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G. ARNOLD

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STRAP SECURING DEVICE

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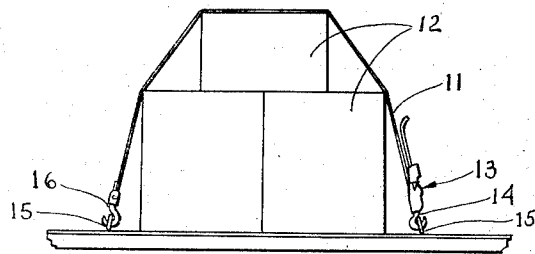


Fig. 1.

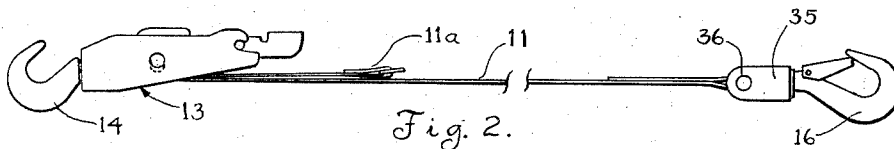


Fig. 2.

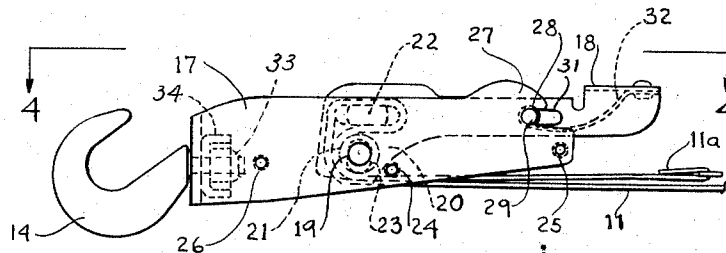


Fig. 3.

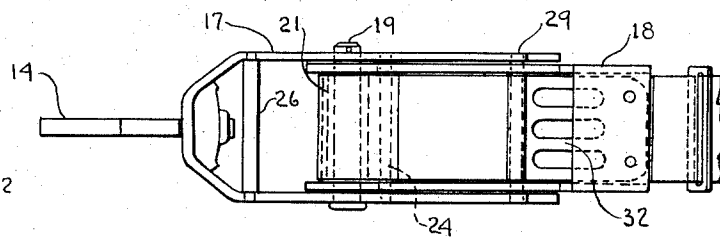


Fig. 4.

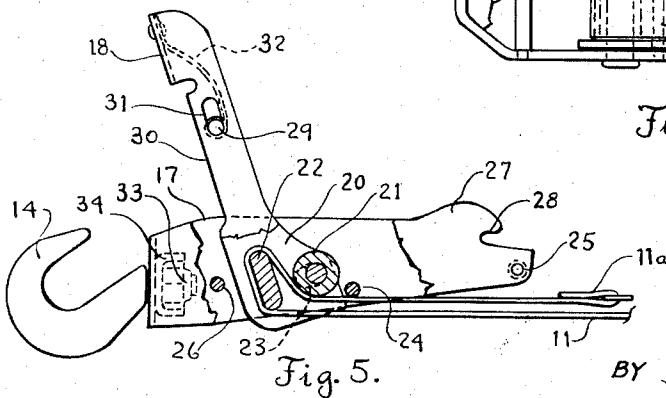


Fig. 5.

INVENTOR
Garland Arnold
BY Harris S. Campbell
ATTORNEY

2,852,827

STRAP SECURING DEVICE

Garland Arnold, Waynesboro, Pa., assignor to Eastern Rotocraft Corporation, Doylestown, Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 24—68)

This invention relates to strap type securing devices and is particularly concerned with improvements in clamping mechanism for transferring load from the strap.

In strap devices which must carry relatively high loads, such as several thousand pounds, one of the main problems is the provision of satisfactory mechanism for adjusting and securing the strap.

A primary object of the present invention is the provision of mechanism which will securely hold the strap by relatively light application of pressure thus preventing damage to the strap member. This is accomplished in the present arrangement by the use of strap mechanism which utilizes multiple snubbing points as well as multiple pressure application points.

Another object of the invention is to provide a handle and frame structure to give locking and releasing action with a minimum angular throw of the handle portion and which incorporates mechanism to automatically assure free adjustment of the strap when the handle is moved to the release position.

Another object of the invention is the provision of an improved snubbing beam on the handle which beam also serves as one of the pressure application points.

How these and other objects and advantages of the invention are accomplished will be clear from the following description of the drawings in which—

Figure 1 shows the device of the present invention in position for securing cargo.

Figure 2 is an elevational view showing the complete strap device.

Figure 3 is an elevational view to an enlarged scale of the strap clamping mechanism showing the parts in closed position.

Figure 4 is a plan view of the device taken in the direction of arrows 4—4, Figure 3.

Figure 5 is a side elevational view similar to Figure 3 with certain parts in section and showing the mechanism with the handle in released position.

Referring to the figures, it will be seen that Figure 1 shows strap 11 in position to hold cargo in the form of boxes 12, the clamping device 13 being shown attached to the strap 11 and being held by hook 14 which engages floor ring 15. Hook 16 at the opposite end of the strap 11 engages another floor ring 15 thus anchoring both ends of the strap unit. As will be more clearly seen in Figures 2 to 5, the clamping mechanism consists primarily of frame 17 and handle 18. Pivot pin 19 extends between the side plates of frame 17, and the handle 18 is supported on pivot 19. Between the side plates 20 of handle 19 a cylindrical part 21 is mounted on the pivot pin 19. Mounted in the handle 18 between the side plates 20 is an anchor beam member 22 the longitudinal axis of which is substantially parallel to the edge of handle 18. When the handle is in the closed position as shown in Figure 3, beam member 22 lies in a position with respect to the pivot 19 which is approximately 90 degrees or at right angles to the line of pull of the strap 11. Also in Figure 3 it will be seen

that side plates 20 of the handle 18 are provided with slotted openings 23 which have their longitudinal axis in a direction perpendicular to the face of beam 22. The presence of slots 23, therefore, allows the handle 18 to shift its position slightly in a direction perpendicular to beam 22 to move toward or away from cylindrical beam 21.

Spacer pin 24 extends between the sides of frame 17 for holding the proper spacing of the frame sides and also serves a further function which will be described later. In the clamped position as shown in Figure 3, the loaded side of the strap 11 extends around the cylindrical beam 21, over one end of beam 22, then around the opposite end of beam 22 and back around the cylindrical beam 21 underneath the portion of the strap 11. The unloaded end 11a of the strap then extends outside the unit 13 in convenient position for access during adjusting operations.

Additional spacer members 25 and 26 hold the side plates of frame 17 in proper parallel relationship. In frame 17, the plates are shaped as shown at 27 to form a latch incorporating slot 28 in which latch pin 29 can engage. Latch pin 29 extends between the side plates 30 of handle 18 and is supported in elongated slots 31 which limit the movement of the latch pin 29. Spring 32 is attached to latch pin 29 and anchored to handle 18 to urge pin 29 to the closed position in the slot. In this way the handle is held in closed position once it has been moved thereto.

The terminal hook 14 is shown connected to the frame 17 by means of an integral shank which extends through the frame and is secured in position by nut 33, washer part 34 being interposed between the nut and the frame for reinforcing purposes. Hook 16 on the opposite end of the tie down may be similarly attached to yoke member 35 which incorporates transverse pin 36 around which strap 11 may be looped and fastened or sewn in a suitable manner.

To release the load from the tie down unit latch 29 is moved out of notch 28 to permit handle 18 to be moved from the position shown in Figure 3 to the position in Figure 5. It will be noted that in the position in Figure 5 the toe ends of plates 20 of the handle engage cross member 24 and thus handle 18 is moved so that slot 23 is in the open position shown, thus permitting beam 22 to move away from cylindrical member 21. In this way the space between beam 22 and cylinder 21 is enlarged and pressure is fully removed from the strap thus permitting strap 11 to be slipped easily around beam 22 to the desired position of looseness. It will be noted that in this position the lower end of beam 22 also moves the loaded portion of strap 11 away from cylindrical beam 21 thus removing any pressure which might be in the transverse direction.

The tightening and closing of the tie down unit is the reverse procedure to that noted above. With hooks 16 and 14 properly secured and the strap over the load the slack is pulled up while the handle remains in the open position. By grasping loose end 11a the strap may be pulled freely around beam 22 until all slack has been removed. Then while retaining the end of strap 11a in one hand, handle 18 is moved with the other hand from open position as in Figure 5 to closed position as in Figure 3. In so moving a toggling action occurs which, in effect, shortens the strap and provides the desired degree of initial tensioning. The amount of tensioning may be controlled by the amount of holding applied to the loose end 11a. When handle 18 is swung into closed position, the tension in strap 11 forces the handle to move on its slot so that it pulls beam 22 down against cylinder 21 into the position shown in Figure 3. In this position the latch 29 retains the handle and the strap

is held against slippage up to the capacity of the strap. High efficiency is developed because of the advantageous arrangement in which the loaded portion of the strap provides holding effect on the unloaded portion of the strap which lies between roller 21 and strap 11. Further, the strap force also urges the beam 22 down to clamp the strap between beam 22 and cylinder 21. It will be noted that after the strap has passed over both ends of beam 22 the snubbing effect has reduced the actual load required to retain the strap.

It will be seen that the slot 23 therefore permits automatic motion of the handle under the influence of tension in the strap to apply holding loads to the strap by virtue of the movement which causes beam 22 to be pulled down to clamp against cylinder 21. Full release of the clamping loads is assured by movement of beam 22 away from cylinder 21 when the handle is moved to open position.

It will be evident, therefore, that I have provided an improved clamping device for a tension loaded strap. While the mechanism for supplying the clamping action is simple in nature, it nevertheless permits the transmission of the full strap load from the strap to the anchoring device without slippage or damage to the strap. By properly relating the beam on the handle to the clamping cylinder, the tension of the strap may be utilized to provide energizing action in producing the clamping effect. Also, the proportioning and shaping of the beam allow taking advantage of the snubbing effect around the two ends before applying the clamping load to the strap, thus reducing the amount of clamping required to prevent slippage. By the slotted handle mounting an energized clamping effect may be attained. Load release is attained in open position because of the shaping of the handle sides and their coaction with the stop on the frame to cause shift of the handle. By pivoting the handle to the frame at the end near the anchorage point, a relatively long and powerful handle action may be incorporated without interfering with the handle movement.

I claim:

1. A strap securing mechanism having a frame, a handle supported on said frame by a pivot member, a strap engaging clamping member mounted on said pivot member, a strap engaging beam attached to said handle, said handle being movable to a closed latched position lying approximately parallel to the direction of strap pull when under load, said handle including a pair of elongated slots the walls of which engage said pivot member, the longitudinal direction of said slots being generally transverse to the direction of strap load with the handle in closed position.

2. A strap securing mechanism having a frame, a handle supported on said frame by a pivot member, said handle being movable to a closed position along said frame approximately parallel to the direction of external strap pull when under load, a strap engaging snubbing drum mounted on said pivot member, a strap engaging beam supported on said handle with the deep axis of the beam parallel to the direction of the strap when the handle is in closed position, the edges of said beam being rounded, said handle including a pair of slots the walls of which support it on said pivot member, the longitudinal direction of said slots being generally transverse to the direction of external strap pull with the handle in closed position.

3. A strap securing mechanism having a frame, a handle supported on said frame by a pivot member, said handle being movable to a closed position along said frame approximately parallel to the direction of external strap pull when under load, a strap engaging drum concentric with said pivot member, a strap engaging beam on said handle, said handle including a pair of side plates each incorporating a slot the walls of which support the handle on said pivot member, said side plates being formed with a toe portion near each of the slots, a stop device mounted in said frame, said toe portions being shaped to engage said stop device when the handle is moved to open position to shift said handle on the slots.

4. A construction according to claim 2 in which the end of said beam in closed handle position lies in a position approximately transverse to the strap cylinder beam to provide approximately a right angle direction change in the strap as it passes from the cylindrical beam around the end of the handle beam.

5. A strap securing device having a frame, a handle supported on said frame by a pivot member, said handle being movable to a closed position along said frame, a strap engaging member mounted on said pivot member, a strap engaging beam attached to said handle, said beam having a flattened side facing said pivot member, said handle being mounted on said pivot member by a slotted structure, the longitudinal axis of said slotted structure being generally perpendicular to said flattened side of said beam.

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