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(54) **A MECHANICAL WINCH HAVING A CONTROL MECHANISM WITH IMPROVED SAFETY**

(57) Mechanical winch (10) with improved safety of the control mechanism, wherein a lever system of the mechanism is hidden inside a rigid protective housing (10a), which is attached to the winch or preferably made as an integral part of the winch housing, while a part of the rope (12) and an optional handle (12a) for activation

of pulling and a part of the rope (13) and a handle (13a) for releasing the brake are not inside the said protective housing wherein the ropes are led to the exterior through an opening (10b) in the protective housing. The said opening, which may have any shape, can be on any side of the protective housing.

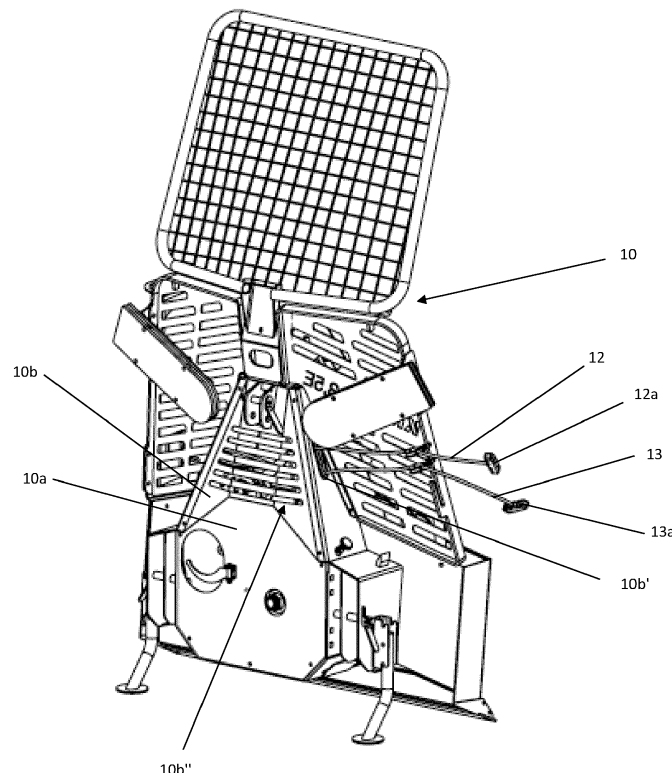


Figure 2

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## Description

### Field of the invention

**[0001]** The present invention belongs to the field of forestry winches, more precisely to the field of constructional details in mechanical forestry winches, which relate to control, namely activation of pulling and shutting down. The present invention relates to a mechanical winch with improved safety of the control mechanism.

### Background of the invention and the technical problem

**[0002]** Mechanical winches are characterized in that their control is performed with a mechanism, which has a first rope (usually green) for activation of pulling and a second rope (usually red) for release (deactivation) of the brake (an expression that is commonly used is also a brake for proportional release). When the first, green rope is pulled for activation of winding, the brake is automatically activated, which ensures that the brake belt slides along the winch drum, but it does not brake, because the drum is rotating in the direction of winding. Consequently, the drum is rotated, rope is wound onto it and the load is pulled towards the winch. When the first rope for activation of winding is released with the load attached, the drum would rotate in the direction of unwinding of the rope, which is automatically prevented by the activated brake. This is enabled by an eccentric connected to the brake belt. Thus, the drum does not rotate and the rope is not winding anymore, which consequently holds the load steady.

**[0003]** When the wire rope has to be pulled out, the second, red rope for deactivation of the brake has to be pulled, which via a special lever system releases the brake belt, thus allowing rotation of the drum, wherein the said lever system is connected to the brake belt so that the latter can be partly released using a handle. By pulling the second rope the brake can be released in two manners, i.e., proportionally with slight pulling so that the load is released in a step-wise manner, or completely with full movement to the position in which the brake is completely deactivated, thus locking the lever system and allowing the rope to freely unwind. The latter is used for example when pulling of the rope is needed during fixing of the load. During operation of the brake for proportional release the cardan shaft or the sprocket with the chain for transferring torque from the drive onto the drum still rotates (idle state). In case the first rope for activation of pulling is pulled, the brake is re-activated and the above-described process is repeated.

**[0004]** Known mechanical winches have the control mechanism on the exterior of the winch, which is away from the pulled load, but is regardless exposed to the environment and conditions such as unwanted touch, movement, dirt, tree branches and similar unwanted events that can damage the mechanism and lead to unsafe conditions for work as well as unreliable operation.

Therefore, the technical problem, which is solved by the present invention, is a constructional solution of a mechanism that will lead to improved safety and thus protection against external impacts as well as to sleek appearance.

### State of the art

**[0005]** Known mechanical winches, such as winches series SI, E and ER of manufacturer Vitli Krpan, have the above-described control mechanism on the exterior of the winch, where it is exposed to environmental conditions.

**[0006]** The applicant is not aware of any mechanical winch, which would have a different control mechanism.

**[0007]** Some hydraulic winches have controlled mechanism of valves inside a housing, however the mechanisms of mechanical winches due to their size and construction are not suitable for the solution used in hydraulic winches.

### Description of the solution to the technical problem

**[0008]** The technical problem is solved as described in the independent claim, while the preferred embodiments are defined in the dependent claims.

**[0009]** The mechanical winch according to the invention has all usual constructional elements of mechanical winches known to the person skilled in the art, such as:

- Housing of the winch, inside which a drum for winding a pulling rope and lamellae of a clutch, a sprocket with a chain and a brake,
- A first (usually green) rope for activation of pulling and winding of the pulling rope onto the drum, which is with pulleys and levers connected with the clutch of the winch drum,
- A guide of the pulling rope and the pulling rope with the end piece.

**[0010]** The essence of the mechanical winch with improved safety of the control mechanism is in that the whole lever system of the mechanism is hidden inside a rigid protective housing, which is attached to the winch or preferably made as an integral part of the winch housing, while a part of the rope and the optional handle for activation of pulling and a part of the rope and the handle for releasing the brake are not inside the said protective housing, so that they are accessible to the user, wherein the ropes are led to the exterior through an opening in the protective housing. The said opening, which may have any shape, can be on any side of the protective housing, wherein the opening may be provided with elements for improving sliding of the rope. For example, the opening may be encased with rubber or plastic material in order to decrease the possibility of damaging the rope due to friction against the preferred metal housing. The protective housing as such may be made from any suitable metal material, which is suitable for housings of

winch and similar machines.

**[0011]** Such construction does not have any parts of the mechanism protruding to the exterior, which could get stuck or damaged, which also means higher safety, lower possibility for operation failures as well as longer life span. At the same time, the straight lines improve the visual appearance of the winch.

**[0012]** The protective housing is installed on the winch in a non-removable manner, for example with welding, or in a removable manner with screws or similar elements, which improves access to the control mechanism in case of breakdowns or maintenance or repairs. Preferably, the protective housing is made as a part of the winch housing, which allows better construction, safety and stability.

**[0013]** The mechanism for controlling the mechanical winch usually comprises:

- a first rope and optionally a handle for activation of pulling, wherein the rope is via pulleys led to the handle connected with the clutch, which may trigger rotation of the drum, onto which the pulling rope is wound, and
- a second rope and handle for release (deactivation) of the brake.

When the first, green rope is pulled for activation of winding, the brake is automatically activated, which ensures that the brake belt slides along the winch drum, but it does not brake, because the drum is rotating in the direction of winding. Consequently, the drum is rotated, rope is wound onto it and the load is pulled towards the winch. When the first rope for activation of winding is released with the load attached, the drum would rotate in the direction of unwinding of the rope, which is automatically prevented by the activated brake. This is enabled by an eccentric connected to the brake belt. Thus, the drum does not rotate and the rope is not winding anymore, which consequently holds the load steady.

When the wire rope has to be pulled out, the second, red rope for deactivation of the brake has to be pulled, which via a special lever system releases the brake belt, thus allowing rotation of the drum, wherein the said lever system is connected to the brake belt so that the latter can be partly released using a handle. By pulling the second rope the brake can be released in two manners, i.e., proportionally with slight pulling so that the load is released in a step-wise manner, or completely with full movement to the position in which the brake is completely deactivated, thus locking the lever system and allowing the rope to freely unwind. The latter is used for example when pulling of the rope is needed during fixing of the load. During operation of the brake for proportional release the cardan shaft or the sprocket with the chain for transferring torque from the drive onto the drum still rotates (idle state). In case the first rope for activation of pulling is pulled, the brake is re-activated and the above-described process is repeated.

**[0014]** Until now known solutions had only the drum or the drive parts including the brake hidden in the housing of the winch, which is provided in the lower middle part, while the invention has the mechanism reshaped in such a manner that it can be integrated in the interior of the winch housing or covered with the protective housing above the drum and the drive parts. Therefore, the above-described handles are connected to the brake or the clutch from above and not from the side as was the case in known solutions. Preferably, the control mechanism for controlling the mechanical winch according to the invention comprises:

- a first rope and optionally a handle for activation of pulling, wherein the rope is via pulleys led to the handle connected with the clutch, which may trigger rotation of the drum, onto which the pulling rope is wound, and
- a second rope and handle for release (deactivation) of the brake.

Wherein the brake handle is in its middle part equipped with a curved cut-out arranged to allow movement of a rolling element, the movement of which can via the eccentric affect the status of the brake belt on the winch drum. The brake belt is installed in the housing of the brake mechanism, which is arranged to be installed on the winch housing near the brake belt. The rolling element, which may be a bolt, a bearing, a cylinder or any other suitable element that can move along the curved cut-out is installed in the housing of the brake mechanism and is connected to the eccentric, so that the linear movement can be transferred to the said eccentric, which can squeeze or release the brake belt. The housing of the brake mechanism comprises a lower part and a left and right parts, which are perpendicular to the lower part, said left and right parts being identically shaped. The left and the right part of the brake mechanism have a groove, into which the bearing fits, once the brake handle is installed in the housing of the brake mechanism. The bearing is connected to the eccentric with a spring and a distancing element. The bottom part has an opening, through which the distancing element with the spring is installed, said distancing element and spring being connected to the brake belt via the eccentric under the winch housing.

**[0015]** In the scope of the invention as described herein and defined in the claims, other embodiments of the mechanical winch obvious to a skilled person are possible, which does not limit the essence of the invention as described herein and defined in the claims.

**[0016]** The mechanical winch with improved safety of the control mechanism will be further described based on figures, which show:

Figure 1 A known mechanical winch with an external control mechanism

Figure 2 A mechanical winch with improved safety of the control mechanism according to the in-

vention

**[0017]** Figure 1 shows a known mechanical winch 1, which has a control mechanism on its exterior, wherein the drum for winding the pulling rope and the drive parts inside the housing of the winch 1a, while the control mechanism is connected to the said parts from the side. The control mechanism of the mechanical winch shown in figure 1 comprises:

- a first rope and a handle (not shown) for activation of pulling, wherein the rope is via pulleys 2 led to the handle 3 connected with the clutch, which may trigger rotation of the drum, onto which the pulling rope is wound, and
- a second rope and handle for release (deactivation) of the brake (not shown).

When the first, green rope is pulled for activation of winding, the brake is automatically activated, which ensures that the brake belt slides along the winch drum, but it does not brake, because the drum is rotating in the direction of winding. Consequently, the drum is rotated, rope is wound onto it and the load is pulled towards the winch. When the first rope for activation of winding is released with the load attached, the drum would rotate in the direction of unwinding of the rope, which is automatically prevented by the activated brake. This is enabled by an eccentric connected to the brake belt. Thus, the drum does not rotate and the rope is not winding anymore, which consequently holds the load steady. When the wire rope has to be pulled out, the second, red rope for deactivation of the brake has to be pulled, which via a special lever system 4 releases the brake belt, thus allowing rotation of the drum, wherein the said lever system is connected to the brake belt so that the latter can be partly released using a handle. By pulling the second rope the brake can be released in two manners, i.e., proportionally with slight pulling so that the load is released in a step-wise manner, or completely with full movement to the position in which the brake is completely deactivated, thus locking the lever system and allowing the rope to freely unwind. The latter is used for example when pulling of the rope is needed during fixing of the load. During operation of the brake for proportional release the cardan shaft or the sprocket with the chain for transferring torque from the drive onto the drum still rotates (idle state). In case the first rope for activation of pulling is pulled, the brake is re-activated and the above-described process is repeated.

**[0018]** Figure 2 shows the mechanical winch 10 according to the invention, which has the control mechanism hidden inside a metal protective housing 10b, wherein the protective housing 10b is made as a part of the winch housing 10a. The protective housing 10b has on one side an opening 10b', through which a part of the first rope 12 and a handle 12a for activation of pulling and a part of the second rope 13 and a handle for releas-

ing the brake 13a are installed, so that they are accessible to the user. The said opening 10b', which may have any shape, preferably oval shape, is provided with an element made from rubber or plastic for improved sliding of the rope, which decreases the possibility of rope damaging due to friction against the metal housing. The protective housing 10b is provided with further elongated openings 10b" for ensuring air flow and improved visibility in case the control mechanism malfunctions. The openings 10b" may have any shape or may be absent, so that the housing surface is smooth.

## Claims

1. A mechanical winch with improved safety of a control mechanism, **characterized in that** levers of the control mechanism are hidden inside a rigid protective housing, which is attached to the winch or the said protective housing is a part of the winch housing, wherein a part of a first rope for activation of pulling and a part of a second rope for deactivation of a brake are not in the said protective housing in order to enable accessibility to a user, wherein the said ropes are led to the exterior of the protective housing through an opening in the protective housing.
2. The mechanical winch with improved safety of a control mechanism according to claim 1, **characterized in that** the said opening may be located on any side of the protective housing.
3. The mechanical winch with improved safety of a control mechanism according to claim 1 or 2, **characterized in that** the said opening is covered with plastics, rubber or any other material, which reduces friction during pulling of the rope.
4. The mechanical winch with improved safety of a control mechanism according to any of the preceding claims, **characterized in that** the protective housing is made from any suitable metal material.
5. The mechanical winch with improved safety of a control mechanism according to any of the preceding claims, **characterized in that** the protective housing is located approximately in the middle part of the winch.
6. The mechanical winch with improved safety of a control mechanism according to any of the preceding claims, **characterized in that** the protective housing is a part of the winch housing.
7. The mechanical winch with improved safety of a control mechanism according to any of the preceding claims, **characterized in that** the protective housing is not removably installed on the winch using weld-

ing.

8. The mechanical winch with improved safety of a control mechanism according to any of the preceding claims from 1 to 6, **characterized in that** the protective housing is removably installed on the winch, preferably with screws.

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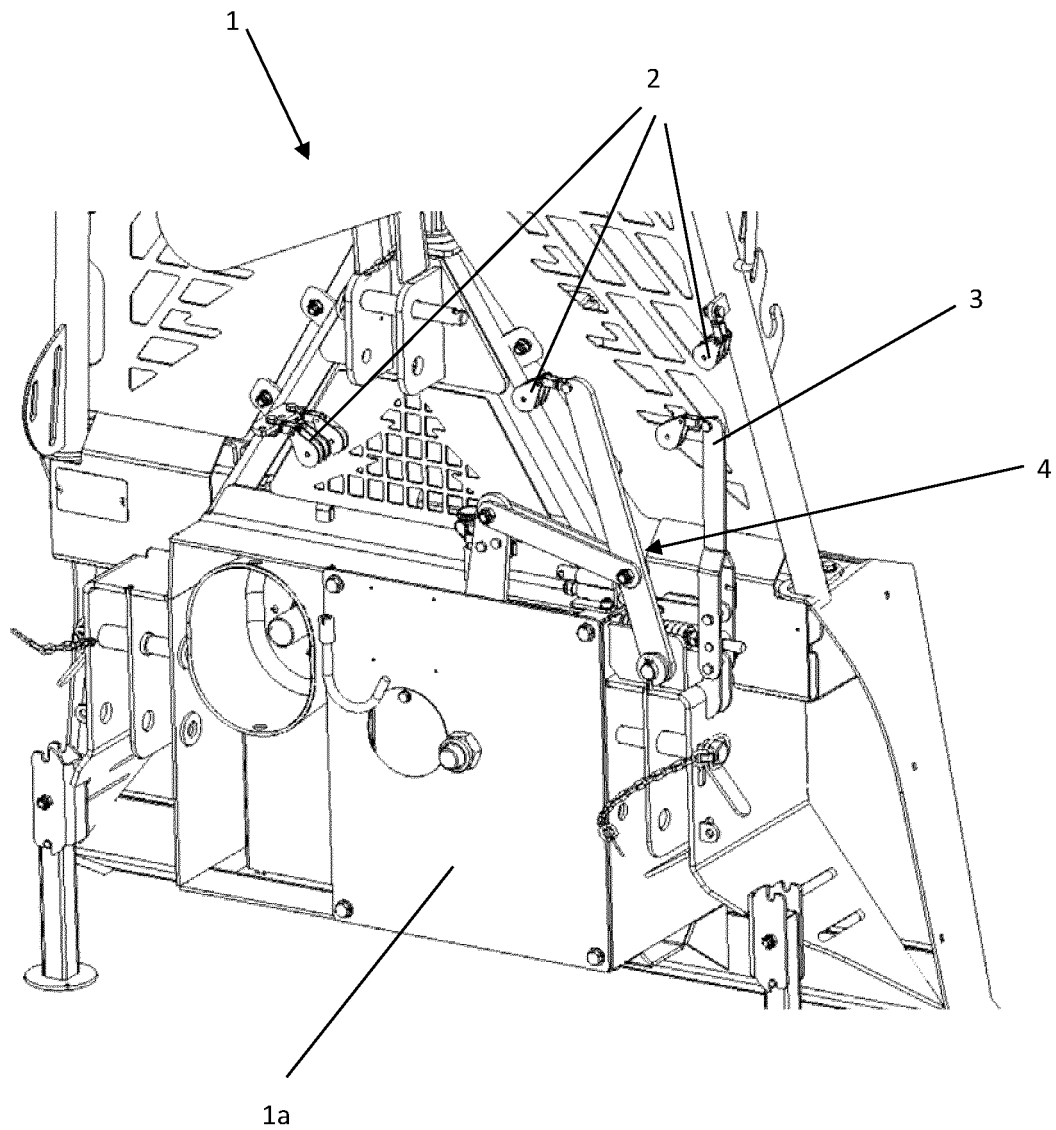


Figure 1 (state of the art)

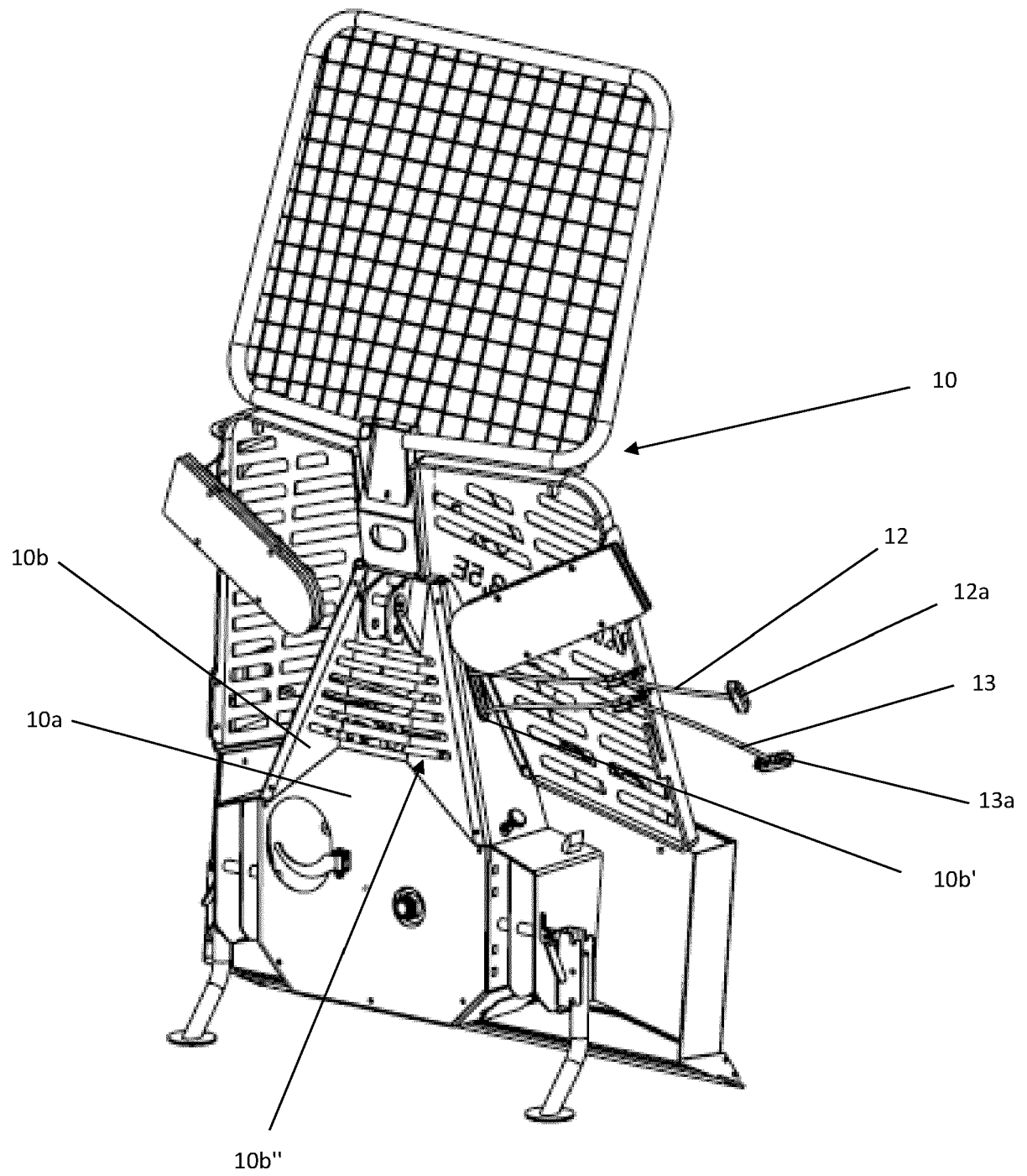


Figure 2



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Application Number  
EP 21 18 0483

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