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(54) **A PULLEY WITH A CLOSURE FLAP AND A WINCH WITH THE SAID PULLEY**

(57) The invention belongs to the field of forestry winches, more precisely to the field of constructional details in winches, which are related to pulling a load by winding the rope onto a drum via a pulley. The invention relates to a pulley with a closure flap (1) and a winch with the said pulley.

The pulley comprising at least:
- a housing (O), inside which a freely rotatable sheave

for leading a rope is installed in an axis,
- a closure flap (1) installed via a bolt (2) of the pulley, which allows movement of the pulley when it is installed on a winch, or via a hinge on the housing of the pulley, wherein the closure flap has an open position and a closed position, and switching between both positions is enabled with a locking pin (3).

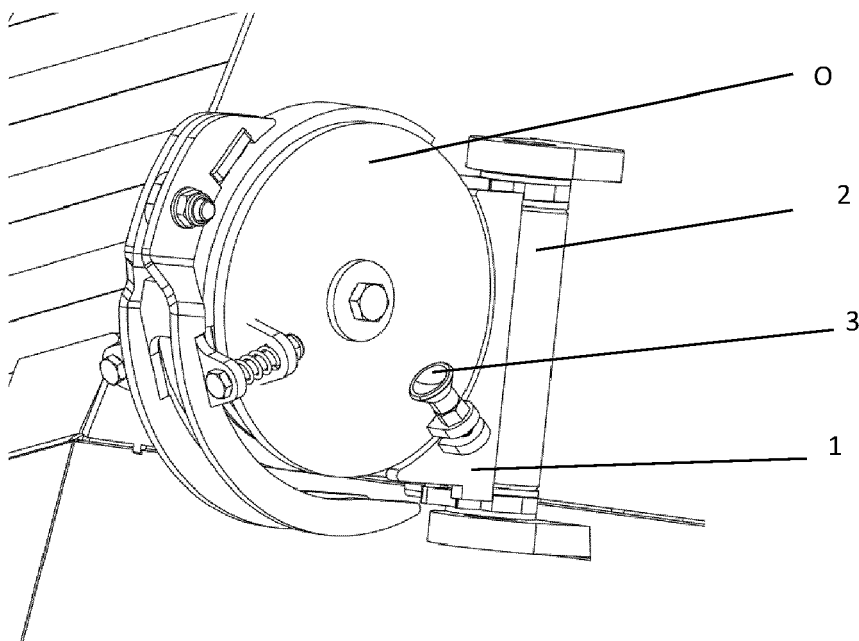


Figure 1

Description

Field of the invention

[0001] The invention belongs to the field of forestry winches, more precisely to the field of constructional details in winches, which are related to pulling a load by winding the rope onto a drum via a pulley. The invention relates to a pulley with a closure flap and a winch with the said pulley.

Background of the invention and the technical problem

[0002] Forestry winches use pulleys for guiding a rope, which is used for pulling a load. Pulleys usually comprise a housing, inside which a sheave is installed, said sheave being freely rotatable around its central axis. A rope that is winding or unwinding from the drum runs on the sheave. During work the rope often fails to wind in a straight manner, but comes at different angles, which may result in disengaged rope from the sheave. In extreme cases the rope may be torn, consequently leading to a damaged winch.

[0003] Lower pulleys in winches serve to decrease the centre of gravity of the pulling force during pulling of a load with the forestry winch and thus represent an important part of winches that ensure reliable load pulling. Due to the occasional use a lower pulley has to be prepared for a fast and simple use, hence, that it is opened quickly, the rope is installed in place and then the pulley is closed. The rope has to be reliably hidden in the housing of the pulley in order to prevent derailing and possible tearing.

[0004] The technical problem, which is solved by the present invention, is a constructional design of a pulley for a forestry winch that will have a safety element for preventing the rope from derailing (falling out) of the pulley, wherein the invention has to enable installation of the rope in a fast and simple manner.

State of the art

[0005] With the aim of preventing unwanted disengagement of the rope a safety mechanism has been developed, the said safety mechanism comprising a pin installed through openings on the both sides of the pulley housing, wherein the pin covers a diameter larger than the diameter of the sheave. Control of the pin is ensured with a stem equipped with a compression spring and a restrictor. The problem of this design is in that the stem with the spring and the restrictor protrudes from the housing, due to which the safety mechanism can deform and cease to optimally operate.

[0006] The above-mentioned problem has been solved with a solution according to patent SI 22796, wherein the safety mechanism comprises at least a pin and a stem with an integrated spring, which are firmly interconnected. The pin can be past the pulley inserted

through the coaxial openings, which are at corresponding locations available in the mutually displaced walls of the housing, while through the specified walls an axis is running through the freely rotating pulley. The stem is rigidly connected to the aforementioned pin, which can be shifted in the direction of its longitudinal axis from the position of fitting the aforementioned openings in the walls of the housing to the position of fitting only one opening in the wall against the spring force, which is during this supported against the corresponding wall of the housing. The stem is on its free end inside the housing equipped with a restrictor, wherein the step is parallel to the pin and inserted through openings in the corresponding wall on that side of the housing, which the pin can be moved to against the force of the aforementioned spring, while the specified stem with the pin is firmly connected via a link located outside the housing. This solution differs from the present invention in the construction of the closure flat and the locking element.

Description of the solution of the technical problem

[0007] The technical problem is solved as described in the independent claim, while the preferred embodiments of the solution are described in dependent claims.

[0008] The pulley with the closure flap according to the invention comprises a housing, inside which a freely rotatable sheave for leading a rope is installed in an axis. The housing is movably mounted on a winch or any other device suitable for pulling a load with a rope and a pulley. The closure flap is installed via a bolt of the pulley, which allows movement of the pulley when it is installed on a winch, which means that the rotation movement of the lower pulley and the closure flap is the same. Alternatively, the closure flap may be installed via a pivot or a hinge on the housing of the pulley, however, the installation via the bolt is preferred due to its simplicity and price. The closure flap has an open position and a closed position, and switching between both positions is enabled with a locking pin. When the closure flap is locked to the housing of the lower pulley with the locking pin, the pulley and the flap move together as a single entity. When the closure flap is not fixed with the locking pin, it can be moved independently from the lower pulley. The closure flap is preferably shaped as an approximate right-angled triangle, wherein the hypotenuse is curved to correspond to the shape of the sheave or the housing of the pulley, respectively. This results in the flap covering a significant part of the housing with the sheave, which prevents derailing of the rope from the sheave or even tearing of the rope. Preferably in the bottom part of the approximate triangle or anywhere else on the triangular part of the flap an ear with a hole is provided, preferably screwed or welded, the said hole being arranged to receive a part of the locking pin, which locks the flap in place. In case the locking pin is not present in the hole, the flap can be opened and thus the rope may be installed into the housing of the pulley. The closure flap may be alternatively

shaped as a rectangle or any other geometrical shape, wherein it may cover at least a part of the pulley or is installed to be near the edge of the housing. Instead of the ear the triangular part may be equipped with any other suitable element, which allows interaction with the pin, so that the pin can be engaged (stuck) in place in the locked position, whereas the pin is not engaged (is removed) in the open position.

[0009] The locking pin may be designed in any suitable way allowing the closure flap is locked or unlocked. It may be designed to have a housing in the shape of a hollow screw, wherein a spring is installed in the said hollow screw, and an inner part, which can be raised and lowered depending on the state of the spring and required position of the flap (open/closed), wherein the pin interacts with the hole in the ear of the flap depending of the open/closed position. In the closed position the inner part of the pin is pushed downwards with the spring, so that the pin is stuck in the hole of the bottom part of the flap, thus closing and locking the flap. In the open position the inner part is raised and released from the hole, which unlocks the flap and opens it. The locking pin is preferably with nuts or any other way mounted into a corresponding hole, a bore or an ear of the housing of the pulley. The pin is according to a second, preferable embodiment similar to the first embodiment; with the difference being that no rotation is required for unlocking. Rather, the inner part of the pin is gripped with fingers and pulled out. In case the inner part of the pin is released, the spring pulls it back and pushes it in the hole thereby locking the position.

[0010] Operation of the closure flap is carried out in the following way:

- the locking pin is opened, which releases movement of the closure flap, which can be moved into an open position; consequently, an opening is created, through which a wire rope can be installed in the interior of the pulley;
- upon instalment of the rope, the closure flap is closed and its position is fixed by closing the locking pin.

By moving the locking pin the position of the closure flap is easily controlled, wherein in the closed state during operation of the pulley no elements are protruding out from the housing. This ensures safe use of the pulley or the device provided the said pulley.

[0011] The described solution is particularly suitable for bottom pulleys of forestry winches, which are not constantly used, but has to be adapted to the pulled load and work with the winch. Using suitable adaptations obvious to the person skilled in the art the design of the closing flap and the locking pin can be used in other types of pulleys.

[0012] The pulley with the closure flap may be installed in any winch or tractor, wherein the winch may have one or several drums.

[0013] The pulley with the closure flap will be described

in further detail based on an exemplary embodiment and figures, which show:

Figure 1 Elevation view of the lower pulley with the closed closure flap

Figure 2 Elevation view of the lower pulley with the open closure flap

[0014] The preferred embodiment of the pulley with the closure flap in a closed position is shown in figure 1, wherein the pulley comprises at least:

- a housing O, inside which a sheave for leading the rope is installed in an axis;
- a bolt 2 of the pulley for installation on the forestry winch or a similar machine;
- a closure flap 1 installed via the bolt 2 of the pulley, wherein the flap 1 has an open position and a closed position, switching between both positions is enabled with a locking pin 3, wherein the closure flap 1 comprises two parts, namely:

- a triangular part 11 approximately shaped as a right-angled triangle, wherein the hypotenuse 11a is curved to correspond to the shape of the sheave or the shape of the housing of the pulley, and

- a bottom part 12, provided with an ear 12a with a hole 12a', into which a part of the locking pin 3 may be moved and thus closes and locks the position of the flap 1.

[0015] Figure 2 shows a pulley with a closure flap 1 from figure 1 shown in an open state of the flap, so that the locking pin 3, which is preferably shaped as a hollow screw, wherein for its unlocking rotation is not needed, but is rather gripped with fingers and pulled out. The locking pin 3 has an inner part, which can be moved in relation to the condition of the spring. When the inner part is pulled out, the spring is compressed and the pin is released from the hole 12a' of the ear 12a, thus allowing the flap 1 to be opened. In case the pin 3 is released upon closure of the flap 1, the spring pulls it back into the hole 12' and locks the position.

Claims

1. A pulley with a closure flap comprising at least:

- a housing, inside which a freely rotatable sheave for leading a rope is installed in an axis,
- a closure flap installed via a bolt of the pulley, which allows movement of the pulley when it is installed on a winch, or via a hinge on the housing of the pulley, wherein the closure flap has an open position and a closed position, and switching between both positions is enabled

with a locking pin.

2. The pulley with the closure flap according to claim 1, **characterized in that** the said closure flap preferably has:

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- an approximately triangular part shaped as a right-angled triangle, wherein the hypotenuse is curved to correspond to the shape of the sheave or the shape of the housing of the pulley, and

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- wherein the said triangular part has an ear or any other suitable element with a hole, which is arranged to accept a part of the locking pin.
3. The pulley with the closure flap according to any of the preceding claims, **characterized in that** the approximately triangular part and the bottom part of the closure flap are made as an integral piece or are made as two separate pieces, which are attached together, preferably welded together.

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4. The pulley with the closure flap according to claim 1, **characterized in that** the said closure flap is designed as a rectangle or any other geometrical shape, wherein it is arranged to cover at least a part of the housing of the pulley or it is arranged to be positioned near to the edge of the housing.

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5. The pulley with the closure flap according to any of the preceding claims, **characterized in that** the closure flap covers a significant part of the housing with the sheave, which prevents derailing of the rope from the sheave or even tearing of the rope.

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6. The pulley with the closure flap according to any of the preceding claims, **characterized in that** the locking pin is designed in any suitable way which allows opening or closing of the closure flap.

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7. The pulley with the closure flap according to the preceding claim, **characterized in that** the locking pin is designed as a hollow screw, wherein the spring is installed in the hollow screw, and the pin has an inner part that can be raised and lowered depending on the state of the spring and the required position open/closed, wherein the pin interacts with the hole in the ear of the flap based on the required position.

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8. The pulley with the closure flap according to the preceding claim, **characterized in that** the locking pin is attached to a hole, a bore or an ear provided on the housing of the winch.

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9. The pulley with the closure flap according to any of the preceding claims, **characterized in that**:

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- in the open position of the closure flap the inner part of the locking pin is raised, the spring is

compressed and the hole in the ear of the bottom part of the closure flap is free; and

- in the closed position of the closure flap the inner part of the locking pin is pushed downwards with the spring and stuck in the hole in the ear of the bottom part of the closure flap, said closure flap being closed and locked and the pulley and the flap move together as a single entity.

10. The pulley with the closure flap according to any of the preceding claims, **characterized in that** the housing of the pulley is movably mounted on a winch or any other suitable device for pulling a load using a rope and a pulley.
11. The pulley with the closure flap according to any of the preceding claims, **characterized in that** the pulley is a bottom pulley of a forestry winch.
12. Forestry winch with the pulley according to any of the preceding claims.

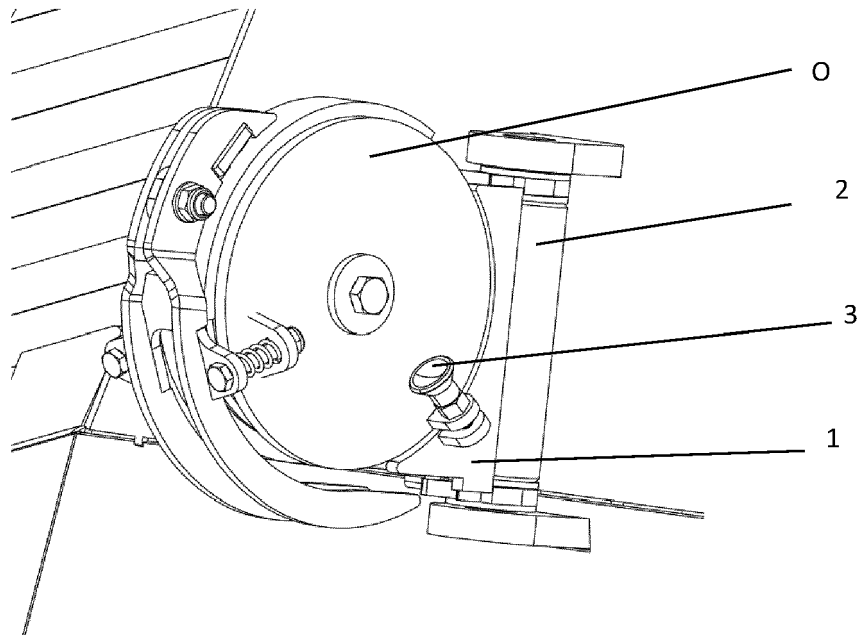


Figure 1

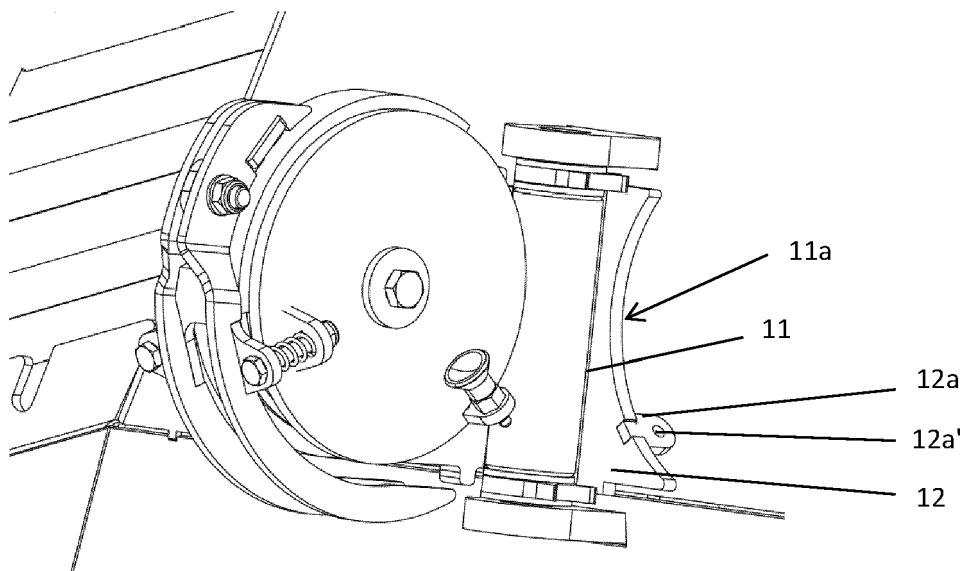


Figure 2



EUROPEAN SEARCH REPORT

Application Number
EP 21 17 4626

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2008/118105 A1 (TAJFUN PLANINA PROIZV STROJEV [SI]; SPAN IZTOK [SI]) 2 October 2008 (2008-10-02) * page 7 - page 10; figures *	1-6,8, 10-12	INV. B66D3/04
X	US 3 372 908 A (MCCARTHY JOHN J) 12 March 1968 (1968-03-12) * column 2 - column 4; figures *	1-10	
X	US 1 672 823 A (MCMILLAN THOMAS A) 5 June 1928 (1928-06-05) * the whole document *	1-6,8,10	
X	US 1 908 784 A (JOSEPH PETERSON) 16 May 1933 (1933-05-16) * the whole document *	1-6,8-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B66D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 September 2021	Examiner Popescu, Alexandru
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 17 4626

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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30-09-2021

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008118105 A1	02-10-2008	NONE	
US 3372908 A	12-03-1968	NONE	
US 1672823 A	05-06-1928	NONE	
US 1908784 A	16-05-1933	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82