DEVICE FOR A SELF-ACTIVATED LOCK OF A ROPE, STRING OR SIMILAR

A device for a self-activated lock of a rope, string or similar (30), which device includes a pair of opposite locking wheels (21a-b), which are provided with gripping teeth (23), which locking wheels (21a-b) are rotatable around adjacent rotation points (22a-b) arranged to a base part (11) adapted for attachment to an object, wherein the device includes a guide part (12) arranged to the base part (11), which guide part (12) includes an exterior housing provided with an S-shaped opening (13), and that locking wheels (21a-b) are provided with projecting elastic elements (24a-b), known per se, to provide a pre-tensioning force.
Device for a self-activated lock of a rope, string or similar

The invention relates to a self-activated lock of a rope, string or similar, according to the preamble of claim 1.

Background

Today, devices, better known as cam cleats, are used especially to secure strings/ropes in connection with sailboats. Such cam cleats usually include a pair of locking wheels, rotatably arranged around a pair of adjacent shafts, which shafts are integrated in a base part. The locking wheels are usually spring-loaded against gripping position and opposite parts of the locking wheels include gripping teeth which are so formed that when they are rotated, the distance between them increases such that a string/rope with varying diameter can be positioned between the locking wheels, and quickly and plainly be maintained secure in position.

US2004187757 describes a cam cleat having a projection for automatic guidance of the rope. The projection is used to prevent tension directed upwards in the rope.

US2004035348 discloses a cam cleat assembly which utilizes two locking wheels and which in addition has an inverted U which the rope runs through to allow the rope to deviate from the centreline at tensioning, for example.

EP0771722 describes a cam cleat where the locking wheels include an integrated spring function.

GB2263726 describes a cam cleat where the locking wheels include an integrated spring function.

US4956897A describes also a cam cleat where the locking wheels include an integrated spring function.

US3750611 describes a two-way cam cleat which provides means for synchronizing the locking wheels.

US3730129 describes an extruded cam cleat.

There are also known mountings for e.g. hawsers, known as a mooring cleat, where a string or rope can be attached by wrapping the string or rope around the mounting.

In many applications it will also be desirable to have a device which provides the properties of both a mooring cleat and a cam cleat. Known solutions lack this combination of properties and known solutions therefore have disadvantages. The known cam cleats are often open solutions where the rope/string is exposed and there is thus a great danger that the rope/string, at unfortunate circumstances, may get out of the cam cleat and in this way loosening the rope/string.

Another disadvantage by prior art is that it does not centre the rope/string at flexible diameter,
which results in bias and a danger that the rope/string gets out of secure fastening and increased
wear and tear on some parts of the cam cleat. Another disadvantage of the known solutions is that
the locking wheels are exposed and thus vulnerable for being damaged as they are not protected,
and also exposed to weather and wind. Another disadvantage of the known solutions is that the
most are based on the use of springs of metal, something resulting in that they, especially in a
maritime environment, will be exposed to water and rust, and gradually break and loose their
functions, which can result in damages of e.g. a sailboat where devices like this have an important
function.

Finally it should be mentioned that the known solutions alone are directed towards sailboats
and similar, and do not have other areas of use.

Object

The main object of the invention 1s to provide a device for self-activated lock of a rope, string or
similar, which solves the above mentioned problems.

It is further an object to provide a device which has several areas of use, such as for fenders,
flag poles, sailboats, tarpaulins, etc.

It is further an object that the device also should be flexible in relation to dimensions of ropes,
strings or similar.

It is further an object that the rope, string or similar is centred in the centre of the device,

Finally it is an object that the device shall provide properties both as a mooring cleat and a cam
cleat, i.e. guiding a rope, string or similar as a mooring cleat, and the fastening of the rope, string
or similar as a cam cleat.

The invention

A device according to the invention is described in claim 1. Preferable features of the device are
described in the remaining claims.

According to the invention it is provided a device which provides the properties of both a
mooring cleat and a cam cleat, which is achieved by that the device includes a guide part, a lock
unit and a base part.

The lock unit is a self-activated lock for a rope, string or similar, which lock unit includes a pair of
opposite locking wheels provided with gripping teeth, which gripping teeth are rotatable around
shafts arranged to the base part. The locking wheels are preferably curved so that the distance
between the locking wheels increases or decreases when they are rotated. The lock unit further
includes synchronisation wheels for synchronizing the locking wheels, which results in that the device is flexible in relation to the dimension of the rope, string or similar, and that the rope, string or similar always is centred in the centre of the device.

The lock unit is self-activated in that the locking wheels are provided with protruding elastic elements, preferably curved, which elements bear against curved pre-tensioning elements arranged to the base part, so that the locking wheels tend to return to the gripping position to grab the rope, string or similar.

The guide part of the device is arranged to the base part of the device, which guide part is formed by a specially designed external housing having an S-shaped opening for the insertion of a rope, string or similar, which rope, string or similar comes into contact with the self-activated lock unit, and then can be tensioned or loosened in a simple manner.

The base part is at its side adapted for attachment to an object and provided with fastening means for attachment to the actual object.

The device according to the invention has many areas of use, and can, for example, be used for fastening fenders, fastening the string of flag poles, fastening a string/rope for tarpaulins, as well as for the use on sailboats.

Example

The invention will now be described in detail with references to the attached drawings, where:

Figures la-b are principle views of a device according to the invention, seen from the side and from above, respectively, and

Figures 2a-c are principle views showing details of the device according to the invention, seen from below.

References are now made to Figures la-b showing a device 10 according to the invention, seen from the side and from below, respectively. The device 10 is formed by a base part 11, which preferably has an elliptic shape or similar, which is adapted to bear against an object, such as a boat’s gunwale, flag pole or similar, and which has an exterior surface which is adapted to the element which the device is to be arranged to. The device 10 further includes a guide part 12, which guide part is formed by a specially formed exterior housing having an S-shaped opening 13 for the insertion of a rope, string or similar, and which guide part 12 is adapted for arrangement to the base part 11.

A lock unit 20 (shown in Figures 2a-c) for self-activated locking of a rope, string or similar is arranged to the base part 11, which lock unit 20 is enclosed/protected by the guide part 12.
References are now made to Figures 2a-c for detailed description of the lock unit 20, where the guide part 12 is not shown to provide a better view of the lock part 20. Figure 2a shows a state where a rope, string or similar 30 is locked, Figure 2b shows a state where the rope, string or similar 30 is unlocked, while Figure 2c shows a state without any rope, string or similar 30.

The lock unit 20 includes a pair of specially shaped opposite locking wheels 21a-b, which locking wheels 21a-b are rotatable arranged to their own rotation point 22a-b, preferably are arranged with an equal distance from the centreline of the base part 11, i.e. the centreline of the S-opening 13, preferably close to the one long side of the base part 11, which rotation points 22a-b extend vertically up from the base part 11. The locking wheels 21a-b preferably have a curved shape which extends towards the other long side of the base part 11, than the one which the rotation points 22a-b are arranged close to. The locking wheels 21a-b are further preferably provided with gripping teeth 23 for engaging a rope, string or similar 30 at the (one) side which faces the opposite locking wheel. The curved shape of locking wheels 21a-b ensures a good engagement with the rope, string or similar 30, and the distance between the locking wheels 21a-b can be increased or decreased by rotation of the locking wheels 21a-b, independent of the diameter of the rope, string or similar 30, which is guided between the locking wheels 21a-b. The teeth 23 preferably have different sizes, whereby the teeth 23 preferably are coarser against the end of the curve. The locking wheels 21a-b are further provided with a pre-tension function, preferably in the form of protruding elastic elements 24a and 24b, respectively, which preferably are curved and extend towards the long side of the base part 11, at the opposite side of where the rotation points 22a-b are arranged, which elastic elements 24a-b bear against curved pre-tension elements 25a-b, which curved pre-tension elements 25a-b extend across the base part 11. In this way the locking wheels 21a-b are pre-tensioned so that they tend to return to lock position.

The lock unit 20 further includes synchronization wheels 26a-b which are arranged to the locking wheels 21a-b, which synchronization wheels 26a-b are provided with teeth, which synchronization wheels 26a-b extend from the rotation points 22a-b and towards each other and to engagement with each other to ensure that the locking wheels 21a-b, i.e. also the elastic projecting elements 24a-b are synchronized, so that the dimension of the rope, string or similar is flexible, and the rope, string or similar is centred at the centre of the device, regardless of the dimension of the rope, string or similar. The dimension will of course have an upper limit, which e.g. can be limited by the size of the S-shaped opening of the guide part 12.

The base part 11 is further provided with through holes 27 for the attachment of the base part 11 to a suitable object, such as the gunwale of a boat, a flag pole or similar, and the guide part 12 is attached to the base part 11 by means of suitable means, such as bolts 28 in threaded holes 29.
The various components of the device are preferably made of plastic, composite or another suitable stainless material, especially if the device is to be used in connection with a maritime environment.

In this way it is provided a self-activated lock for use on a rope, string or similar, for example, in connection with fenders, flag poles, sailboats, tarpaulins or similar.

The device according to the invention functions in the way that a rope, string or similar is inserted through the S-shaped opening 13 of the guide part 12 of the device 10. The rope, string or similar 30 is then guided in the direction denoted with the arrow S to tension the rope, string or similar. As the rope, string or similar is pulled, this results in that the locking wheels and synchronization wheels are rotated, which results in that a force is built up in the elastic elements, which as the rope, string or similar is let loose, will result in that the locking wheels due to the force built up in the elastic elements, are rotated towards lock position and the teeth will thus engage the rope, string or similar and fasten the rope, string or similar in a secure way. The S-shaped opening will also ensure that the rope, string or similar is held in place at any time after it is inserted in the device. The device is preferably arranged so that the load of the rope, string or similar is in the direction of the arrow S, so that when the rope, string or similar is inserted in the device, the load of the rope, string or similar together with the force of the elastic elements will result in that the locking wheels are rotated and grab the rope, string or similar and hold it secure in place. If the rope, string or similar is to be tensioned, one easily pulls the rope, string or similar in the direction with the arrow L and let go, and the device again locks the ropes, string or similar as described above.

When unfastening, the rope, string or similar is pulled in the opposite direction, i.e. with the arrow L, so that the locking wheels are moved away from each other and the rope, string or similar is released from engagement with the teeth of the locking wheels, and the rope, string or similar can then be brought out from the S-shaped opening.

**Modifications**

The base part of the device can, as mentioned, be designed/adapted to the object it is to be arranged to, and the base part can, for example, in connection with the use on flag poles which have a circular shape, have a circular surface which is suitable for arrangement thereto.

A base plate can be arranged to the base part of the of the device, where the shape of the base plate is adapted for attachment to an object which the device is to be attached to, e.g. adapted to different tube dimensions for attachment on a boat, to flag poles or similar. In this way a general embodiment can be adapted to different objects by using a base plate arranged to the base part of the device.
The guide part can have different shapes so that it may be adapted to different designs of different objects which the device is to be arranged to.

The device can be adapted for use in connection with larger dimensions, such as anchor handling. Then, the lock unit and guide part of the device must be adapted for the loads which are applied to the device.

The components of the device can of course be of other materials than plastic if it is adequate for the actual area of use.

The projecting elastic elements of the lock unit can be replaced with other types of elements which provides a pre-tensioning function/spring force, e.g. a helical spring or similar can be arranged in connection with the rotation points.
Claims

1. A device for a self-activated lock of a rope, string or similar (30), which device includes a pair of opposite locking wheels (21a-b) which are provided with gripping teeth (23), which locking wheels (21a-b) are rotatable around adjacent rotation points (22a-b) arranged to a base part (11) adapted for attachment to an object, characterized in that the device includes a guide part (12) arranged to the base part (11), which guide part (12) includes an exterior housing provided with an S-shaped opening (13), and that lock wheels (21a-b) are provided with projecting elastic elements (24a-b), known perse, to provide a pre-tensioning force.

2. A device according to claim 1, characterized in that the base part (11) has an elliptic shape and that the S-shaped opening (13) extends across, between the first and second long sides of the base part (11).

3. A device according to claim 1, characterized in that each locking wheel (21a-b) is provided with a synchronization wheel (26a-b) provided with teeth, which synchronization wheels (26a-b) engage each other for the synchronization of the locking wheels (21a-b) and the elastic elements (24a-b) for centring the rope, string or similar in the device.

4. A device according to any one of the claims 1-3, characterized in that the base part (11) is provided with pre-tensioning elements (25a-b), which preferably have a curved shape and extend across the base part (11).

5. A device according to any one of the claims 1-4, characterized in that the rotation points (22a-b) are arranged close to the first long side of the base part (11).

6. A device according to any one of the claims 1-5, characterized in that the locking wheels (21a-b) have a curved shape which extends against the other long side of the base part (11).

7. A device according to any one of the claims 1-6, characterized in that elastic elements (24a-b) to provide pre-tension force have a curved shape and bear against the pre-tensioning elements (25a-b).

8. A device according to any one of the claims 1-7, characterized in that the base part (11) has a surface adapted to the object which the device is to be attached to.
9. A device according to any one of the claims 1-8, characterized in that a base plate is arranged to the base part, which is adapted to the object which the device is to be attached to.

10. A device according to any one of the claims 1-9, characterized in that the guide part (12) is adapted to the design of different objects which the device is attached to.
INTERNATIONAL SEARCH REPORT

International application No
PCT/NO2009/000223

A CLASSIFICATION OF SUBJECT MATTER
F16G 11/10, B63B 21/08

According to International Patent Classification (IPC) or to both national classification and IPC

B MINIMUM DOCUMENTATION SEARCHED
F16G, B63B

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

Data base consulted during the international search (name of data base and where practicable, search terms used)
EPOQUE: Epodoc

C DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<tbody>
<tr>
<td>Y</td>
<td>US 4453486 A (HARKEN, PETER O.) 12.06.1984, Abstract, fig. 1 and fig. 2, column 5 line 34-41</td>
<td>1, 2, 9</td>
</tr>
<tr>
<td>A</td>
<td>GB226601 1A (SKINNER, RICHARD STEPHEN) 13.10.1993, Abstract, figure 2 and page 4.</td>
<td>3-8, 10</td>
</tr>
<tr>
<td>Y</td>
<td>DE 20209372 U1 (MORALES TERCERO, S.C.) 21.11.2002, Abstract, claims 1-6 and figures 1 and 2.</td>
<td>1, 2, 9</td>
</tr>
<tr>
<td>A</td>
<td>US 4766835 A (RANDALL, RICHARD C.) 30.08.1988, Abstract and figures 1 and 2.</td>
<td>3-8, 10</td>
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</tbody>
</table>

D Further documents are listed in the continuation of Box C

See patent family annex

* Spedul categories of cited documents
  "A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search: 28 September 2009 (28.09.2009)

Date of mailing of the international search report: 29.09.2009

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<th>Patent Number</th>
<th>Date</th>
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<tr>
<td>US 4453486 A</td>
<td>12.06.1984</td>
<td>GB2003542 A</td>
<td>14.03.1979</td>
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<tr>
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<td>DE2835643 A</td>
<td>01.03.1979</td>
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<tr>
<td>GB 226601 1 A</td>
<td>13.10.1993</td>
<td>NONE</td>
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<td>PT 9821 T</td>
<td>31.12.2002</td>
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<td></td>
<td>FR 2832778 A</td>
<td>30.05.2003</td>
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<td></td>
<td>ITMI20020330 U</td>
<td>29.12.2003</td>
</tr>
<tr>
<td>US 4766835 A</td>
<td>30.08.1988</td>
<td>NONE</td>
<td></td>
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