July 28, 1959 J. R. HUBER 2,896,296

STRAP CLAMP-DEVICE

Filed Aug. 16, 1954

Fig. 1.

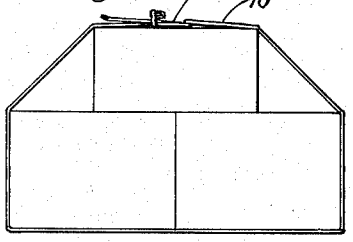


Fig. 2.

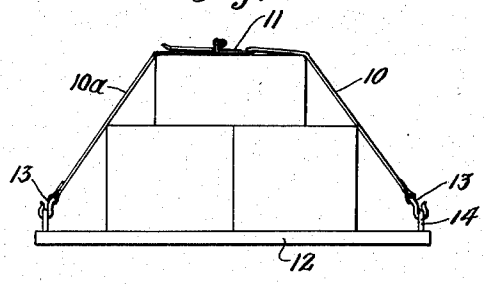


Fig. 3.

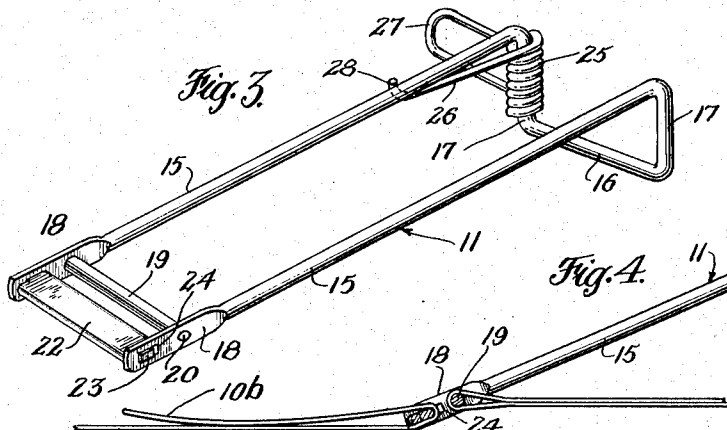


Fig. 4.

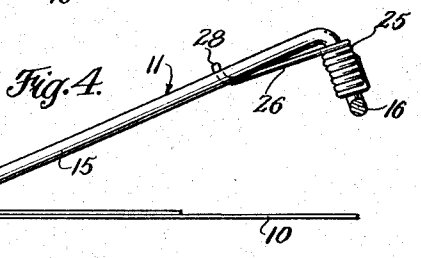


Fig. 5.

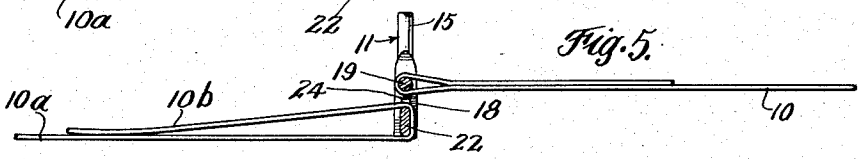


Fig. 6.

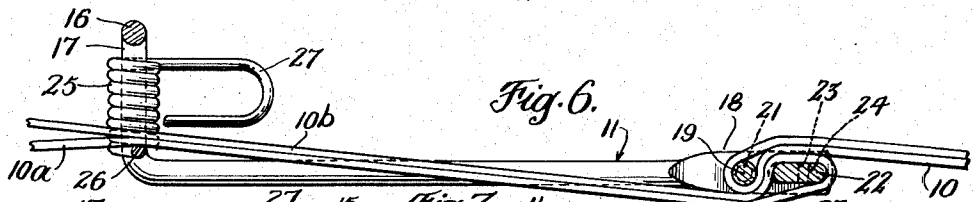


Fig. 7.

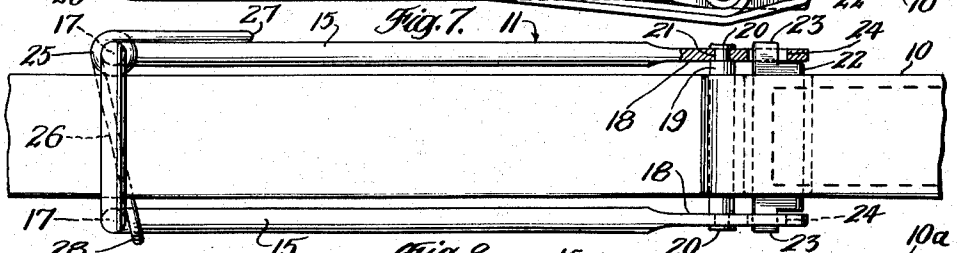
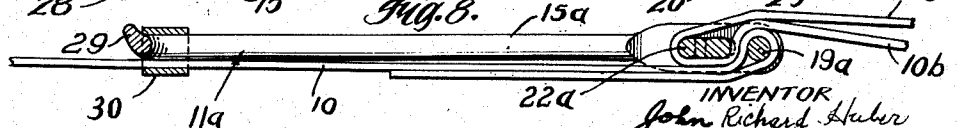


Fig. 8.



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STRAP CLAMP-DEVICE

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Application August 16, 1954, Serial No. 449,830

4 Claims. (Cl. 24—273)

This invention relates to improvements in strap adjustment and securing devices.

The present invention has as its primary object the provision of a strap assembly with an adjusting and securing device which is simplified not only in construction but in operation.

One of the objects of the invention is the provision of a simple frame terminal device having a strap anchoring bar and a second adjustably supported bar so related as to provide a secure positioning anchor for the strap with a simple swinging action of the frame through an angle not greater than 180 degrees and with minimum strap wrap around.

An additional object of the invention is the provision of a frame terminal device having an offset and arranged to allow easy adjustment to a position where the frame is retained in proper locked location. This offset frame construction includes provision for mounting a retention device for holding the frame in position adjacent the tensioned strap.

How the above objects and advantages are obtained will be clear from the following description of the drawings in which—

Figure 1 is a view showing one application of a strap assembly according to the present invention.

Figure 2 is a view showing another application for a somewhat different strap assembly.

Figure 3 is a perspective view to an enlarged scale of the strap securing fitting or frame.

Figure 4 is a sectional view showing the strap assembly in the first stage of the securing operation.

Figure 5 is a view similar to Figure 4 but showing the strap and frame in different relative positions with the frame in partly closed position.

Figure 6 is a view similar to Figures 4 and 5 drawn to an enlarged scale with the frame moved to closed position with the strap tightened and secured.

Figure 7 is a plan view of the assembly with the frame in closed position as in Figure 6.

Figure 8 is a view similar to Figure 6 showing a modified type of frame.

One manner in which the strap assembly may be used is to completely encircle miscellaneous articles as illustrated in Figure 1. With this arrangement one end of the strap **10** is anchored to the frame unit **11**. The other end of strap, after it has passed around the article or articles, is attached to the frame in the manner to be described below. The frame device is secured to retain the strap tightly in holding position.

A somewhat different arrangement of the device provides for tying down articles in the fashion illustrated in Figure 2. Such an arrangement might be used in connection with a car top platform, a truck, or the baggage compartment of an aircraft. In this instance, the articles to be secured are placed upon the base **12**. Strap **10** is provided with a securing hook **13** which may be attached to a ring **14** in the base **12**. The other end of strap **10** is permanently anchored to the tightening device **11**. Another strap **10***a* which includes a terminal hook **13** is then connected to the tightening unit **11** in the same fashion as in the case of the arrangement in Figure 1.

Referring to Figures 3 to 7 inclusive, it will be seen that the strap anchoring device **11** is constructed in the form of a frame having side rod portions **15** and end rod portion **16** constructed of a single continuous metal rod. The end **16** of the frame is located in a plane offset from the plane of sides **15** by bending the side frame members in the manner illustrated to produce connecting posts **17** between the end **16** and the side frame members **15**. The free ends of the side frame members **15** are flattened at **18** to provide for support of the strap connecting bars. Thus, a round bar **19** is supported between the ends **18** by means of trunnions **20** which extend through apertures **21** in the flattened portions **18**. The ends of trunnions **20** are riveted in position to securely fasten frame members **15** in fixed relationship. A second bar **22** is preferably shaped to provide a beam with greater depth than width. This shape will be clearly observed in Figures 4 to 6. The ends of beam **22** are provided with reduced extensions **23** which are also deeper than their width. A slotted aperture **24** in each of the flatted ends **18** provides for the support of bar **22** with extensions **23** projecting therein. Slot **24** is proportioned to fit the width of extension **23** but provides ample clearance for longitudinal movement of bar **22**. The elongated shape of extension **23** prevents relative rotation of bar **22** with respect to the frame structure. Bar **22** is also provided with rounded edges in order to prevent damaging the strap as it passes over it or when clamping pressure is applied.

From Figures 4, 5, 6, and 7 the strap assembly and the mode of operation will be clear. Here it will be seen that the strap **10** is passed around the bar **19** and stitched or otherwise fastened in position in a permanent fashion. With frame members **15** in the position shown in Figure 4, that is, with the main portion of the unit extending over the anchored end of the strap **10**, the opposite end of the strap **10***a* is then passed under the bar **22** and through the space between bars **22** and **19**. With extensions **23** of the bar **22** at the outer end of slot **24**, the space is ample to comfortably pass the strap between bars **19** and **22**. The end of strap **10***b* is then pulled through the unit until all slack has been removed from the strap. Holding the terminal end of the strap **10***b* in position against the tensioned or load carrying part of the strap **10***a* the unit **11** is then swung over through the position shown in Figure 5 to the position shown in Figure 6 where the main portion of the unit **11** lies over the adjusted end **10***a* of the strap. As will be clear the action of swinging the unit from the position in Figure 4 to the position in Figure **6** causes a further tightening in the strap due to the toggle or eccentric action produced by the relative motion of bars **19** and **22**. If too great a tension is being developed during this motion, the end of strap **10***b* may be released momentarily to permit the end **10***a* to slip back slightly through the slot between the bars. This will allow the completion of the movement of the unit **11** into position while maintaining the desired tension in the strap.

Reference to Figures 6 and 7 will show that the strap in adjusted and locked position moves bar **22** inwardly in its slot to a point where pressure is applied on the portion of the strap **10***b* where it passes around bar **22**. This position also produces displacement of the strap **10** near the point where it passes around the bar **19** so that the two straps are forced intimately together at this location between bars **19** and **22**. In view of the fact that most of the pressure is applied to the strap **10***a* after it has passed around the bar **22**, the pressure required to produce non-slipping action at the bar **22** is greatly

reduced over what would be required if direct clamping action were applied at a point with full tension of strap **10***a*. By this construction positive holding qualities are developed in the device without damage to the strap and with a minimum amount of wrap around of the strap parts. It will be noted that each end **10** and **10***a* of the strap assembly wraps around its bar only approximately 180 degrees with an additional slight offset displacement caused by the swinging of bar parts **19** and **22** into line. This construction therefore eliminates a bulky strap wrap in the unit. It will be noted that in the position shown in Figures 6 and 7 guide terminals **23** of beam **22** still have clearance in slot **24** so that full tension in the strap **10***a* is available for applying pressure between the strap parts where they pass through the slot between bar **19** and bar **22**. In this position and with the tension applied, the space between the two bars is less than two thicknesses of strap since under load the strap is compressed to some extent.

In order to hold unit **11** in it adjusted position, the tension portion of strap **10***a* is raised slightly so that the strap passes between rod portions **17**. In this position the retention device **25** may be rotated so that rod **26** passes under strap **10***a*, thus preventing unit **11** from swinging away from the end **10***a* toward open position. In this fashion the unit is held in securely tensioned position until the strap is released by swinging rod **26** out of position to permit unit **11** to be rotated back into the position shown in Figure 4 for release of the strap. It will be noted that the retention device **25** is in the form of a coiled wire member which extends around one of the upright post members **17**. One end of device **25** is formed into a loop **27** which serves as a handle for pivoting the unit around on rod **17** while the other end of part **25** extends to form the retention rod **26**. It will be noted that rod **26** has a slight curved portion **28** at its end so that it springs over rod **15** when in the position shown in Figure 6 thereby preventing accidental displacement from the locked position. The spring action in the rod **26** is further supplemented by the tension in strap **10***a* to securely hold unit **11** in locked position.

Figure 8 shows a modified form of the frame device in which the side rods **15***a* are not offset but are provided with a slight projection **29**. Slide **30** which may be moved along strap **10** into the position shown serves to hold the unit **11***a* in tightened position as illustrated. The main difference in the construction of unit **11***a* as compared with unit **11** of the form shown in the previous figures is in the relationship of the strap bars. The positions of the fixed and movable bars are reversed. Thus fixed bar **19***a* is located at the outer end of rods **15***a* while movable bar **22***a* is located inwardly. With this arrangement the fixed or sewn end of strap **10** is anchored to the outer bar **19***a*. The tensioned side of the strap is shown at **10***a* and the unloaded or unused portion of the strap at **10***b*. With this arrangement of parts the frame unit **11***a* swings over the fixed end of strap **10** when in tightened position to permit the slide **30** to be moved into position. The same advantageous tightening and holding action is obtained with this form. The tension in strap **10***a* pulls the movable bar **22***a* toward the strap clamping position and provides adequate holding capacity without damage to the strap and with a minimum amount of wrap around of the strap with respect to the cross bars.

From the foregoing it will be clear that I have provided an improved and simplified strap tightening and holding mechanism. The simplified frame consists chiefly of a single rod bent to proper shape with its ends flattened. The strap bar construction with the floating beam member assures positive holding characteristics with a minimum amount of strap distortion. Shaping the rod type frame with the end offset and supported in this position by perpendicular portions of the rod provides for simple mounting for the fitting retention device which can be quickly placed in position on the strap without the need for twisting it from its straight line pulling position. The locking device is formed from a single length of wire which is pivotally mounted on the rod frame without the need for additional structural parts.

I claim:

1. An adjustable strap assembly having a strap member and a securing frame, two sides and one end of the frame being formed from a continuous length of rod, the other end of the frame having a pair of transverse bars supported between the sides, one end of said strap member being looped around the inner of said bars and anchored thereto, the side rod portions of said frame being bent near the end thereof to locate the rod end in offset relation from but parallel to the plane of the side rods, said bent parts of the side frame being substantially normal to the longitudinal side rods, and a retention latch formed from wire having a portion helically wrapped around one of the bent parts of the side frame to form a pivoting member, a portion of the wire being bent to form a loop handle and another portion extending tangentially from the helical portion, said last portion being swingable into position across the sides of the frame to hold the frame in adjusted position on the strap.

2. An adjustable strap assembly having a strap member and a securing frame, two sides and one end of the frame being formed with a continuous length of rod, the other end of the frame having a pair of transverse bars supported between the sides, one end of said strap member being looped around the inner of said bars and anchored thereto, the side rod portions of said frame being bent near the end thereof to locate the rod end in offset relation from but parallel to the plane of the side rods, and a pair of transverse bars supported between said sides in close proximity to each other, one of said bars being movably supported to allow slight motion toward or away from the other bar, the bent parts of the side frame being substantially normal to the longitudinal side rods, and a frame retention latch movably supported on one of the bent parts of the frame.

3. An adjustable strap assembly having a strap member and a securing fitting shaped to form an elongated integral handle, said fitting having a pair of slotted side frame members, two cross bars consisting of an inner and an outer bar mounted at one end of said frame members, one end of the strap being secured to the inner of said cross bars, one of the cross bars being rigidly supported, and the other bar being movably supported in said slots for motion toward and away from the fixed cross bar, the strap assembly having an open position with the bars separated and the strap freely adjustable, the strap member being adapted to be passed beneath, around and over the outer bar so that a terminal end of the strap member overlies a load carrying portion thereof, whereby when the assembly is rotated through an angle of approximately 180 degrees the movable bar moves toward the rigidly attached bar and simultaneously shortens the strap and clamps two strap thicknesses therebetween.

4. A strap assembly in accordance with claim 3 in which the inner of said bars is rigidly supported.

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