L 7/00</td>
<td>(2006.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A01L 7/04</td>
<td>(2006.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F16B 35/06</td>
<td>(2006.01)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>