(54) Title: A RATCHET STRAP

(57) Abstract: A ratchet strap, comprising a first body part, provided with means for attachment of a first strap; and a second body part, rotatably connected to the first body part, provided with a handle, wherein the first and second body part are mutually rotatable about a winding drum, for winding a second strap around, wherein the winding drum comprises two mutually spaced legs, between which a slot is formed for insertion of the second strap, a ratchet mechanism, arranged to wind the second strap on the winding drum when the two body parts are mutually rotated, wherein the winding drum is laterally moveable between a closed position, and an open position, in which the slot of the drum is accessible for loading of the second strap in the ratchet strap.

Fig 3
Published:

— with international search report (Art. 21(3))
A ratchet strap

The present invention relates to a ratchet strap and an assembly of such a ratchet strap and a strap.

Ratchet straps are used widely to fasten for instance cargo straps, which are typically provided with a coupler, which is located on one end of the cargo strap. For using such a prior art coupler a strap with on one side a coupler connected to is placed around a load that requires securing, subsequently the free end of the strap that is placed around the load is fed through an opening in the coupler until the strap is tightly wound around the load. The strap may also be placed around the load including further items like for instance a carrier, a mounting, another load, to secure the load. Such conventional ratchet strap is for instance disclosed in US2012/233823.

A disadvantage of such ratchet straps is that, for instance when the size of the load to be secured is small, a large amount of free strap length has to be fed through the opening of the ratchet strap until the portion of the strap that is actually used to secure the load is tightened enough to secure the load. The transfer of the over-length of free strap end through the ratchet strap is time-consuming, not user friendly and may create more safety risks in practical situations.

It is therefore an object of the current invention to overcome these drawbacks of the prior art, and to provide a ratchet strap that may be efficiently used to couple belt portions. The invention thereto provides a ratchet strap, comprising a first body part, provided with means for attachment of a first strap; and a second body part, rotatably connected to the first body part, provided with a handle, wherein the first and second body part are mutually rotatable about a winding drum, for winding a substantially elongated second strap around, wherein the winding drum comprises two mutually spaced legs, between which a slot is formed for insertion of the second strap, a ratchet mechanism, arranged to wind the second strap on the winding drum when the two body parts are mutually rotated, wherein the winding drum is laterally moveable between a closed position, in which the slot of the drum is substantially enclosed by the first and/or second body part for locking the second
strap in the ratchet strap, and an open position, in which the slot of the drum is accessible for loading of the second strap in the ratchet strap.

In the prior art solutions a free end of a strap is fed through the slot between the two mutually spaced legs, until the desired length of strap is achieved. By moving the winding drum with the two legs laterally, out of the body, the slot between the legs becomes accessible for loading the strap. Instead of feeding the complete length of excess strap through the slot, the strap is fed into the accessible slot at the desired length at once, without the need of feeding the excess length of strap through. The functioning of the ratchet mechanism is known in the art.

By moving the two legs of the winding drum together, they keep their mutual orientation. This way the winding drum is moveable within the body parts in a controlled fashion and prevents rattling and displacement of the drum. In moving the winding drum, the two legs thus move simultaneously, stability of the drum and user friendliness is improved.

In the open position the slot of the drum is accessible for loading of the second strap in the ratchet strap from the front of the ratchet strap. In open position the winding drum may allow front loading of the winding drum, such that a strap can be loaded in the slot, from the front. In the closed position the slot between the two mutually spaced legs is situated in the body, to secure the strap in the ratchet strap. Although the ratchet strap may be front loaded, the open position would also allow a back loading, wherein the strap is inserted from behind, or bottom or top loading, instead of loading from the front.

The open position for instance allows a lateral loading of a strap in the slot. With lateral loading according to the invention is meant that a strap may be loaded sideways into the slot, or that the slot may be moved sideways over a strap. Preferably, in the open position the complete width of the first and/or second body part is available for insertion of a strap on the winding drum.

The winding drum may be moveable in a direction substantially perpendicular to the longitudinal direction of the second strap or the first and/or second body part. The winding drum may thus be arranged to be moved sideways compared to the rest of
the ratchet strap. Such movement may be desired as forced, exerted on the drum and the body parts, can then be taken up directly, instead of having force components in multiple directions. On top of that, the winding drum is preferably oriented perpendicular to the longitudinal direction of the strap, for efficient loading of the strap on the drum.

The legs of the winding drum are for instance of different length. The shorter leg is for instance the length corresponding to the width of the first and/or second body part, whereas the longer leg is longer. When the drum is moved from a closed position to an open position, the shorter leg is moved out of the first and/or second body part, at least on one side, such that it is no longer supported by that body part. The winding drum is then supported by that body part by means of the longer leg. Keeping the longer leg supported also allows to maintain a constant orientation of the legs with respect to the body parts of the ratchet strap.

The longer leg is for instance about twice the length of the shorter leg, especially when the shorter leg is about the length of the width of the first and/or second body part. In this way, the winding drum may be fully opened in a way such that the slot is accessible from the front or back, depending on the orientation of the ratchet strap. The strap may when be placed against the longer leg, while the shorter leg is out of the way, and for instance at least partially out of the first and/or second body part. When the winding drum is moved to its closed position, the shorter leg returns between the first and/or second body part, enclosing the strap with the longer leg. This allows easy loading of a strap into the ratchet strap, while the winding drum remains supported in the body by the longer leg. This way, the longest leg extends beyond the first and/or second body part. Keeping the longer leg supported also allows to maintain a constant orientation of the legs with respect to the body parts of the ratchet strap, and thus results in a stable winding drum in the ratchet strap, irrespective of the position of the winding drum (in open or closed position).

The lengths of the legs, which are moved together when the winding drum is moved between its open and closed position, are preferably adapted such that in the open position of the drum, the complete width of the winding drum is available for insertion and removal of the strap. Therefore, the shorter leg is about the width of the first and/or second body part. In order to keep the winding drum in the body
parts, the longer leg will have a length of about twice the shorter leg. When the drum is in its open position, and none of the shorter leg is obstructing insertion of a strap, the longer leg is (still) present in the body part. Preferably the shorter leg, in the open position, is not present between the first and/or second body part, and in the closed position, is present between the first and/or second body part. Preferably, the longer leg is present between the first and/or second body part, both in open and closed position.

An advantage of having a shorter leg which is (almost) completely moved out of the way in the open position is that the full width of the first and/second body part is available for insertion of a strap. Additionally, when the ratchet is opened after use, the full width is available for removal of the strap (wound) on the winding drum. This enables a quicker release of the strap from the drum, and thus allows for a quicker unloading of cargo.

Each of the legs for instance has a substantially half-moon shaped cross section. Together with the slot between the legs, a substantially cylindrically shaped winding drum is formed, around which a strap may be collected without damaging the strap. Other shapes cross section, and preferably at least partially rounded shapes like ellipsoid, round or rounded square, are also possible.

At least one of the sides of the first and/or second body part may comprise a guide, for guiding the moveable winding drum during its movement. The guide is for instance provided with two openings, which are shaped to substantially match the cross section of the legs of the winding drum. Each of the legs may thus be supported and guided by the guide.

At least one of the sides of the first and/or second body part may comprise a connector, connecting the outer side of the first/and or second body part with the inner side. The ratchet mechanism of a ratchet strap is typically located at the inside of the body parts, between the body part and the actual winding drum. By moving the winding drum in and out of the body parts, the ratchet mechanism could become unstable, as it is not fully supported by the winding drum when the drum is moved to the open position. The connector may be used to keep the ratchet mechanism in place when moving the winding drum laterally.
Each of the legs may be provided with a stop at at least one of its ends, which stop limits the movement of the winding drum with respect to the first and/or second body part. The winding drum may accordingly slide or move in the housing without the need for predetermined orientation. The stop may be used to prevent the legs to be moved completely from the body parts. The ratchet strap will thus not come apart unintentionally. Preferably, both legs are provided with stops, which may be in the form of substantially circular disks. The stop, or disk, on one sides of the legs may be connecting the legs, while on the other side the stop, or disk, is connected to one leg only, typically the longer leg. The stops may further be used to grip the winding drum in order to move the drum laterally. This greatly enhances user friendliness in common situations, whereas for instance even with gloves or protective gear on it is possible to grip the stops of the winding drum in order to move the winding drum between the open and closed position.

The first and/or second body part may comprise a (spring-) biased block, to limit free rotation of the drum, wherein the block is also arranged to block lateral movement of the winding drum. Such blocks typically comprise a plate which can be placed between the gaps of two teeth of the ratchet mechanism. When the block is moved out of the gap the drum can rotate freely. Such blocks are already used in prior art ratchet straps. However, similar blocks may also be used to limit the lateral movement of the winding drum. In closed state, when the strap should be secured inside the ratchet strap, lateral movement of the winding drum is not desired, as this would release the strap from the ratchet strap while it should be holding on to a load. The free rotation of the winding drum and the opening of the winding drum could thus occur at the same time, wherein the block may be incorporated in a similar way as to the known blocks for the ratchet mechanisms.

The winding drum may be slidable between the closed and open position. In sliding the winding drum, a continuous support of the drum in the first and/or second body part may be achieved.

The transition from closed to open position may be independent of the mutual orientation of the two body parts. The winding drum may be moved between the two positions, for instance when such movement is not blocked by a dedicated
block. Lateral movement of the winding drum is generally undesired in a loaded
state, and desired when inserting or removing a strap from the winding drum.
Lateral movement is thus independent of the mutual orientation of the body parts.
Traditional ratchet straps for instance require a specific mutual orientation to allow
the winding drum to be unloaded, which is undesired.

The invention is further related to an assembly of a ratchet strap according to one
of the previous claims, and at least one strap, connected to the ratchet strap.

The invention will be further elucidated herein below on the basis of the non-
limitative exemplary embodiments shown in the following figures. Herein:
- figure 1 shows a ratchet strap according to the present invention in closed
  state
- figure 2 shows the ratchet strap of figure 1 in open state;
- figure 3 shows the ratchet strap of figures 1 and 2, with an inserted strap in
  a partially closed state;
- figure 4 shows the ratchet strap of figure 3 in almost closed state;
- figure 5 shows a side view of a ratchet strap according to the invention
- figure 6 shows a schematic view of a winding drum according to the present
  invention.

Figure 1 shows a ratchet strap (1), comprising a first body part (2), provided with
means (3) for attachment of a first strap; and a second body part (4), rotatably
connected to the first body part (2). The second body part (4) is provided with a
handle (5). The first (2) and second (4) body part are mutually rotatable about a
winding drum (6), for winding a substantially elongated second strap around. The
winding drum (6) comprises two mutually spaced legs (7, 8), between which a slot
(9) is formed for insertion of the second strap. The ratchet strap (1) is further
provided with a ratchet mechanism (10), arranged to wind the second strap on the
winding drum (6) when the two body parts (2, 4) are mutually rotated.

The winding drum (6) is, in figure 1, shown in the closed position, in which the slot
(9) of the drum (6) is substantially enclosed by the first (2) and second body part (4)
for locking the second strap in the ratchet strap (1). The drum (6) is movable with
respect to the body parts (2, 4) in lateral direction (L). At one end of the drum, the
right side of the drum in figure 1, a stop (11) is located, which blocks movement of the drum towards the left. The second body part (4) is provided with a block (12), which blocks movement of the drum (6) towards the right. When this block (12) is removed or lifted, the drum (6) may move towards the right of figure 1. The outer side of the block (12), located on the right in figure 1, has a chamfered side (13), to facilitate movement of the stop (11) from the right to the left.

Figure 2 shows the ratchet strap (1) of figure 1, in open position. The slot (9) between the legs (7, 8) is moved to the right in figure 2, together with the drum (6). The slot (9) of the drum (6) is now accessible for lateral loading of a second strap in the ratchet strap (1). To do so, a strap may simple be placed against the leg (7) between the body parts (2, 4). The lateral loading of the strap occurs when the drum (6) is moved towards the left again, in which the strap may be enclosed between the legs (7, 8), in the slot (9).

Figure 3 shows the ratchet strap (1) of figures 1 and 2, in which a strap is inserted in the slot (9) between the legs (7, 8), and the movable winding drum (6) is in between the open and closed position, and is technically still in the open position, as lateral insertion of a strap in the slot (9) is still possible in the shown position.

Figure 4 shows the ratchet strap (1) of figures 1-3, in which a strap is inserted in the slot (9) between the legs (7, 8), and the movable winding drum (6) is almost in a closed position, lateral insertion of a strap in the slot (9) is no longer possible in the shown position. The drum (6) is almost in the fully closed position. When the drum (6) is moved even further to the left, the stop (11) is pushing the block (12) up via the chamfered edge (13), after which the block (12) will engage behind the stop (11), blocking lateral movement of the drum (6).

Figure 5 shows a side view of a ratchet strap (1), showing a detail of the winding drum (6) between the first (2) and second (4) body part. The winding drum (6) comprises two mutually spaced legs (7, 8), between which a slot (9) is formed for insertion of the second strap. The ratchet strap (1) is further provided with a ratchet mechanism (10), arranged to wind the second strap on the winding drum (6) when the two body parts (2, 4) are mutually rotated. The winding drum (6) is shown in a transitional position, between the open and closed position.
The legs (7, 8) have a substantially half-moon shaped cross section, and are guided during lateral movement by a guide (14), shown as half-moon shaped openings (14). The longer leg (7) is protruding through the opening (14), whereas the shorter leg (8) is not. The body part (2, 4) is on at least one side provided with a connector (15), connecting the outer side (O) of the body part (2, 4) with the inner side (I), holding the ratchet mechanism (10) and the body parts (2, 4) together while the winding drum (6) is laterally moveable.

Figure 6 schematically shows a winding drum (6) of a ratchet strap (1) shown in the previous figures. The winding drum (6) comprises two legs (7, 8), a longer one (7) and a shorter one (8). Between the legs (7, 8), a slot (9) is present, for insertion of a strap. On one end, a first stop (11) is present, which connects the two legs (7, 8), and prevents the winding drum (6) to move further, in the shown position is present further movement to the right. On the other end, a second stop (16) is present. This stop (16) has a similar purpose as the other stop (11), but for limiting movement the other way. Additionally, the stops (11, 16) may be used for gripping of the winding drum (6), in order to move it between its open and closed position. On the shown right side of the winding drum (6), the connector (15) is shown, and on both sides the ratchet wheels (10) of the ratchet mechanism (10) are also indicated.

The longer leg (7) is about twice the length of the shorter leg (8). In the shown closed position in figure 6, the shorter leg (8) is between the ratchet mechanism (10), whereas when the drum (6) is moved to the left, to the open position, the shorter leg (8) is moved away fully, such that the slot (9) is fully available for loading or removal of a strap.

Inventive concepts are illustrated in a series of examples, some examples showing more than one inventive concept. Individual inventive concepts may be implemented without implementing all details provided in a particular example. It is not necessary to provide examples of every possible combination of the inventive concepts provide below as one of skill in the art will recognize that inventive concepts illustrated in various examples may be combined together in order to address a specific application.
Other strap constructions, assemblies, methods and advantages of the disclosed teachings will be or will become apparent to one with skill in the art upon examination of the figures and detailed description. It is intended that all such additional constructions, assemblies, methods, features and advantages be included within the scope of and be protected by the accompanying claims.
Claims

1. A ratchet strap, comprising:
   a. a first body part, provided with means for attachment of a first strap;
      and
   b. a second body part, rotatably connected to the first body part, provided with a handle
   c. wherein the first and second body part are mutually rotatable about a winding drum, for winding a substantially elongated second strap around;
   d. wherein the winding drum comprises two mutually spaced legs, between which a slot is formed for insertion of a second strap;
   e. a ratchet mechanism, arranged to wind the second strap on the winding drum when the two body parts are mutually rotated
   f. characterized in that the winding drum is laterally moveable between:
      i. a closed position, in which the slot of the drum is substantially enclosed by the first and/or second body part for locking the second strap in the ratchet strap, and
      ii. an open position, in which the slot of the drum is accessible for loading of the second strap in the ratchet strap.

2. A ratchet strap according to claim 1, wherein both legs of the winding drum are arranged to be moved simultaneously when moving the drum between the open and closed position.

3. A ratchet strap according to claim 1 or 2, wherein in the open position the complete width of the first and/or second body part is available for insertion of a strap on the winding drum.

4. A ratchet strap according to any of the preceding claims, wherein the winding drum is moveable in a direction substantially perpendicular to the longitudinal direction of the second strap or the first and/or second body part.
5. A ratchet strap according to any of the preceding claims, wherein the legs of the winding drum are of different length.

6. A ratchet strap according to one of the previous claims, wherein one of the legs is about twice the length of the other leg.

7. A ratchet strap according to one of the previous claims, wherein in the closed position the longest leg extends beyond the first and/or second body part.

8. A ratchet strap according to one of the previous claims, wherein each of the legs has a substantially half-moon shaped cross section.

9. A ratchet strap according to one of the previous claims, wherein at least one of the sides of the first and/or second body part comprises a guide, for guiding the moveable winding drum.

10. A ratchet strap according to one of the previous claims, wherein at least one of the sides of the first and/or second body part may comprise a connector, connecting the outer side of the first and/or second body part with the inner side.

11. A ratchet strap according to one of the previous claims, wherein each of the legs is provided with a stop at at least one of its ends, which stop limits the movement of the winding drum with respect to the first and/or second body part.

12. A ratchet strap according to one of the previous claims, wherein the first and/or second body part comprises a (spring-) biased block, to limit free rotation of the drum, wherein the block is also arranged to block lateral movement of the winding drum.

13. A ratchet strap according to one of the previous claims, wherein the winding drum is slid able between the closed and open position.
14. A ratchet strap according to one of the previous claims, wherein the transition from closed to open position is independent of the mutual orientation of the two body parts.

15. Assembly of a ratchet strap according to one of the previous claims, and at least one strap, connected to the ratchet strap.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60P7/08
ADD...

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) B60P

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search 2 March 2017
Date of mailing of the international search report 09/03/2017

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