Oct. 31, 1961 E. C. ELSNER Re. 25,069

WEB-TENSIONING BUCKLE

Original Filed Dec. 17, 1956 2 Sheets-Sheet 1

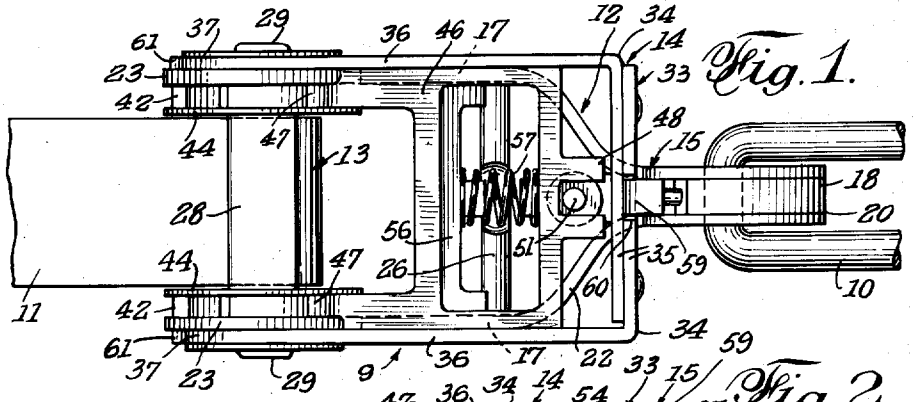


Fig. 1.

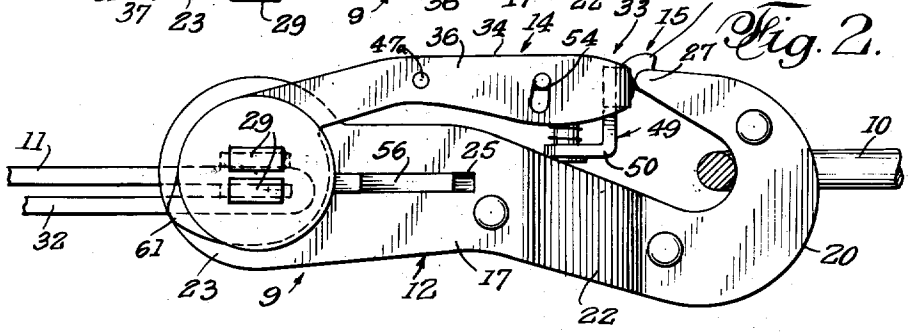


Fig. 2.

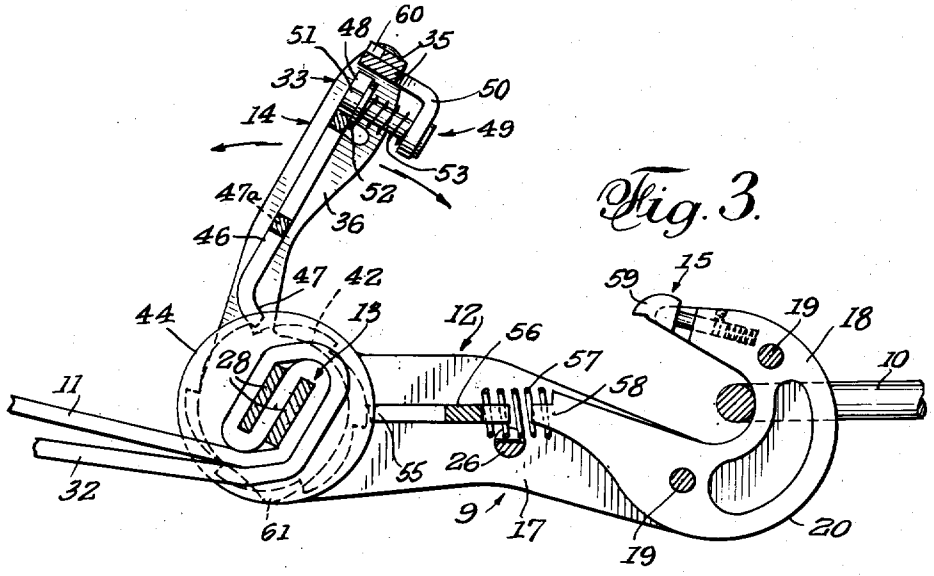


Fig. 3.

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Fig. 4.

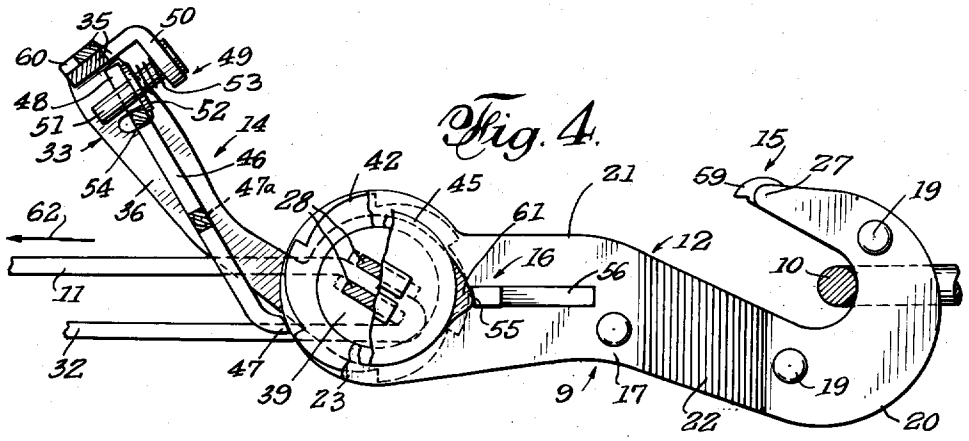


Fig. 5.

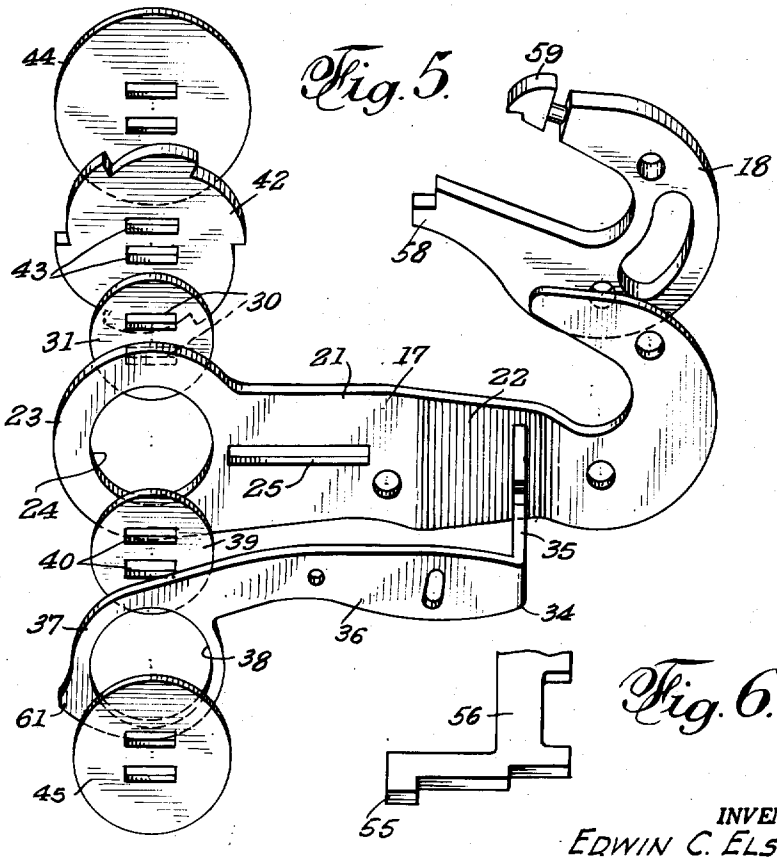


Fig. 6.

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WEB-TENSIONING BUCKLE

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Original No. 2,874,431, dated Feb. 24, 1959, Ser. No. 628,771, Dec. 17, 1956. Application for reissue June 6, 1960, Ser. No. 34,348

11 Claims. (Cl. 24—77)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to a web-tensioning buckle and has for an object to provide a buckle embodying manually-operable means for increasing the tension or tautness of a web or strap, the same having a power advantage that enables the application of forces far greater than can be obtained by manual pull on the web or strap.

Another object of the invention is to provide a buckle of the character indicated that may be latched to insure retention of the tautness of the web or strap.

A further object of the invention is to provide a web-tensioning buckle that has a tautening range of operation, a locked or latched position at one side or end of said range of operation, and a release position on the opposite side or end of said range.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

FIG. 1 is a plan view of a web-tensioning buckle according to the present invention.

FIG. 2 is a side elevational view thereof in latched position.

FIG. 3 is a longitudinal sectional view showing said buckle in the position thereof during a web-tensioning operation.

FIG. 4 is a partial side elevational and partial longitudinal sectional view showing said buckle in release position.

FIG. 5 is a perspective view of the parts comprising one side of the buckle, the parts on the opposite side being shown in exploded or separated relationship.

FIG. 6 is a broken perspective view of an element of the buckle.

The present buckle **9** is shown as connecting a tension-receiving member such as a loop or eye **10** and a strap **11**. The loop or eye is exemplary of any non-adjustable connection means and may comprise a strap loop or the like. The strap **11** may be woven in the flat form shown of nylon webbing or comparable material. Regardless how otherwise made, the strap **11** is preferred to be of such pliability as to be foldable on itself in fairly tight folds or convolutions.

The buckle **9** that is illustrated comprises, generally, a frame **12**, web connection means **13** spanning across the frame, means **14** for operating the means **13** to increase tension or tautness in a web or strap **11** connected to said means **13**, means **15** to latch the means **14** to the frame to hold the tension produced by the means **14**, and means

16 for effecting release of the tautened web, when the same is desired.

The frame **12** is shown as formed of sheet metal side pieces **17** between which is disposed a filler piece **18**, rivets **19** permanently connecting said pieces to form a strong hook **20** at one end of the frame.

The side pieces **17**, at the opposite end, are transversely spaced to form frame sides **21**, transition sloping portions **22** connecting said frame sides **[22]** *21* and the parts of the pieces **17** that are directly connected to the filler piece. Formed in this manner, the frame **12** is generally Y-shaped in plan with the hook **20** comprising the leg and the sides **21** of the arms.

The ends **23** of the frame sides **21** are rounded, as in FIG. 5, a large central and circular hole **24** being formed in each said end. The sides **21** are shown as provided with slots **25** that extend from spaced relation to the holes **24** toward the hooks **20**.

The frame may be strengthened by means of a cross pin **26** between the frame sides **21**, the same being so located as to resist convergence of said frame sides under tension or pull between hook **20** and the opposite end of the frame. The loop **10** is connected with said hook as by passing the same over the open end **27** of the latter.

The web-connection means **13** comprises a pair of plates **28**, the same being arranged in spaced parallel relation to accommodate between them the strap **11**, said plates being provided with end tongues **29** that are narrower than the plates themselves. Said tongues are entered in slots **30** provided in discs **31** which fit into the mentioned holes **24** in the arms **21** of the buckle frame. Thus, the plates **28** may rotate together with the discs **31** in the bearings afforded by said holes **24**.

It will be understood that the web **11**, after being passed through the space between the connection plates **28**, is doubled back to form an end **32**. Assuming the strap or web **11** to be engaged over cargo with its opposite end fastened down or even looped back and connected to eye **10**, a pull on the end **32** will tauten said web only to the degree of manual force that may be applied by such pull. In the present case, it is intended that end **32** be held, whether or not the same is being tensioned, while the means **14** is being manipulated.

Said means **14** comprises an arm **33** that is formed of substantially similar arm parts **34** that are connected by transverse ends **35** thereof in a rectangular arrangement in which the sides **36** of said arm parts terminate in round portions **37** that have holes **38** similar to and aligned with the bearing holes **24** in the frame sides **21**.

Said arm **33** constitutes a member that is adapted to be oscillated around discs **39** that are similar to discs **31** and have the plate tongues **29** extending through the slots **40** therein.

The means **14** further includes a ratchet wheel **42** disposed inward of each disc **31** and, therefore, inward of each frame end **23**, the same being provided with slots **43** through which the mentioned plate tongues **29** project. Inner discs **44** and outer discs **45**, each slotted for said tongues **29**, enclose the assembly, on each side, of ratchet wheel **42**, discs **31** and **39** and the frame and crank arm portions **23** and **37**, respectively. The tongues are peened or swaged over the discs **45** to maintain the assembly.

Another component of the means **14** is a pawl frame **46** that is carried between and by the arm sides **36**, as may be seen in FIG. 1, by pivots **47a**. Said pawl frame, at one end, is provided with a drive pawl **47** engaged with the teeth of each ratchet wheel **42** and, at the other end, with a bifurcation **48** that is engaged by spring-biased means **49**. The latter means is shown as a bracket **50** provided on one of the ends **35** of the arm parts **36**, a pin **51** carried by said bracket and extending into the

bifurcation **48**, a disc or washer **52** slidably carried on said pin beneath the bifurcation, and a spring **53** biasing said washer and the bifurcated end of pawl frame **46** in a direction to hold pawls **47** into engagement with the teeth of ratchet wheels **42** and allowing frame **46** to ratchet with respect to said teeth.

The ratcheting movement of the frame **46** is limited by a pin and slot connection **54** between said frame and each part **34** of arm **33** to hold said pawl frame generally within the confines of the arm.

It will be understood that, as the arm **33** is cranked back and forth, the ratchet wheel **42** will be intermittently advanced, causing intermittent rotation of the web-engaging plates **28**. If the end **32** of said web is held reasonably taut, such rotation or winding up of the web-connection means **13** will cause the same to build up, as in FIG. 3, to, thereby, increase the tension on web **11**, accordingly.

Such ratchet-tautening of the means **13** is retained by a dog **55** which is provided on each side of a dog plate **56**. Said plate is guided in the slots **25** of the buckle frame and is biased into ratchet-holding position by a spring **57** that is carried by an extension **58** of the filler piece **18**.

The arm **14** is held releasably latched, when not in use as a web tautener, by means **15**, the same closing the otherwise open hook **20**, as best seen in FIG. 2. Said means **15** is shown as a spring-biased latch **59** on the open end **27** of said hook, the same being biased in a direction to snap into engagement with a shoulder **60** on the arm, when the latter is moved to its down or closed position, as in said FIG. 2. Manual retraction of latch **59** frees said arm **14** for web-tautening cranking oscillation, as above described.

Since dogs **55** hold the tautened position, the arm may be moved to close position after its last tensioning stroke. With the arm **14** latched, this condition is maintained until increased tensioning is desired, in which case the above procedure is repeated, or until it is desired to release the tension on web **11**. In the latter case, the arm is released and swings back to the position of FIG. 4 to bring the means **16** into operation. Said latter means comprises a projection **61** on each arm portion **37**, said projections being so located, angularly, that, during the normal cranking movement of the arm, the same do not achieve engagement with the dogs **55**. However, as seen in FIG. 4, upon swinging the arm further back that, normally, the projections **61** engage dogs **55** and cam the latter away from engagement with the ratchet teeth. Now, the tension force on web **11** pulls in the direction of arrow **62** to unwind the wound-up web on the means **13**. Since pawl frame **46** is in ratchet-teeth engagement, manual pressure on the bifurcated end thereof will serve to free the pawls **47** from the ratchet teeth, this release position being shown in FIG. 4. Thus released, the buckle and web **11** may be separated or the hook of the buckle may be removed from connection with loop **10**.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A web-tensioning buckle comprising a frame provided with an end adapted to be connected to a tension-receiving member, an open hook on the frame to which the tension-receiving member is connected, web-connection means carried by the other end of said frame, manually-operable means carried by the frame to intermittently rotate the web-connection means to foreshorten the web connected therewith and to increase the tension thereon relative to the tension-receiving member, said hook and the manually-operable member cooperating to constitute enclosed means confining the tension-receiving member, means to releasably latch said manually-operable means in non-operating condition, said latch means inter-engaging the open end of said hook and the manually-operable member, and means to disconnect the web-connection means from the manually-operable means to allow the stored-up force of the tension on the web to move the web-connection means to tension-released position, the last-mentioned means being operable only upon release of the latch means.

2. A web-tensioning buckle comprising a frame provided with an end adapted to be connected to a tension-receiving member, web connection means carried by the other end of said frame, manually-operable means carried by the frame to intermittently rotate the web-connection means to foreshorten the web connected therewith and to increase the tension thereon relative to the tension-receiving member, said manually-operable means comprising a crank arm, ratchet means operated by said arm, and a releasable dog to hold the ratchet means during recovery movement of the arm, said releasable dog being engaged by a portion of the crank arm to effect disconnection of the web-connection and manually-operated means, means to releasably latch said manually-operable means in non-operating condition, and means to disconnect the web-connection means from the manually-operated means to allow the stored-up force of the tension on the web to move the web-connection means to tension-released position, the last-mentioned means being operable only upon release of the latch means.

3. In a web-tensioning buckle, a crank, a crank-operated ratchet wheel, web-connection means intermittently rotated with the ratchet wheel during reciprocative movements of the crank to wind up a web on the connection means, means to latch the crank to non-operating position, dog means to hold the wound-up tension on the connection means, and means on the crank to release said dog means.

4. In a web-tensioning buckle, a crank, a crank-operated ratchet wheel, web-connection means intermittently rotated with the ratchet wheel during reciprocative movements of the crank to wind up a web on the connection means, means to latch the crank to non-operating position, dog means to hold the wound-up tension on the connection means, and an offset camming surface rigidly mounted on the crank to free the dog means and release the wound-up tension.

5. A web-tensioning buckle comprising a frame having a hook at one end, a rotational bearing at the other end, web-connection means rotationally carried by said bearing, a ratchet wheel affixed to the connection means, an arm rotationally carried by said bearing and movable in an arc toward and from the frame hook, a pawl carried by the arm to intermittently rotate the ratchet and the web-connection means, a dog carried by the frame to retain the rotated position during recovery movement of the arm and pawl, and means to latch the free end of the arm to the hook to close the latter.

6. A web-tensioning buckle comprising a frame having a hook at one end, a rotational bearing at the other end, web-connection means rotationally carried by said bearing, a ratchet wheel affixed to the connection means, an arm rotationally carried by said bearing and movable in an arc toward and from the frame hook, a pawl carried by the arm to intermittently rotate the ratchet and the web-connection means, a dog carried by the frame to retain the rotated position during recovery movement of the arm and pawl, means to latch the free end of the arm to the hook to close the latter, and means carried by said arm and movable, upon movement of the arm to a position beyond its normal cranking movement positions, to release the dog and, therefore, the ratchet wheel and the web-connection means.

7. A web-tensioning buckle comprising a frame provided with an end adapted to be connected to a tension-receiving member, web connection means carried by the other end of said frame, manually-operable means carried by the frame to intermittently rotate the web-connection means to foreshorten the web connected therewith, to increase the tension thereon relative to the tension-receiving member, and to clamp the web in tension, said manually-operable means comprising a crank arm, ratchet means operated by said arm, and a releasable dog to hold the ratchet means during recovery movement of the arm, said releasable dog being engaged by a portion of the crank arm to effect disconnection of the web-connection and manually-operated means, and means to disconnect the web-connection means from the manually-operated means to allow the stored-up force of the tension on the web to move the web-connection means to tension-released position.

8. A buckle for use in tensioning and clamping in tensioned relation adjacent web ends comprising a frame provided with an end adapted to be connected to a tension-receiving member, web-connection means carried by the other end of said frame, said web-connection means comprising a pair of plates arranged in spaced parallel relation to accommodate therebetween a length of web and including means for positioning and laterally confining said length of web on said plates, manually-operable means carried by the frame to intermittently rotate the web-connection means to foreshorten the web connected therewith, increase the tension thereon relative to the tension-receiving member, and clamp said web in tension, said manually-operable means comprising a crank arm, ratchet means operated by said arm and a releasable dog to hold the ratchet means during recovery movement of the arm, said releasable dog being engaged by a portion of the crank arm to effect disconnection of the web-connection and manually-operated means, and means to disconnect the web-connection means from the manually-operated means to allow the stored-up force of the tension on the web to move the web-connection means to tension-released position, whereby adjacent web ends may be successively tensioned relative to each other, clamped in tensioned condition and released from clamped and tensioned condition.

9. The buckle of claim 8 wherein said means for positioning and laterally confining said length of web on said plates comprises a pair of discs lying in substantially parallel relation to each other and spaced apart from each other a distance approximately equal to the width of said web.

10. A buckle for use in tensioning adjacent web ends and clamping said web ends in tensioned condition, comprising a frame having substantially parallel side members and ends, a tension-receiving member adjacent one end of said frame, web-connection means adjacent the other end of said frame, said web-connection means comprising a pair of plates rotatably mounted transversely of said side members of said frame and in spaced parallel relation to accommodate therebetween a length of web, ratchet means carried by said plates, means for positioning and laterally confining said length of web on said plates, a U-shaped crank arm including legs pivotally mounted at the free ends thereof on said side members of said frame, a pawl disposed generally between the legs of said crank arm and pivotally secured thereto at a point on said pawl which lies between a ratchet-engaging end thereof and an actuating end thereof for selectively connecting and disconnecting said web-connection means and said crank arm, and a releasable dog to hold said ratchet means during recovery movement of said crank arm, said releasable dog being engageable by a cam surface formed on said crank arm in one position of said crank arm to release said web-connection means.

11. A buckle as defined in claim 10 wherein said releasable dog is transversely mounted between said side members of said frame for guided sliding movement longitudinally thereof, said dog being spring-urged into releasable engagement with said ratchet means.

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