June 21, 1932. M. ANGERPOINTNER 1,864,114

HOLDING DEVICE FOR PIECE GOODS IN SUSPENDED LINES

Filed July 10, 1931 2 Sheets-Sheet 1

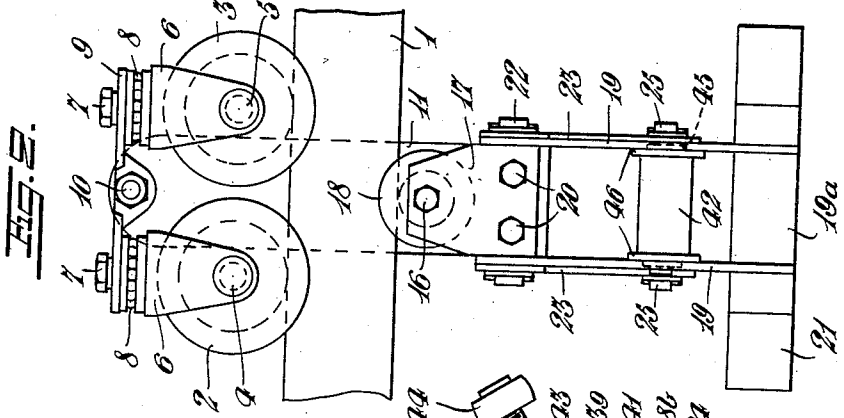


Fig. 2.

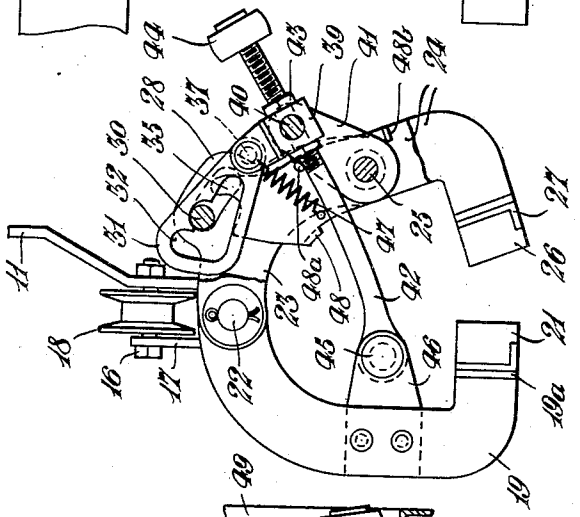


Fig. 3.

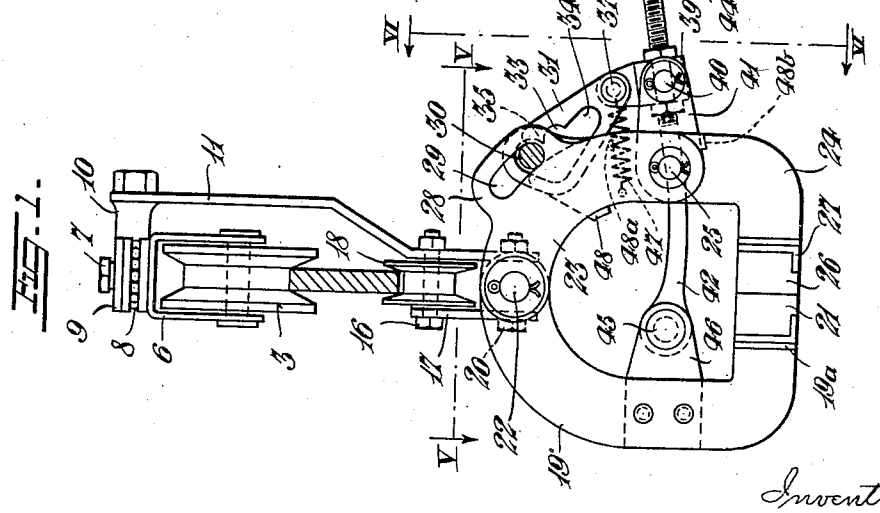


Fig. 1.

Inventor
Matthias Angerpointner
By Sommers & Young,
Attys.

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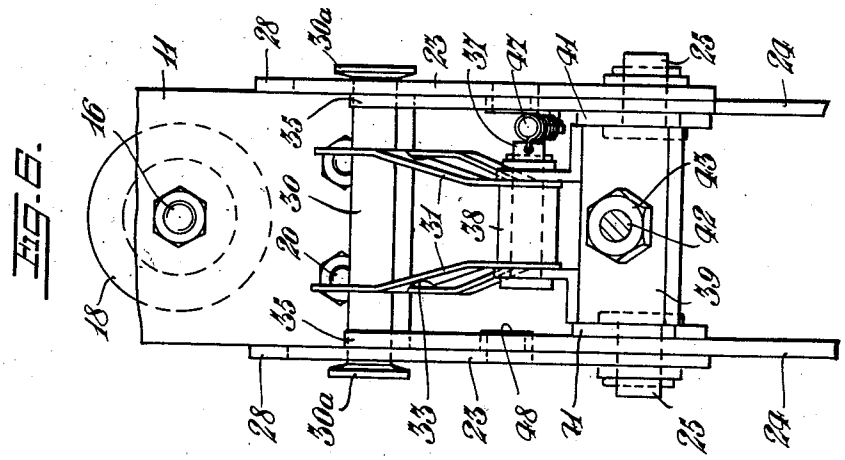


Fig. 3.

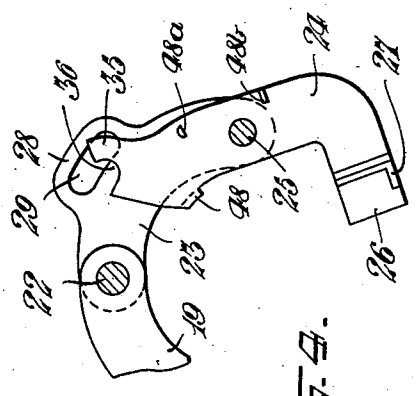


Fig. 4.

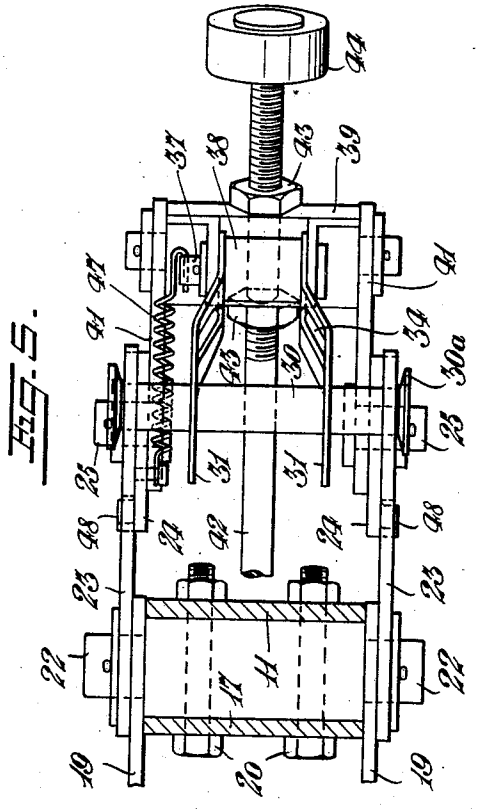


Fig. 5.

Inventor,
Matthias Angerpointner
By Sommers & Young,
Attys.

Patented June 21, 1932 1,864,114

UNITED STATES PATENT OFFICE

MATTHIAS ANGERPOINTNER, OF DJURON, NEAR NORRKOPING, SWEDEN

HOLDING DEVICE FOR PIECE GOODS IN SUSPENDED LINES

Application filed July 10, 1931. Serial No. 550,023.

This invention relates to holding devices for the transportation of piece goods by suspended railways.

The chief object of the invention is to create such holding devices for piece goods, such as bags, bales, packages, etc., having a simple and reliable construction and also adapted for automatic loading and unloading, while being cheap to manufacture.

A further object of the invention is to create a holding device to hold the piece of goods firmly, when in holding position, but adapted to be released rapidly, when the load is to be discharged. The gripping members of the device are moved apart very rapidly and consequently all risk for the piece goods to hook on to the jaws or be scratched or torn by them is eliminated. A further object of this invention is to make it possible for the gripping members to swing freely, when released, so that said gripping members may, without any inconvenience, be made very short even if the maximum width of the gripping jaws is great. Thus, the whole holder or carrier may be made very low to save space. This is very important, especially, when the holder is used for storing devices of the type described in my co-pending U. S. patent application, Serial No. 550,022 filed at the same date as this application.

One embodiment of my invention is shown in the annexed drawings.

Fig. 1 shows an end view of a load carrier in accordance with my invention, as seen in the direction of the suspension line, the jaws being closed.

Fig. 2 shows a corresponding side view (seen from the left in Fig. 1).

Fig. 3 shows a partial end view, analogous to that shown in Fig. 1 but showing the jaws pushed apart.

Fig. 4 is a detail view showing the shape and journalling of the two-part gripping arm.

Fig. 5 is a horizontal section on the line V—V in Fig. 1 and shows the operating lever and the locking means in detail and on a larger scale.

Fig. 6 is a vertical section on the line VI—VI in Fig. 1, also on a larger scale.

In the drawings 1 indicates a rail of flat iron on which the whole holder or carrier rolls by means of two wheels or rollers 2, 3 journalled by means of ball bearings on journals 4, 5. These journals are fixed in forks 6 whose upper ends by means of pins 7 are rotatably journalled on a carrying part 9 resting on the upper sides of the prongs of the forks 6 by intermediate axial ball bearings 8 through which the pins 7 pass. Thus, the rollers 2, 3 roll and also turn (on the bearings 8) in curves very easily, because these two movements are facilitated by the ball bearings.

On the carrying piece 9 a pin 10 is rotatably journalled which is secured to a carrying arm 11 from which the gripping device or holder proper hangs. The parts 2—9 form a wagon rolling on the suspension line 1.

On a shaft 16 between this carrying arm 11 and a second arm or projection 17 a roller 18 is rotatably journalled engaging the rail 1 from below to prevent the wagon and the holder from derailing. A gripping arm 19 is attached to the carrying arm 11 and the arm 17 by means of bolts 20 to form a rigid structure together with said arms. The gripping arm 19 consists of two side pieces 19, 19 secured to each other by use of the arm 17 and a cross piece 19*a*, to which a jaw 21 is secured preferably having a shape fit for the pieces of goods to be held.

A second gripping arm is rotatably journalled on a bolt 22 and consists of an upper inner part 23 and a lower outer part 24 articulately jointed with the upper part 23 by means of two co-axial journals 25. The parts 23 and 24 thus form an articulated two-part gripping arm. The lower part 24 carries a jaw 26 adapted to cooperate with the jaw 21. Said two parts of the second gripping arm consist of side pieces 23, 23 and 24, 24, respectively, said last-mentioned pieces being interconnected by a cross-piece 27 carrying the jaw 26.

The side pieces 23, 23 are provided with projections 28 in which slots or grooves 29 for a locking bolt 30 are made. Said bolt is loosely placed between said two side pieces 23 and prevented by flanges or washers 30*a* at both ends from falling out of the slots 29.

Said bolt is also embraced by two loop-shaped members 31, whose shape is best seen from Figs. 1 and 3. The openings in the members 31 show three notches 32, 33 and 34 of such a size that the bolt 30 fits snugly in any of these notches. Each of the side pieces 24 carries a projection 35 at the base of which a notch 36 (Fig. 4) is made having a size corresponding to the diameter of the bolt 30.

The members 31 are rotatably journalled on a pin 37 and are kept apart by an intermediate distance member 38. The pin 37 is fixed on a die 39 rotatably journalled between two link members 41, 41 at one end of said link members while the other ends of said link members are rotatably journalled on the journals 25. The die 39 has a transverse hole through which an operating lever 42 is loosely inserted and may be moved in its longitudinal direction. Said operating lever is threaded to a part of its length and normally locked to the die 39 by use of two nuts 43 screwed on the operating lever on both sides of said die and engaging the latter. The operating lever is somewhat curved in the embodiment shown. It may consist of two parallel arms, if desired. At the outer end of the operating lever a roller 44 is rotatably journalled and the opposite or inner end of said operating lever is rotatably journalled on a pin 45 between two projections 46, 46 projecting from the side pieces 19, 19 of the undivided gripping arm.

A tension spring 47 is arranged between the pin 37 and one of the side pieces 24. The motion of the part 24 of the two-part gripping arm in relation to the part 23 of said gripping arm is limited by abutments 48 on the side pieces 24. Furthermore, abutments 48*a* and 48*b* are provided on the side pieces 24 to limit the motion of the link members 41 in relation to said last-mentioned side pieces. When the jaws are opened, the link members 41 will abut against the abutments 48*a* to rotate the part 24 of the two-part gripping arm in relation to the part 23 of the same arm. Thus, the jaws are rapidly moved apart even if no load is held between them. When the gripping arms are moved against each other to close the jaws said link members 41 will abut against the abutments 48*b* and cause the parts of the two-part gripping arm to rotate until the abutment 48 engages the part 23. The abutment 48*b* also serves to limit the downward motion of the operating lever 42.

The device described acts as follows:

When the parts are in the positions shown in Fig. 1 the jaws are closed and locked. This locking is effected by the operating lever 42 and the bolt 30, in as much as said bolt rests in the notches 36 and thus keeps the part 24 rigidly locked to the part 23 of the two-part gripping arm, said part 24 engaging the abutments 48 and 35 and being thus kept in position so that the parts 23, 24 act as one single rigid gripping arm. In this position the members 31 prevent the bolt 30 from sliding out of the notches 36 and are themselves kept in their position by the operating lever 42. Said lever locks the two-part gripping arm 23, 24 now rigid to the gripping arm 19 and presses the jaws 21, 26 against each other. The operating lever 42 is prevented from moving downwards from this position by the link members 41 and also by the abutment 48*b*. It is to be observed that the operating lever 42 would keep the jaws and gripping arms locked even if the special locking device 28—36 was not provided for.

When the hold of the jaws is to be released to free the load held between them, the operating lever 42 is moved upwards. This is done either by hand or automatically. In said latter case the roller 44 is caused to be lifted by a stationary operating rail 49 (Fig. 1) arranged obliquely beside the rail 1, when the roller 44 engages said rail 49 at the forward motion of the holder on the rail 1. When the roller 44 thus is lifted, it swings the operating lever 42 upwards on the journal 45, thus causing the link members 41 to swing on the journal 40 and to move the journals 25 which are then moved out from the journal 45, so that the jaws 21, 26 are moved apart. Simultaneously, the members 31 are moved upwards and push upwards and inwards the locking bolt 30 resting in the notches 32, thus lifting said bolt out of the notches 36, so that the locking between the parts 23 and 24 of the two-part gripping arm is released. Immediately after the beginning of the upward motion of the operating lever 42 the part 24 of the two-part gripping arm is freed and may rotate freely on the journals 25. The piece of goods held between the jaws 21 and 26 will be momentarily freed in this moment and push the free part 24 outwards. Consequently, the jaws are opened very rapidly to their maximum width and the piece of goods is effectively prevented from being hooked on to and possibly torn by the jaws and a correct operation is always secured. When the operating lever is thus moved upwards the link members 41 will engage the abutments 48*a* and aid in swinging the part 24 in relation to the part 23, so that a rapid opening motion is attained. Even if no load is placed between the jaws 21, 26, the latter will yet be opened positively by means of the abutment 48*a*.

It is evident that the distance between the jaws in the locking position shown in Fig. 1 or, in other words, the minimum width of the jaws may simply and easily be adjusted by use of the nuts 43 within wide limits. By such adjustment the holder may rapidly be adapted to grip and hold objects of very different sizes and shapes.

When the bolt 30 has slid to the upper ends of the slots 29 the members 31, which now as-

sume a different angular position, also slide upwards so that said bolt slides out of the notches 32 and into the notches 33 or even 34. After this the operating lever can continue its movement upwards and move the jaws 21, 26 still farther apart, independent of the fact that the upward movement of the bolt 30 is limited by the upper ends of the slots 29. Now the various parts have the positions illustrated in Fig. 3.

When the operating level is pushed down, the various parts of the holder are moved to their locking positions again. The spring 47 will press the part 24 of the two-part gripping arm to engage the part 23 of said gripping arm tightly by the abutments 48, thus causing the notches 36 to coincide with the lower ends of the slots or grooves 29. After this, the bolt 30 will be introduced into its locking position in said notches 36 and the lower ends of the grooves 29 by the members 31 engaging said bolt by their notches 32 and, above all, 31. Consequently, the locking bolt 30 is positively returned to its locking position. Independently of this, the link members 41 will, however, abut against the abutment 48*b* to turn the part 24 in relation to the part 23, until the abutment 48 engages the part 23. After this the parts 23, 24 form a rigid structure, constituting the second gripping arm. The engagement of the link members 41 with the journals 25 cause at the same time this gripping arm 23, 24 to be returned to the closed position and to be locked in this position by the operating lever. The downward movement of the operating lever to close and lock the jaws as described may be effected by hand or automatically, for instance by a spring (not shown) or an oblique rail, similar to the rail 49 but engaging the roller 44 from above (not shown).

In the embodiment shown, more than one different device is used for the same purpose, particularly for locking the parts, for moving the parts 23, 24 together to form a rigid unit and to move them apart. The holder will evidently function even if such doublings of the devices are not at hand. Particularly the locking device 28—36 may be omitted, if desired.

The holders or carriers in accordance with this invention may be used in combination with wagons for suspended lines of various types, such as suspended railways, aerial cableways, etc. Their motion along the line may be originated in any suitable or well-known way. For instance, the holders or their wagons may be attached to a rope or chain running along the rail 1 or may be engaged by catching devices attached to such rope or chain. In this latter case side-rails and switches may be provided so that the holders with their loads may be switched to different rails and distributed in any desired manner.

The rail 1 may also be slanting so that the holders are moved forward by gravity. A special plant based upon this principle is described in my copending U. S. patent application Serial No. 550,022 mentioned above.

Because suspension lines having holders in accordance with the invention require very little space and may easily be constructed to follow almost any vertical or horizontal curves desired, such lines are very useful for solving many transportation problems which otherwise would cause very high costs.

What I claim is:—

1. In a suspension line, a wagon movable along the line, an undivided gripping arm on said wagon, a two-part gripping arm, an articulate joint between the two parts of said arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said joint between said two parts, and an abutment on one of said parts to engage the other of said parts, when in the locked position.

2. In a suspension line, a wagon movable along the line, an undivided gripping arm on said wagon, a two-part gripping arm, an articulate joint between the two parts of said arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said joint between said two parts, an abutment on one of said two parts to engage the other of said parts, when in the locked position, and a locking device between said two parts on the opposite side of said two-part gripping arm in relation to said abutment.

3. In a suspension line, a wagon movable on rollers along the line, an undivided gripping arm on said wagon, a two-part gripping arm, one or more coaxial journals to form an articulate joint between said two parts of said divided gripping arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said journals, an abutment on one of said two parts to engage the other of said parts, when the gripping arms are in their locked position, and one or more additional abutments on the outer one of said two parts, which is journalled on said journals only, said additional abutments being adapted to limit the motion of said link members in relation to said last mentioned outer part.

4. In a suspension line, a wagon movable on rollers along the line, an undivided gripping arm on said wagon, a two-part gripping arm, one or more coaxial journals to form an articulate joint between said two parts of said divided gripping arm, an articulate joint be-

tween one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said journals, an abutment on one of said two parts to engage the other of said parts, when the gripping arms are in their locked position, slots in the inner one of said two parts, which is articulately jointed with the undivided gripping arm, a locking bolt slidably journalled in said slots, and loop-shaped catching members connected with said operating lever and engaging said locking bolt to move it to the locking position between said two parts of the two-part gripping arm and to release it therefrom.

5. In a suspension line, a wagon movable on rollers along the line, an undivided gripping arm on said wagon, a two-part gripping arm, one or more coaxial journals to form an articulate joint between said two parts of said divided gripping arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said journals, an abutment on one of said two parts to engage the other of said parts, when the gripping arms are in their locked position, slots in the inner one of said two parts, which is articulately jointed with the undivided gripping arm, a locking bolt slidable in said slots, loop-shaped catching members connected with said operating lever and engaging said locking bolt to push it into locking position between said two parts of the two-part gripping arm and to release it therefrom, and notches on said catching members to engage said locking bolt.

6. In a suspension line, a wagon movable on rollers along the line, an undivided gripping arm on said wagon, a two-part gripping arm, one or more coaxial journals to form an articulate joint between said two parts of said divided gripping arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said journals, an abutment on one of said two parts to engage the other of said parts, when the gripping arms are in their locked position, and a tension spring between said operating lever and the outer one of said two parts of the divided gripping arm, which is journalled on said journals only.

7. In a suspension line, a wagon movable along the line, an undivided gripping arm on said wagon, a two-part gripping arm, an articulate joint between said two parts of said two-part gripping arm, an articulate joint between one of said two parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, a die on said operating lever, nuts screwed on said operating lever to lock said die in any position on said lever, link members between said die and said joint between said two parts, and an abutment on one of said parts to engage the other of said parts, when the gripping arms are in the locked position.

8. In a suspension line, a wagon movable along the line, an undivided gripping arm on said wagon, a two part gripping arm, an articulate joint between the two parts of said two-part gripping arm, an articulate joint between one of said parts and said undivided gripping arm, an operating lever rotatably journalled on said undivided arm, link members between said operating lever and said joint between said two parts, an abutment on one of said parts to engage the other of said parts, when the gripping arms are in the locked position, and oblique stationary rails to actuate said operating lever.

In testimony whereof I have signed my name.

MATTHIAS ANGERPOINTNER.