June 2, 1953 W. C. WEIMER 2,640,242

ADJUSTABLE BUCKLE FOR THE BODY OF ARTIFICIAL LIMBS

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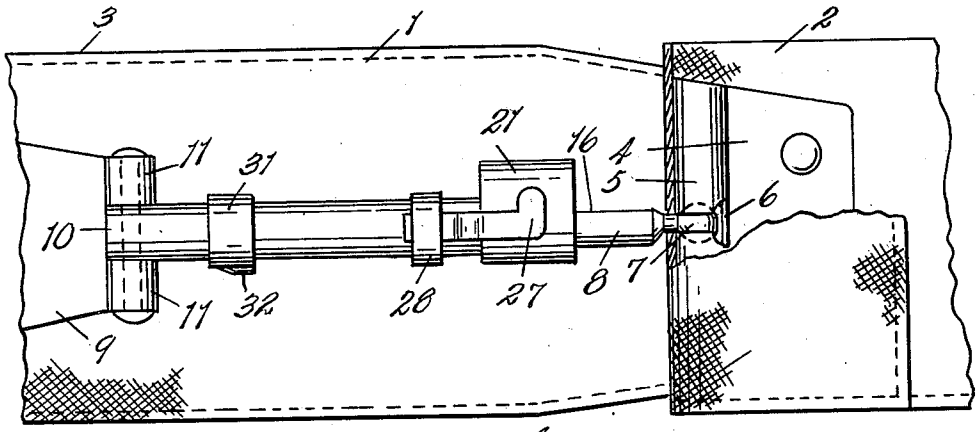


FIG. 1

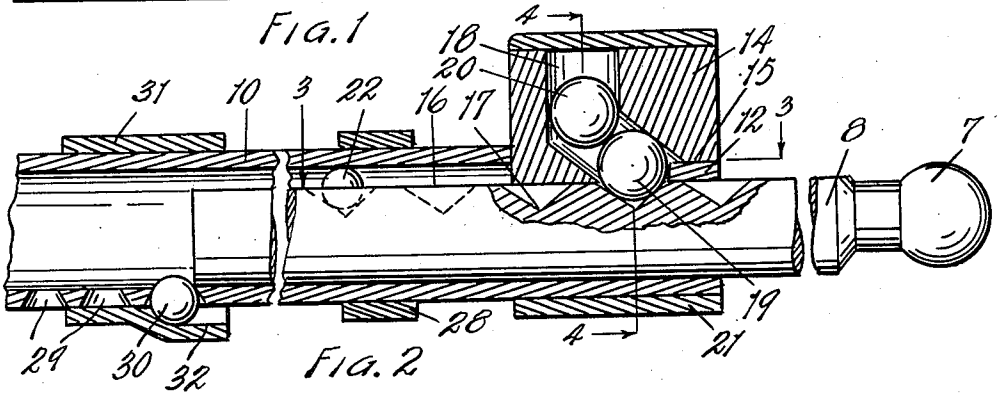


FIG. 2

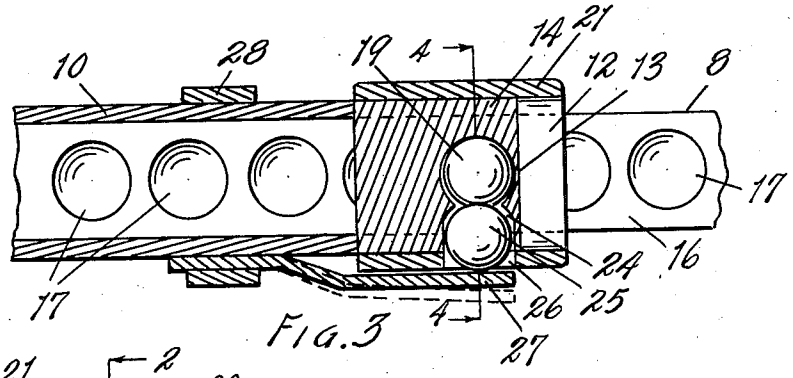


FIG. 3

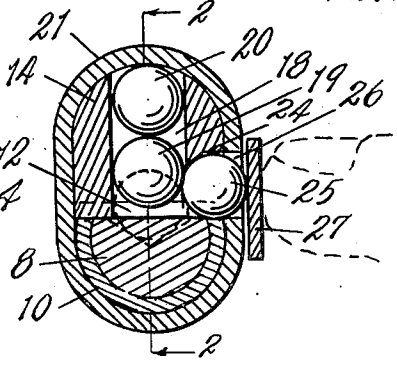


FIG. 4

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ADJUSTABLE BUCKLE FOR THE BODY OF ARTIFICIAL LIMBS

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5 Claims. (Cl. 24—206)

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This invention relates to improvements in adjustable buckle for the body belt of artificial limbs.

The principal objects of this invention are:

First, to provide a buckle for joining the ends of the body belt of an artificial limb which buckle permits easy adjustment of the tightness of the belt with only inconspicuous movements of the wearer.

Second, to provide a belt buckling device which is readily adjustable between a tightened and loosened position and in which the limits of adjustment can be readily changed at periodic intervals to accommodate the desires of the user.

Third, to provide a buckle arranged to be worn beneath the outer clothing of the user for securing the body belt of an artificial limb which buckle can be easily adjusted through the clothing and without resorting to conspicuous movements.

Fourth, to provide an adjustable buckle having a ball lock for limiting the extension of the buckle and a release ball for holding the lock in disengaged position for extending the buckle.

Other objects and advantages relating to details of my buckle will be apparent from a consideration of the following description and claims.

The drawings, of which there is one sheet, illustrate a preferred form of the buckle.

Fig. 1 is a fragmentary front elevational view of the ends of a body belt joined together by my buckle.

Fig. 2 is a fragmentary, enlarged vertical cross sectional view through the buckle taken along the plane of the line 2—2 in Fig. 4.

Fig. 3 is a fragmentary horizontal cross sectional view through the buckle taken along the plane of the line 3—3 of Fig. 2.

Fig. 4 is a transverse cross sectional view through the buckle taken along the planes of the lines 4—4 in Figs. 2 and 3.

My buckle is designed, as indicated in the objects, for use on the body belts of artificial limbs. A great many users of artificial limbs require a relatively heavy body belt to attach the artificial limb to the stumps of the wearer and in the past these belts have been capable of adjustment only when they are put on. In other words, when the wearer adjusts the belt in the morning the belt must stay at that tension throughout the day unless the wearer should go to the trouble of removing the outer clothing and making a new adjustment. This construction of body belts is uncomfortable and undesirable in that different

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tensions of the belt are desirable as the wearer assumes different positions. For instance, when a person with an artificial leg is walking he wants the belt tight for adequate control and foundation for the artificial limb. On the other hand, when the wearer is sitting down the belt becomes too tight and unnecessarily uncomfortable. My buckle permits the wearer to adjust the tension of his belt by simple unobtrusive movements and without opening or removing the outer clothing.

In Fig. 1 I have illustrated portions of a body belt 1 including what may be referred to as the free end 2 and the fixed end 3. The free end carries a female socket fixture 4 consisting of a plate with a tubular fold 5. The fold 5 is cut away as at 6 to receive the ball-like head 7 of a stud 8 and hold the head against release when the belt is tightened.

The fixed end 3 of the belt is secured to a relatively heavy plate 9 which forms a base for the artificial limb of the wearer. However, the plate is not an essential feature of my invention and may be dispensed with with some types of artificial limbs. Secured to the plate 9 or other portions of the fixed end of the belt is a tubular member 10 which forms the body of my buckle. In the example illustrated the fixed end of the tube 10 is pivotally pinned between the ears 11 formed on the end of the plate 9.

The outer or swinging end of the tube 10 is flattened across the top as at 12 and the upper half of the tube is cut away or notched behind the flat portion as at 13 to receive a locking block 14. The block 14 is the same width as the tube 10 and is notched on its lower outside corner as at 15 (see Fig. 2) to fit over the flattened portion 12 of the tube. The under surface of the locking block 14 and the flattened portion 12 are approximately flush and form a surface engageable with the top of the stud 8. The stud has a cylindrical surface fitting within the tube but is flattened as at 16 to non-rotatably slide underneath the block 14.

The flattened surface 16 of the stud is provided with a series of recesses or depressions 17 and the locking block 14 defines an angular passage 18 opening at the bottom of the block to the top of the stud and the recesses 17. Positioned within the passage 18 is a locking ball 19 superimposed by a loading ball 20. From a consideration of Fig. 2 it will be apparent that the locking ball 19 will be urged by its own weight and the weight of the loading ball 20 downwardly in the passage 18 and into whichever recess 17 of the stud is

located at the lower end of the passage. Any tendency to withdraw the stud from the tube and thus lengthen the buckle results in the locking ball being pressed against the top inclined surface of the passage 18 thus resisting release of the stud. If the stud is pressed inwardly of the tube to tighten the buckle the forward or outer surface of the recess 17 will force the locking ball 19 and loading ball 20 upwardly in the passage 18 and permit the stud to move inwardly of the tube as far as is desired.

The locking block 14 is releasably retained on the tube 10 by means of an oval sleeve 21 removably securing the block and tube by means of a friction fit. The sleeve also holds the loading ball 20 and locking ball 19 within the passage 18. The stud is selectively limited in its outward movement from the tube by an out-limit ball 22 positioned in one of the inner recesses 17 in the stud and engageable with the inner edge of the locking block 14. The position of the out-limit ball 22 can be selectively changed at periodic intervals by dismantling the sleeve 21 and block 14 to locate the out-limit ball in a different recess.

In order to selectively release the locking ball 19 when it is desired to extend the stud and loosen the belt, the front wall of the locking block 14 forms a passage 24 opening to the bottom of the angular passage 18. A release ball 25 is positioned in the passage 24 and the sleeve 21 forms a hole 26 through which the outer edge of the release ball projects. In the locked position of the locking ball 19 the release ball 25 is pressed outwardly of the passage 24 and is protected against accidental actuation by a spring finger 27 secured to the tube by the band 28. To release the buckle and belt from their tightened position it is only necessary for the wearer to momentarily contract his body muscles and tighten the belt slightly by pressing against its sides. This forces the stud 8 inwardly of the tubular member 10 and thus forces the locking ball 19 out of its recess 17. The wearer then presses inwardly on the spring finger 27 and release ball 25 to hold the locking ball in inoperative position. The wearer can then expand his body muscles to enlarge the belt and draw the stud outwardly to the extent possible determined by the out-limit ball 22. It will be noted that the spring 27 can be easily operated through the outer clothing of the wearer without conspicuous movement and without opening or removing of the wearer's clothing.

In order to selectively determine the inner limit of the stud 8 and therefore the normal tightness of the belt in its tightened position the bottom wall of the tube 10 is provided with a series of holes 29 near its inner or fixed end and an inner limit ball 30 is removably secured in one of these holes by the sleeve 31. The sleeve 31 is provided with a wedge shaped offset 32 so that the sleeve can be periodically slid back and the position of the ball 29 changed to vary the tightness of the belt. The ball 30 projects into the tube to be engaged by the inner end of the stud 8 as will be readily appreciated.

From the foregoing description it should be apparent that my buckle can be selectively adjusted for operation between the inner and outer limits according to the changing desires of the wearer of the belt. The buckle is further adjustable between these inner and outer limits without dismantling the buckle and without opening or removing the outer clothing of the wearer. When the wearer rises from a sitting position in which the belt has been released to a

loosened position the wearer has merely to press the sides of the belt to force the stud into the tube and tighten the belt as desired. This tightening operation may extend completely to the inner-limit ball 30 or to any intermediate position determined by the recesses 17. When the wearer releases the belt the buckle automatically locks in the closest recess 17. When the wearer again sits down and desires to loosen the belt he has merely to unlock the locking ball as described previously and permit the buckle and belt to expand.

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

1. A buckle comprising an anchor member adapted to be carried by one end of a belt, a tubular member adapted to be pivotally secured to the other end of said belt, a stud slidable in said tubular member and having its outer end engageable with said anchor member, said stud having a flattened upper surface with a series of depressions formed therein, the top of said tubular member being notched down to the level of said flat surface adjacent to the outer end of said tubular member, the band of said tubular member at the outer side of said notch being flattened against the top of said stud, a locking block having a notched under surface fitting within the notch in said tube and lapped upon said band, said block defining an inwardly and upwardly inclined angular passage opening at the bottom to the flat surface of said stud, a means removably securing said block to said tube, a locking ball positioned in said angular passage and engageable with said recesses in said stud, said locking block having a forwardly opening passage therein, a releasing ball positioned in said forwardly opening passage and engageable through the inner end thereof with said locking ball, a spring finger overlying said releasing ball on the outside of said block, an out-limit ball selectively positioned in an inner recess of said stud and engageable with the inner edge of said locking block within said tubular member to limit outward movement of said stud, the end of said tubular member toward the pivotal support therefor having a longitudinally disposed series of openings formed therein, an in-limit ball selectively positioned in one of said openings and engageable with the inner end of said stud, and a second sleeve wedgingly and releasably securing said in-limit ball in position.

2. A buckle comprising an anchor member adapted to be carried by one end of a belt, a tubular member adapted to be pivotally secured to the other end of said belt, a stud slidable in said tubular member and having its outer end engageable with said anchor member, said stud having an upper surface with a series of depressions formed therein, the top of said tubular member being notched adjacent to the outer end thereof, a locking block having an under surface fitting within the notch in said tube, said block defining an inwardly and upwardly inclined passage opening at the bottom to the surface of said stud, a means removably securing said block to said tube, a locking ball positioned in said passage and engageable with said recesses in said stud, said locking block having a forwardly opening passage therein, and a releasing member positioned in said forwardly opening passage and engageable through the inner end thereof with said locking ball.

3. A two piece extensible coupling comprising

a tubular member and a stud axially slidable in said tubular member, said stud and said tubular member being adapted to be secured at their opposite ends to two parts to be connected, said stud having an upper surface with a series of depressions formed therein, a block element on said tube and lapped upon said stud, said block defining an inwardly and upwardly inclined passage opening at the bottom to the surface of said stud, a locking ball positioned in said passage engageable with said recesses in said stud, said block having a forwardly opening passage therein, a releasing member positioned in said forwardly opening passage and engageable through the inner end thereof with said locking ball, a spring finger overlying said releasing member on the outside of said sleeve, and an outlimit ball selectively positioned in an inner recess of said stud and engageable with the inner edge of said block within said tubular member to limit outward movement of said stud.

4. A two piece extensible coupling comprising a tubular member and a stud axially slidable in said tubular member, said stud and said tubular member being adapted to be secured at their opposite ends to two parts to be connected, said stud having an upper surface with a series of depressions formed therein, a block element on said tube, said block defining a passage inclined upwardly away from the outer end of said stud and opening at the bottom to the surface of said stud, a locking ball positioned in said passage engageable with said recesses in said stud, said block having a forwardly opening passage therein, and a releasing member positioned in said forwardly opening passage and engageable through the inner end thereof with said locking ball.

5. An extensible coupling comprising telescopically slidable inner and outer members, said members being adapted at their opposite ends for connection to parts to be connected, said inner member having a series of locking recesses formed in its surface and spaced longitudinally therealong, means on said outer member forming a passage opening closely adjacent to said recesses, said passage being inclined downwardly away from said pivotal connection, a locking member movable in said passage into and out of engagement with said recesses, said locking member being lockingly engageable between one side of said recesses and the upper side of said passage to resist extension of said inner and outer members but being movable outwardly of said passage by the other sides of said recesses on inward telescoping motion of said inner and outer members, and means extending through said outer member and manually actuatable from the outside thereof for holding said locking member out of engagement with said recesses during extension of said inner and outer members.

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