(No Model.)

3 Sheets—Sheet 1.

O. HILLERSCHEIDT.

SELF LOCKING HOISTING DEVICE.

No. 484,932. Patented Oct. 25, 1892.

Fig. 1.

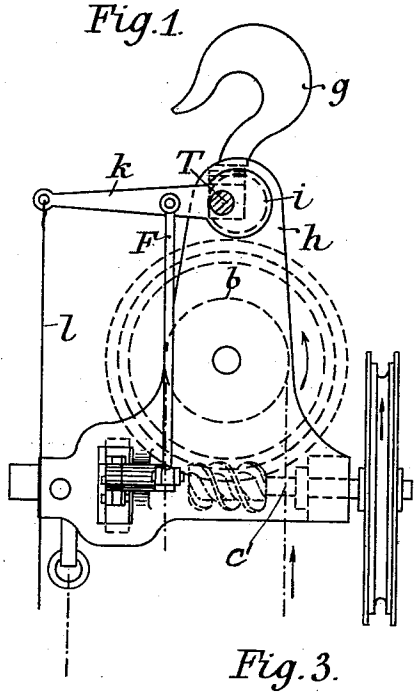


Fig. 2.

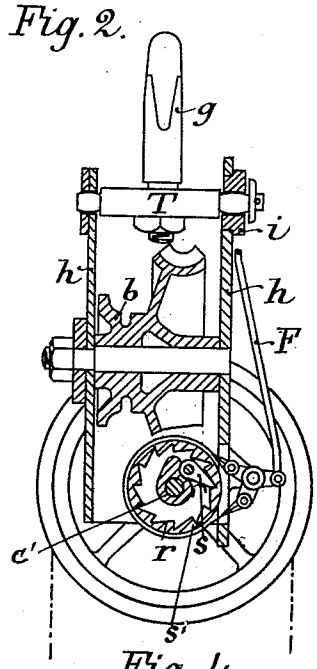


Fig. 3.

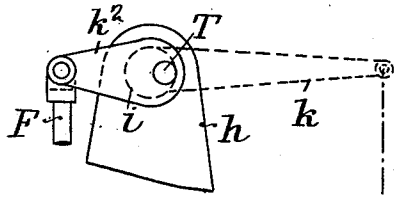


Fig. 4.

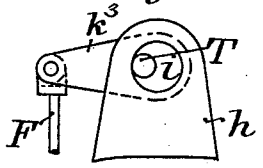
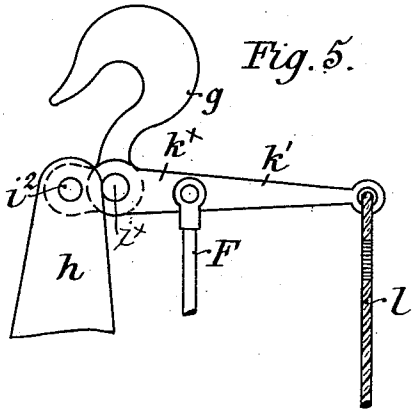


Fig. 5.



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(No Model.)

3 Sheets—Sheet 2.

O. HILLERSCHEIDT.

SELF LOCKING HOISTING DEVICE.

No. 484,932. Patented Oct. 25, 1892.

Fig. 7.

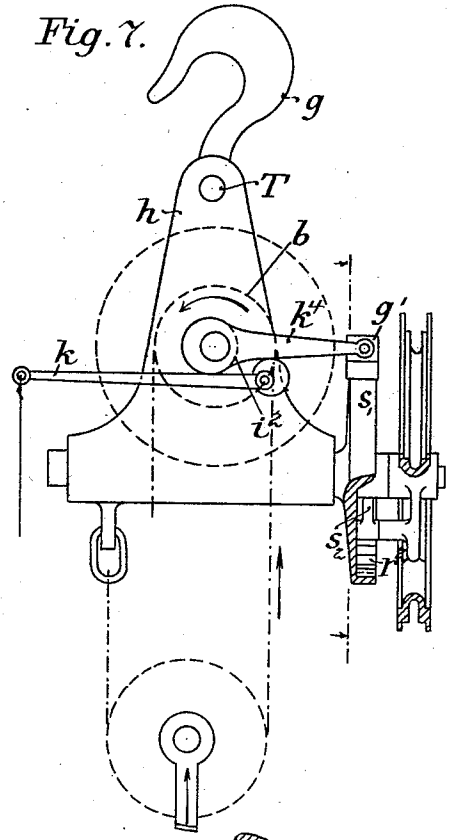


Fig. 6.

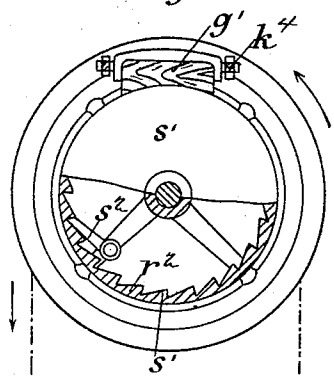


Fig. 8.

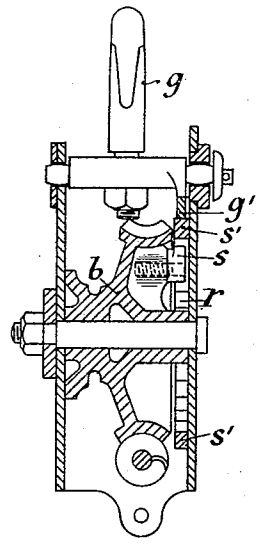
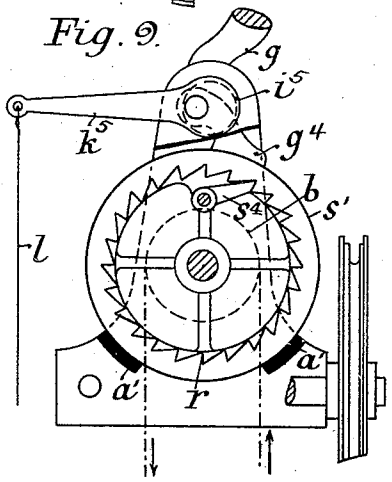


Fig. 9.



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(No Model.) 3 Sheets—Sheet 3.

O. HILLERSCHEIDT.

SELF LOCKING HOISTING DEVICE.

No. 484,932. Patented Oct. 25, 1892.

Fig. 10.

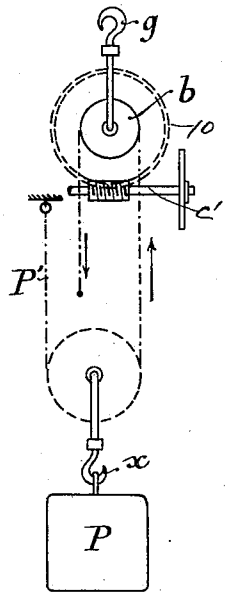


Fig. 11.

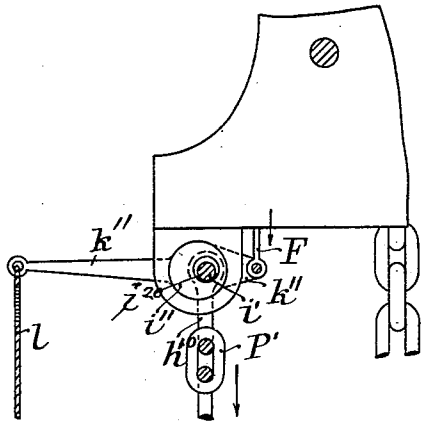


Fig. 12.

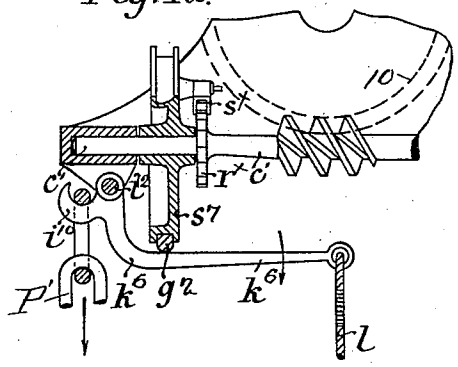


Fig. 13.

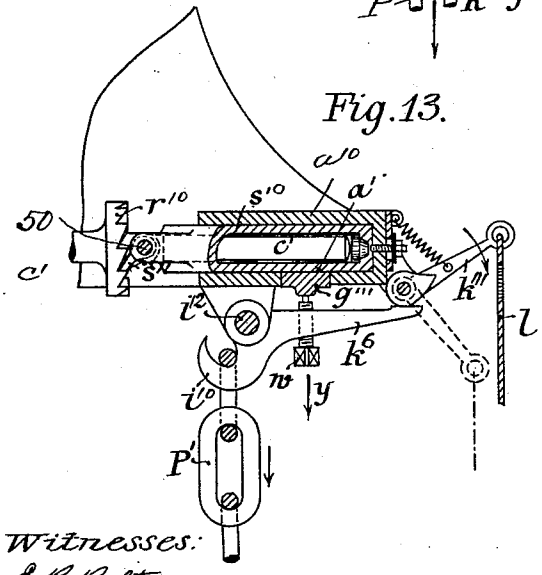
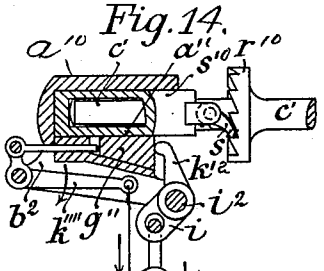


Fig. 14.



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UNITED STATES PATENT OFFICE.

OSCAR HILLERSCHEIDT, OF BERLIN, GERMANY.

SELF-LOCKING HOISTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 484,932, dated October 25, 1892.

Application filed February 29, 1892. Serial No. 423,263. (No model.)

To all whom it may concern:

Be it known that I, OSCAR HILLERSCHEIDT, mechanical engineer, a subject of the King of Prussia and German Emperor, and a resident of the city of Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Self-Locking Hoisting Devices; and I do hereby declare the following to be full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in a self-locking hoisting device, which have for their object, on the one hand, to cause a braking apparatus connected with such gear to be acted upon by the load to be raised in such manner that after the hauling-power has ceased to be exerted the load cannot of itself descend again by gravity, while, on the other hand, the said brake apparatus can be released at will by hand to such an extent as to allow the load to descend with any desired moderate velocity.

I will proceed to describe the said invention with reference to the accompanying drawings, in which it is applied to ordinary pulley blocks or sheaves—such, for example, as the kind indicated diagrammatically at Figure 10.

Fig. 1 is a side view of a pulley-block with my improvements. Fig. 2 is a vertical sectional view of Fig. 1. Figs. 3, 4, and 5 are detail views of modifications of the manner of arranging the operating-lever. Fig. 6 is a side view, partly in section, of a modified form of brake-disk. Fig. 7 is a side view of a modification. Figs. 8 and 9 show a vertical section and a side elevation of a further modification. Fig. 10 is a diagrammatic view of the manner of suspending the hoisting chain and block. Fig. 11 is a detail view showing how the brake device can be combined with the arrangement shown in Fig. 10; and Figs. 12, 13, and 14 are modifications, partly in section.

In the arrangement shown in side view and vertical section at Figs. 1 and 2 an ordinary worm and worm-wheel pulley-block is connected with its suspension-hook g by a cross-head T, which can move in all directions in one of the block-cheeks, while in the other block-cheek it is carried, also rotatable in all directions, by an eccentric i, which in its turn is rotatable in the block-cheek and has attached to it a lever k, which is connected to a brake and can be moved by hand, so as to release such brake. The brake-disk, which can be on any rotating spindle of the apparatus, contains ratchet-teeth r, with which gears a pawl s. This pawl is pivoted on a block fixed on the brake spindle or shaft c' and is so arranged as to leave the brake-spindle free to revolve independently of the brake-disk in the direction corresponding to the raising of the load; but when the spindle revolves in the contrary direction, consequent upon the sinking of the load, the pawl carries the brake-disk with it.

The application of the frictional brake-surfaces—such as, in the present instance, the brake-band upon the brake-disk s'—is effected by causing the load, by means of the pulley-block, to exert a pull on the actual center of the eccentric i, while the suspension-hook g is connected to the eccentric center of rotation T of the eccentric i. If the line drawn through the actual center of the eccentric and the center T of the rotation is approximately at right angles to the vertical center line of suspension, the eccentric i will, on the downward pull exerted by the load on the block, be caused to rotate to a certain extent, and is thereby made to impart motion to the lever-arm k, which is fixed thereto, and this in its turn actuates a rod F, so as to cause this to apply the brake-band to the disk s'. By suitably proportioning the eccentricity of i and the length of leverage at which the rod F acts it is possible to determine at will the amount of brake-power applied. When applying the said braking device to hauling apparatus of the above-described kind as at present constructed, the brake will of course be applied with the greater force the heavier the load is, and with a proportionately great eccentricity and leverage this action can be such as to actually prevent the descent of the load. In order now to permit of the load being lowered at any desired speed, it is only necessary to move the lever by hand in the direction in which it will effect the release of the brake-band, for which purpose, of course, the lever k must be of a sufficient length.

Instead of a single lever k and eccentric i,

there may be two of these—namely, an eccentric and lever on each side cheek of the block—and these may be made to act in such manner that of the two corresponding rods F one is made to apply its brake-strap by a short arm $k^{\times}$ of pressure and the other by tension, as shown by the arrangement of the lever-arms k^2 k^3 in said Figs. 3 and 4, respectively, in relation to the centers T. The corresponding arrangement of the eccentrics—that is to say, the positions of the centers of motion for the above case—is shown at Figs. 3 and 4. With hauling apparatus for smaller loads the eccentric i would have to be too large in proportion. In this case, therefore, instead of an eccentric I employ the arrangement shown at Fig. 5, where it is replaced by a lever k', on which are provided the center pin $i^{\times}$ for the attachment of the suspension-hook and the center pin i^2 for attachment to the block-cheeks h, such center pins taking the place of the center T and center of eccentric i in the previous arrangement.

Figs. 6 and 7 show a construction in which in place of mounting the cross-head T of the hook g in eccentrics, as at Fig. 2, the axis of the chain-wheel b, carrying the load, is mounted in eccentrics i^3. The levers k^4 of the eccentrics are connected at their ends with the pins of a brake-block g', which presses upon a brake-disk s', connected rotatably with the cheeks h of the hauling apparatus. On raising the load the brake-disk s' is stationary; but on ceasing to haul up the load the pawl s^2 on a revolving shaft (here shown to be the worm-shaft) gears with the ratchet-teeth r^2 of the brake-disk s', and thus prevents the backward motion of the axis and consequently the sinking of the load, the pawl s being made to slide over the ratchet-teeth during the hauling motion. On releasing the brake-disk s' to a greater or less extent of the pressure of the brake-block by hand it will be carried round with the axis by means of the pawl, such rotation and consequently the descent of the load being governed by the pressure of the brake-block. The ready raising of the brake-block g' or of its lever k^4 is in Fig. 7 shown to be effected by means of a hand-lever k and eccentric. It may, however, be effected in any other convenient manner, such as by a wedge, screw, short lever-arm, &c.

In the arrangement shown at Figs. 8 and 9 the eccentric-lever k^5, whose eccentric i^5 is here made to carry the cross-head of the hook g, as first described, bears with its brake-block g^4 against the brake-disk s', which rests rotatably on the brake-surfaces a' a', carried by the side cheeks. A pawl s^4, carried by the load-chain wheel b, slides over the teeth of the brake-disk when rotated in the direction for raising the load, but gears with the same as soon as the hauling strain ceases, and thus prevents any backward rotation of the chain-wheel until the brake-block g^4 is slightly raised by hand, whereupon the brake-disk will be caused by the pawl s^4 to rotate in overcoming a greater or less amount of frictional resistance, and this will allow of the backward rotation of the chain-wheel and descent of the load.

Figs. 10 to 14 show constructions in which instead of effecting the application of the brake by a slight motion of the loaded block or frame of the hauling apparatus or by the loaded chain-wheel, as in Figs. 1 to 8, a lever k^6 is provided below the apparatus which is caused to apply the brake by being acted upon by the fixed end P′ of the hauling-chain, as at Fig. 10. This lever is shown in Fig. 12 pivoted at i^{12} to the frame and having its long arm extending under the friction brake-wheel s^7 to press the brake-block g^2 thereon. The short arm of the lever is hooked at i^{10} and sustains the weight of the chain P′ and the load. The friction brake-wheel is loose on the shaft c', which has a worm gearing with a worm-wheel 10 on the shaft of the chain-wheel b, as will be readily understood from Figs. 10 and 12, and it engages the said shaft to move therewith when the load is lowered by the pawl $s^{\times}$ and the ratchet-wheel $r^{\times}$ on the shaft. From this it will be clearly seen that when the load is being hoisted the ratchet-wheel will turn freely forward under the pawl, which will simply drop into the teeth in succession, the weight of the load and the chain P′ holding the lever-arm k^6 up with the block g^2 bearing strongly against the brake-wheel s^7, and thus when the lifting action ceases and the load tends to fall the ratchet-wheel engages the pawl, which tends to turn the friction-wheel s^7, and this movement is resisted to any desired degree by the pressure of the block g^2 on said wheel, which pressure may be regulated by adjusting the lever by pulling down on the cord l.

In the arrangement at Fig. 11 i^{11} is the eccentric, through the eccentric-bore of which the bolt i^{20} of the shackle h^{10} passes, that connects the fixed end P′ of the hauling-chain to the hauling apparatus. The lever k^{11}, fixed to the eccentric i^{11}, as also the rod F, connected thereto, transmits the tendency to rotary motion of the eccentric produced by the pull of the loaded chain P′ as a straight pull to the brake device, which is not shown, which of course may be of any well-known form.

For relieving the brake the lever k^{11} is drawn downward (more or less) by means of the cord l, so that the fixed end of the chain P′, as also the lever k^{11} and rod F, are slightly raised, and thus move the brake block or strap out of action to the required degree to allow of a corresponding descent of the load.

In the arrangements shown at Figs. 12 and 13 the eccentric is transformed into a hook i, from which the end of a chain P′ is suspended. With regard to Fig. 13 it may be stated that with this construction the length of lever-arm for the attachment of the load can be varied within certain limits by means of a screw w. This is for the purpose of adjusting the leverage to suit different weights of

loads; also, if a greater or less quantity of oil should pass unintentionally to the brake-surfaces from the spindle-bearings it may become necessary to adjust the brake-leverage.

In Fig. 13 the screw w presses the brake-block g''' directly against the brake-surface, the said block being arranged in an opening in the bearing 10^{a}. If the screw is turned backward in the direction of the arrow y, the point of attachment of the chain P′ will, in consequence of the slight rotation of the lever k^{6} i^{10}, approach the vertical line passing through the point of suspension i^{12} of the lever, and consequently the ideal leverage at which the load acts will become shorter, while the lever-arm from the point i^{12} to the point of the screw w remains about the same. The result will therefore be that the brake-pressure will be diminished. In adjusting the screw in the contrary direction to the arrow y it will be seen that an increase of the brake-pressure will be produced. This change in the leverage, it will be seen, is due to the fact that the end of the chain is loose on the hooked end i^{10} of the lever, which is therefore free to move toward and from the pivot of the lever as said lever is tilted, and this shifting movement is due to the peculiar curve of the upper edge of the hook, as it will be seen that a raising of the hook i^{10} will cause the chain to slip nearer the pivot. As in the construction at Fig. 13 the hand-lever k''' acts upon the lever k^{6} by means of a cam for the purpose of enabling a very slight release of the brake to be effected with a heavy load on the hauling apparatus. It may be necessary in adjusting the screw w also to provide for a corresponding adjustment of the axis of the lever k'''. In Fig. 14 the eccentric i is also replaced by a short lever, the second arm k^{12} of which, however, presses a brake-block formed as a wedge against the brake-surface a^{11}. The release of the brake is effected by a corresponding slight backward motion of the wedge g^{11} by means of the hand-lever k''' and a small pressing-rod b^{2}.

In Figs. 13 and 14 the brake-blocks press directly against the sleeve s^{10}, arranged to rotate within the bearing a^{10} of the frame. This sleeve receives the end of the shaft c', which, while not shown fully, is connected to the chain-wheel in a manner similar to that before described in relation to Fig. 12, said shaft carrying rigidly a toothed disk r^{10}, which is the equivalent of the ratchet $r^{\times}$ of said Fig. 12, while the sleeve, which is loose on the sleeve c', carries a pawl s'', engaging said disk in a manner similar to the before-mentioned pawl $s^{\times}$, the said pawl being pivoted at 50 to the sleeve.

I claim—

1. In combination, the pulley-block, the chain-wheel carried thereby, a loosely-journaled rotary brake device, also carried by the said block, a brake-lever normally in connection with the said rotary device and under tension of the load, whereby the said device will be held stationary normally, and a pawl-and-ratchet connection between the said rotary brake device and the chain-wheel and arranged to turn the said device upon the fall of the load when the pressure of the brake-lever is relieved, and the means for operating the brake-lever to release the rotary brake device and allow it to turn more or less freely under the action of the pawl-and-ratchet connections, substantially as described.

2. In combination, the pulley-block and its chain-wheel, the brake-lever, and the rotary brake device in connection with each other normally, the said rotary part being loosely mounted on the block, the chain having one end supported on the brake-lever to apply a tension thereto, and the pawl-and-ratchet connection between the rotary brake device and the chain-wheel and arranged to turn the brake device as the load descends upon the release of the brake-lever, and means for controlling the pressure of the brake-lever on the rotary brake device, substantially as described.

3. In combination, the pulley-block, the chain-wheel, the brake device independent thereof, the lever having one arm connected with the brake device, the hoisting-chain supported on the other arm, and the manual operating means for the lever, substantially as described.

4. In combination, the pulley-block and brake device, the pivoted lever connected with said brake device, the hoisting-chain connected with the lever, and the means for adjusting the leverage, substantially as described.

5. In combination, the pulley-block and brake device, the pivoted lever connected with the brake device, the chain connected with the lever, and the screw w for adjusting the said lever, substantially as described.

6. In combination, the pulley-block, the shaft c', carrying a toothed wheel and a loose pawl-support, the brake-block to bear against said support, the pivoted lever connected with the brake-block, the hoisting-chain connected with said lever, and the manual connections for operating the lever, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

OSCAR HILLERSCHEIDT.

Witnesses:

MARC M. ROTTEN,

OSCAR SCHMIDT.