Sept. 29, 1953 E. C. ELSNER 2,653,365

BUCKLE WITH SWINGABLE RELEASE MEMBER

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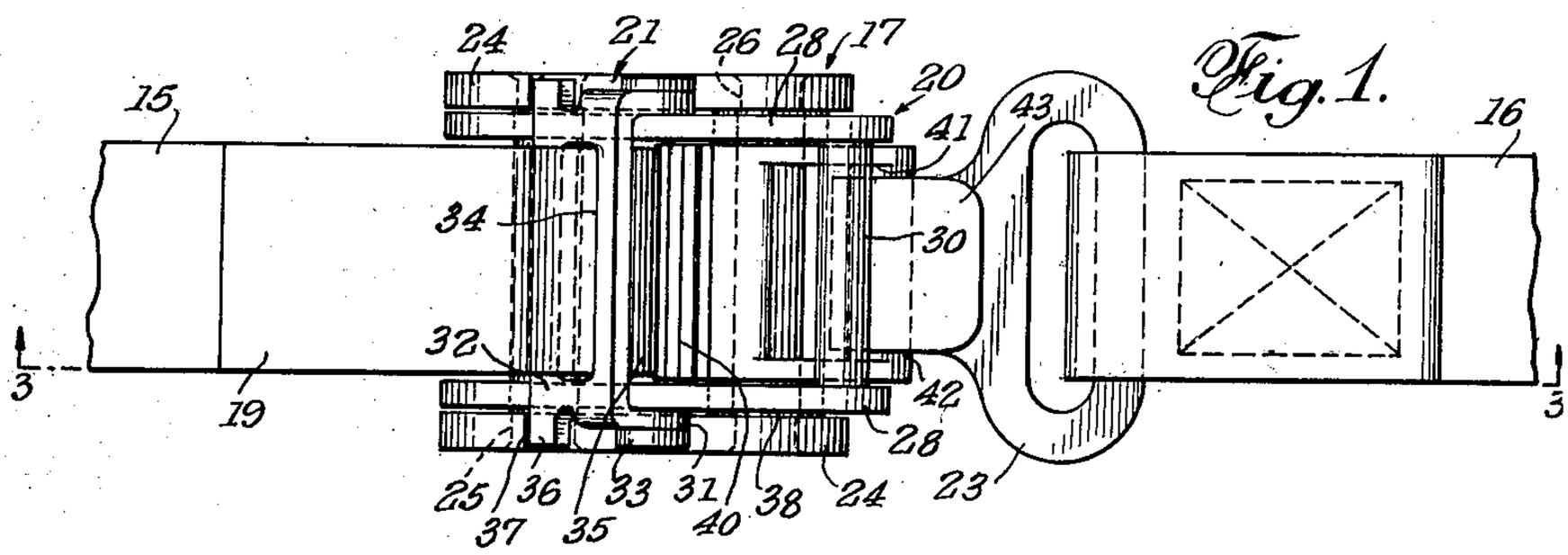

Fig. 1.

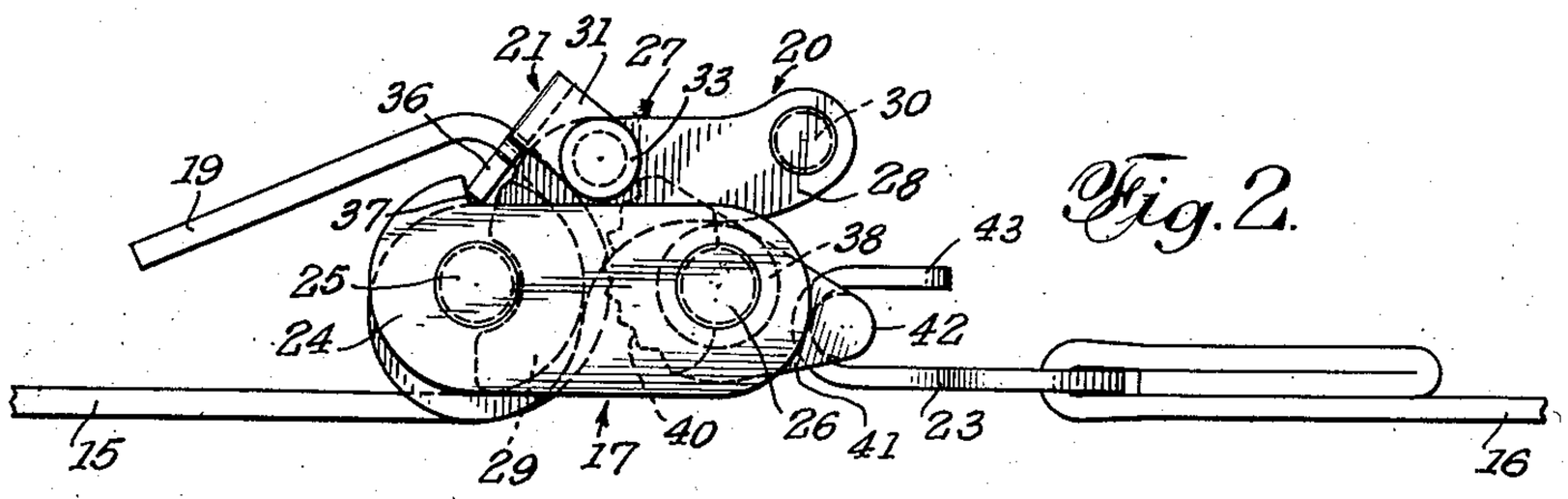

Fig. 2.

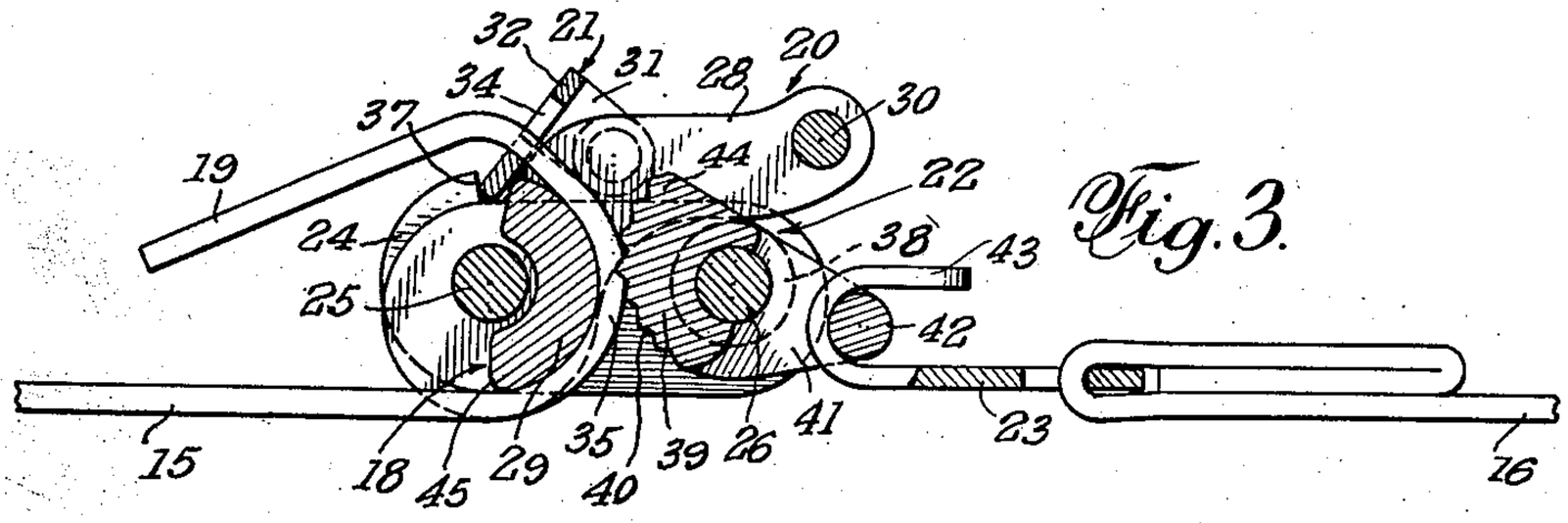

Fig. 3.

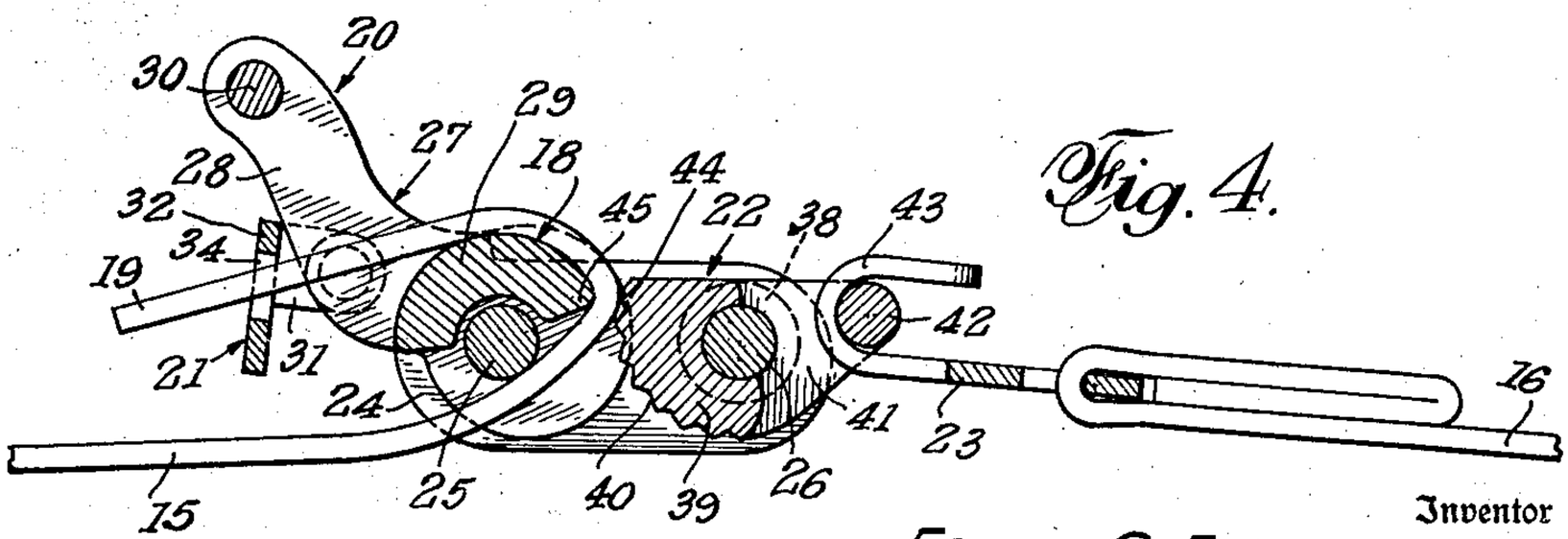

Fig. 4.

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Fig. 5.

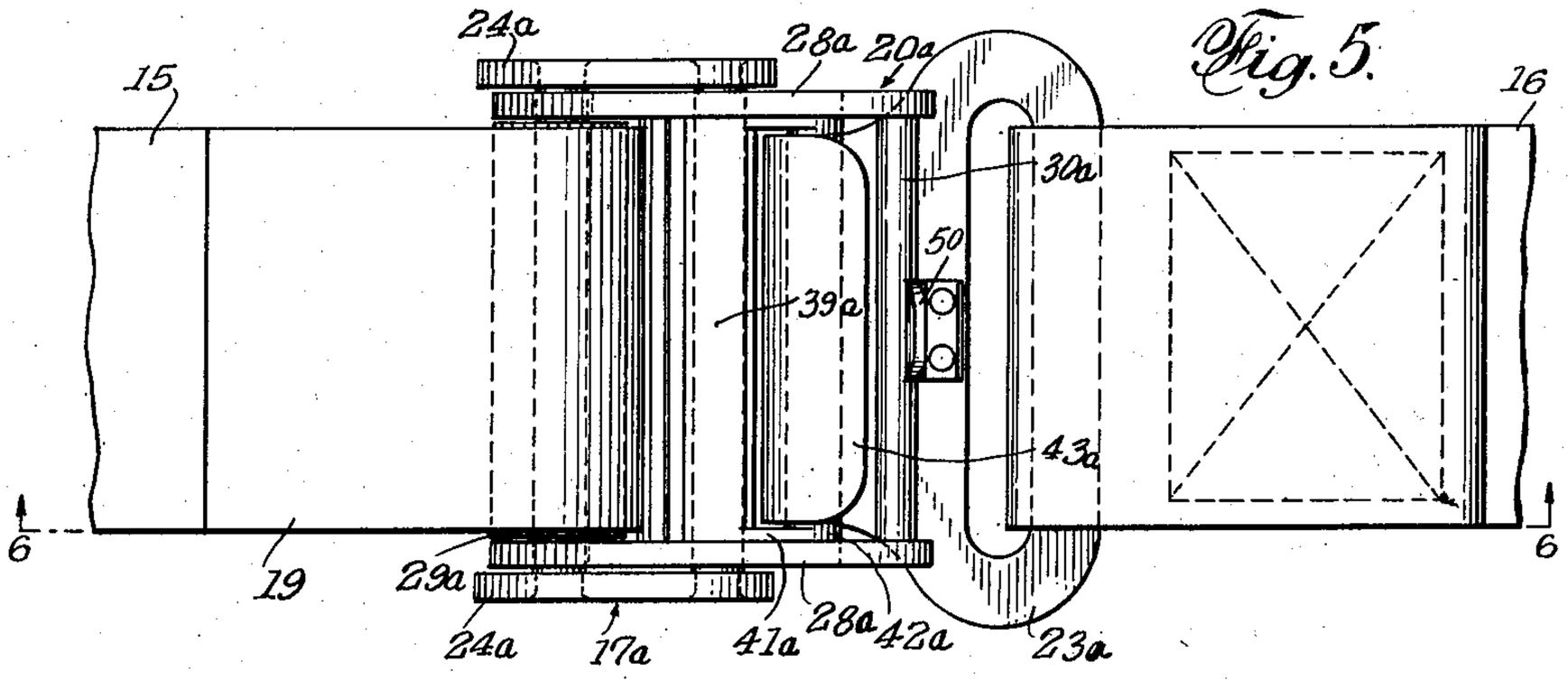

Fig. 6.

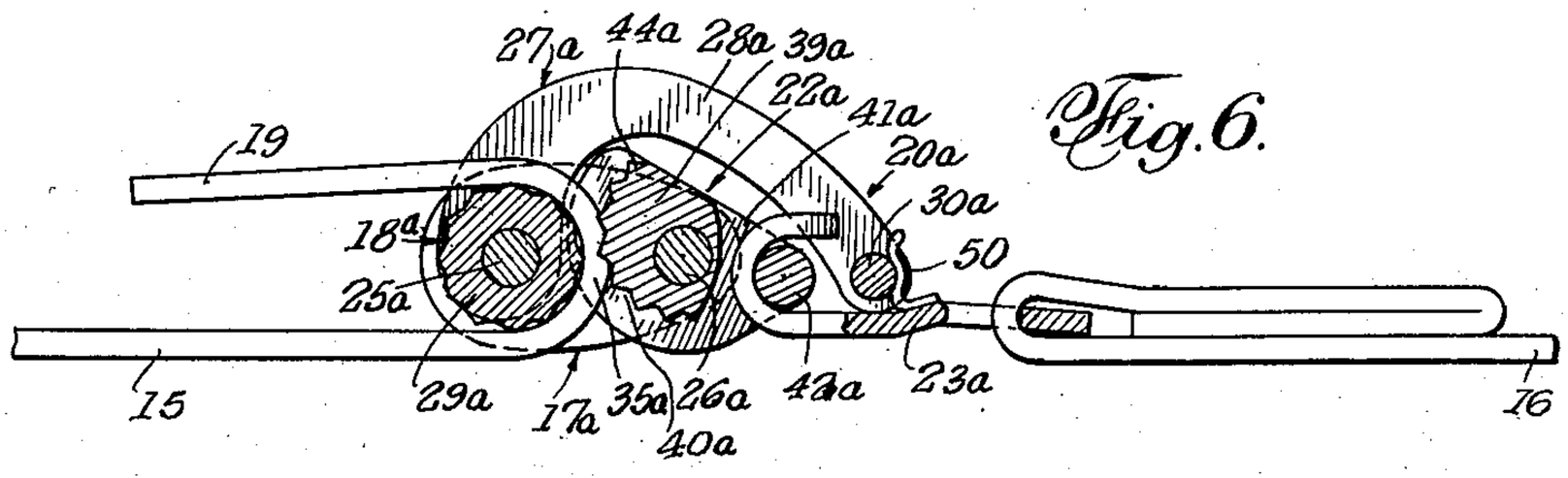

Fig. 8.

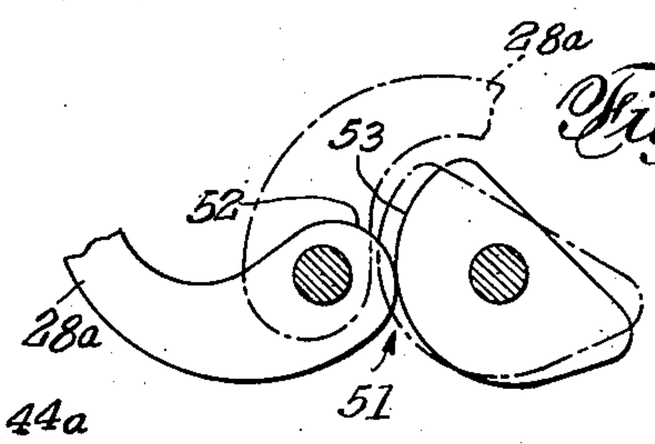

Fig. 7.

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Fig. 9.

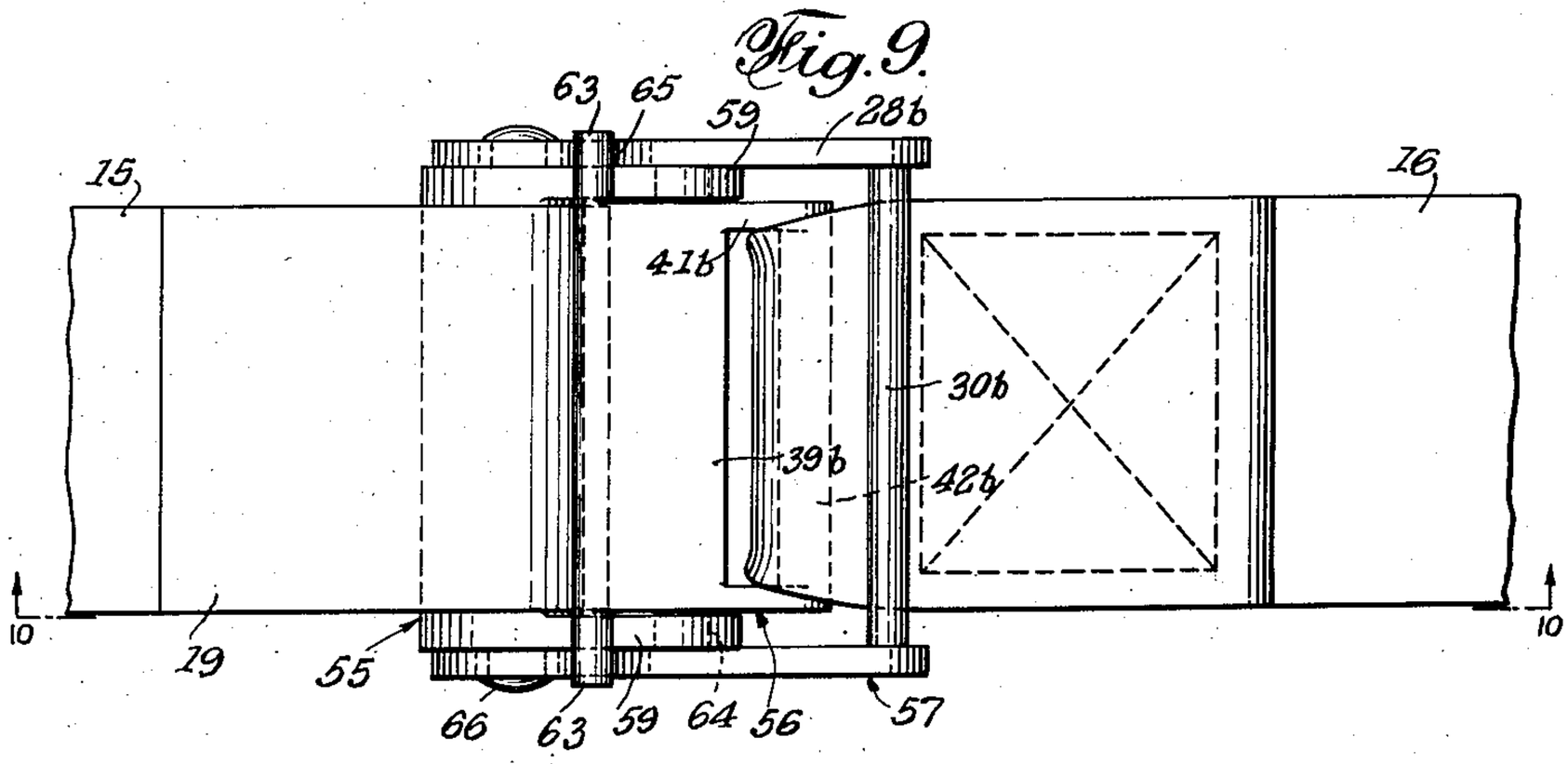


Fig. 10.

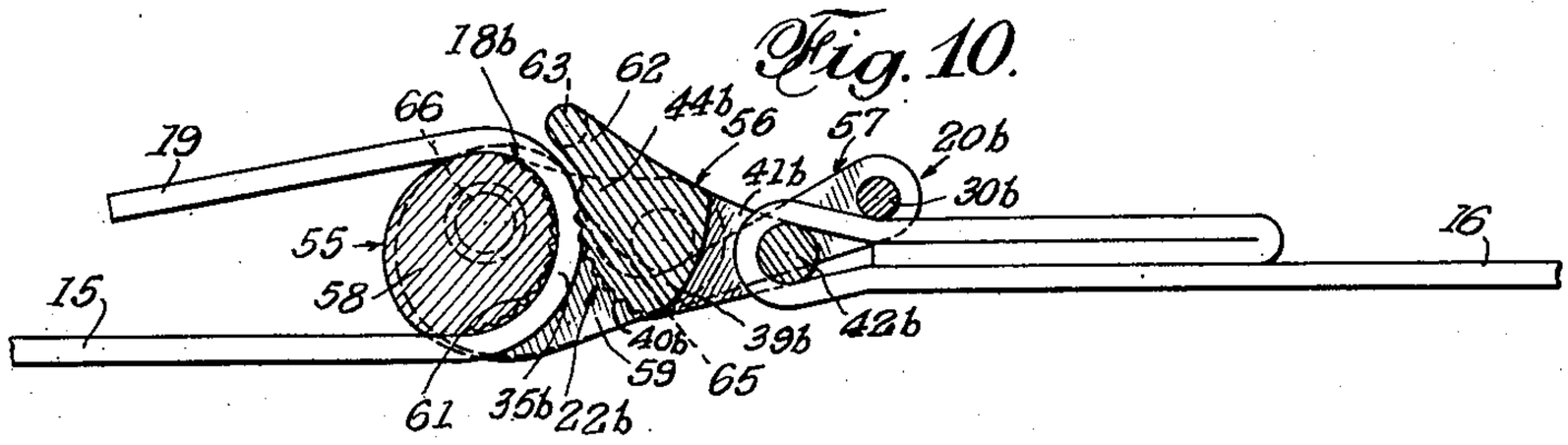
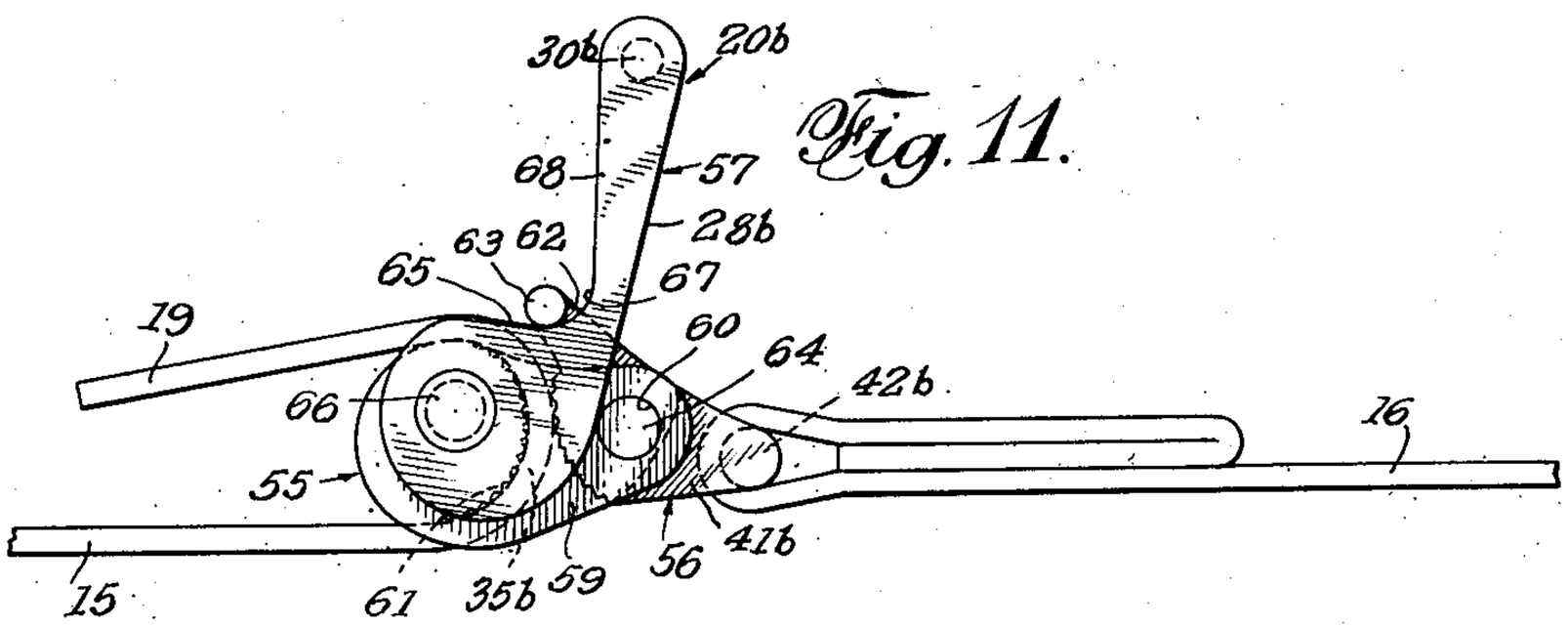


Fig. 11.



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UNITED STATES PATENT OFFICE

2,653,365

BUCKLE WITH SWINGABLE RELEASE MEMBER

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Application April 21, 1950, Serial No. 157,231

14 Claims. (Cl. 24—170)

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This invention relates to a buckle of the wedge type and it is an object of the present invention to provide a buckle that is not only quickly released, but grips more tightly as the tension thereon is increased.

Another object of the invention is to provide a buckle, particularly for connecting flat-sectioned members, such as tapes, that embodies an outwardly swingable member that automatically effects release of the buckle regardless how tightly the same has been drawn, said member being designed to have a high power advantage enabling swinging thereof with little effort.

Another object of the invention is to provide a wedge type of buckle in which the release member is latched to obviate inadvertent release movement of said member to impart extreme safety to the buckle.

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 embodiments of the present invention, which are 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 top plan view of a preferred form of buckle and embodying features of the present invention.

Fig. 2 is a side elevational view thereof.

Fig. 3 is a longitudinal sectional view as taken on line 3—3 of Fig. 1.

Fig. 4 is a similar view, showing the buckle released.

Fig. 5 is a top plan view of a second form of the invention.

Fig. 6 is a longitudinal sectional view as taken on line 6—6 of Fig. 5.

Fig. 7 is a similar view, showing said second form of buckle released.

Fig. 8 is a fragmentary side view of release means used in said second form of buckle.

Fig. 9 is a plan view of a third form of buckle according to the invention.

Fig. 10 is a longitudinal sectional view as taken on line 10—10 of Fig. 9.

Fig. 11 is a similar view showing the third form of buckle released.

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The present buckles are shown as connecting strap ends 15 and 16 which may be the opposite ends of a single strap or the free ends of two straps that are connected to the same rigid structure.

The buckle illustrated in Figs. 1 to 4 comprises, generally, a frame 17, wedge means 18 mounted transversely of the frame and around which strap end 15 is trained to provide a free and untensioned end 19 on said strap end, release means 20 fixed with said wedge means 18 to move the latter to strap-releasing position, latch means 21 for releasably locking the release means 20 against inadvertent movement, and cam-wedge means 22 also mounted transversely of frame 17 and arranged to operatively grip strap end 15. While the cam-wedge means 22 may be directly connected to strap end 16, in this instance, separable connector means 23 is shown to effect such connection.

The frame 17 is shown as comprising a pair of similar side plates 24 rigidly connected by transverse shafts 25 and 26 in longitudinal spaced relation.

The wedge means 18 and the release means 20 are combined in a single unitary structure 27 pivotally mounted on shaft 25. Said structure comprises a pair of arms 28 that reside adjacent the inner faces of frame plates 24 and are connected by semi-cylindrical wedge member 29 concentric to the axis of shaft 25 and by a cross-rod 30 at the ends of arms 28. The portions of arms 28 that are connected by rod 30 are offset to be above the frame 17, as seen in Fig. 2, so that said rod can be readily grasped and structure 27 bodily swung around shaft 25.

The latch means 21 comprises a bail-like member having ears 31 connected by a cross-bar 32 and carried on pivots 33 extending laterally from arms 28. The cross-bar 32 is provided with a slot 34 through which free end 19 of strap end 15 passes after said strap end is trained around concentric wedge member 29 to form a bight 35. The ends of cross-bar 32 are provided with lugs 36 that engage against upstanding shoulders or abutments 37 that are formed in the upper edges of side plates 24. Abutments 37 are so placed that said bail-like member can be swung on its pivots 33 to withdraw lugs 36 from behind said abutments to thereby free structure 27 for swinging movement around shaft 25. In practice, said bail-like member falls automatically into latching position when structure 27 is swung to the position of Fig. 2.

The cam-wedge means 22 is pivotally carried on shaft 26 and extends between arms 28 and is

held against endwise displacement between frame plates 24 by washers 38 which are slightly thicker than said arms so that there is clearance for the cam-wedge 39 of the means 22 between arms 28. The cam face 40 of wedge 39 is knurled or otherwise suitably roughened to bite into bight 35. Said face 40 is curved on a center eccentric with the axial center of shaft 26, the center of curvature being above said axial center so that the greatest length of wedge 39 is in a direction toward but clear of concentric wedge member 29. Integrally formed with cam wedge 39, the means 22 is provided with a loop defined by side arms 41 and a cross pin 42, the same extending in a direction opposite to the greatest length of cam wedge 39. The connector 23 has a hook 43 that is adapted to separately connect with cross bar 42.

The present buckle grips strap end 15 and connects the same to strap end 16, when free end 19 is pulled to increase the tension between the strap ends. It will be evident that the more tightly end 19 is pulled, the more nearly will bail rod 42 line up with shafts 25 and 26 as the end 44 of the cam-wedge 39 bites into bight 35. Since release means 20 is locked, the buckle will remain tightened and there can be no slippage since any tendency for strap end 15 to slip is counteracted by increased grip of cam-wedge 39.

As shown in Fig. 4, release is effected by first flipping lugs 36 out of engagement with abutments 37 and then, by grasping rod 30, swinging structure 27 away from cam-wedge means 22. The semi-cylindrical wedge member 29 will thus be moved on its pivot so that the end 45 thereof will be brought opposite to cam-wedge end 44. In this position, a clear space is formed between wedge ends 44 and 45 that is at least as wide as strap 15 is thick. Said strap will, therefore, immediately slack off to loosen the buckle.

In the second form of the invention illustrated in Figs. 5 to 8, the latch means 21 is omitted although the same may be used, if desired. Or, alternatively, the unitary structure 27*a* may be held against movement to a release position by a spring detent 50 fastened to connector 23*a* and engaged by cross-rod 30*a*.

In this form of the invention, instead of releasing strap bight 35*a* by creating a space between wedge 29*a* and cam-wedge 39*a*, means 51 is provided for rocking cam-wedge means 22*a* to non-gripping position when the release means 20*a* is swung in the way that the release means 20 is swung. In this case, wedge member 29*a* is formed as a cylindrical roller free to revolve on shaft 25*a* and is not influenced by release movement of means 20*a*.

The means 51 comprises an eccentric cam 52 formed on that end of each arm 28*a* through which shaft 25*a* extends and a complementary eccentric cam 53 on each end of cam-wedge 39*a*. When release means 20*a* is in the position of Fig. 6 and wedges 29*a* and 39*a* are gripping strap bight 35*a* so the wedges 29 and 39 grip the bight 35, the edges of cams 52 are clear of the edges of cams 53. Upon swinging said release means to the position of Figs. 7 and 8, the portions of cams 52 having increasingly greater eccentricity pick up cams 53 and thereby rock the cam-wedge means to strap-releasing position.

The elongated handle that is constituted by arms 28*a* provides a long lever that enables the rocking of cam-wedge means 22*a* with a light touch regardless of how great the tension on the strap ends. This power advantage is increased by the sliding engagement between cams 52 and

53. In other respects, the second form of buckle resembles the preferred form above described.

In this form of the invention, frame 17*a*, wedge means 18*a*, pivoted structure 27*a*, cross-rod 30*a*, arms 41*a*, cross-pin 42*a*, hook 43*a*, and cam-wedge end 44*a* are, respectively, the substantial equivalents of the parts 17, 18, 27, 30, 41, 42, 43 and 44 of the form of the invention shown in Figs. 1 to 4.

The third form of the invention, shown in Figs. 9 to 11, embodies the wedge means 18*b* and 22*b* and the release means 20*b*. The structure of this form dispenses with a separate frame, such as frame 17 or 17*a*, and is simplified to comprise three simple elements, a wedge element 55, a cam-wedge element 56, and a release element 57.

Wedge element 55 is formed as a casting or forging that is generally U-shaped, integrally having a thickened transverse portion 58 that is the counterpart of wedge members 29 and 29*a* of the earlier forms and a pair of arms 59 that replace the frame sides 24 and 24*a*. The ends of said arms have aligned holes 60. Said portion 58 is provided with a knurled face 61 over which strap bight 35*b* is trained.

Wedge element 56 is similar to the one used in the other two forms with the exception that the end 44*b* thereof is extended as at 62 and has laterally projecting extensions 63. Said element is mounted for rocking movement relative to element 55 on studs or pins 64 that have bearing in holes 60.

Release element 57 differs from those of the earlier forms in that the arms 28*b*, while swinging in the same direction, are generally reversely formed, said arms being each formed to have an edge cam 65 that is beneath each of the projections 63 and pick up the latter to tilt element 56 to strap releasing position. The cams 65 are disposed at such an angle that, when swung about the pivot 66, the same have a tangential approach toward projections 63 and slide past the projections as element 56 is tilted. The swinging movement of arms 28*b* is limited by projections 63 entering recesses 67 that are defined by cams 65 and the extensions 68 of said arms.

While strap end 16 is shown directly connected to cross pin 42*b*, the connector 23 may be used if desired. In other respects, this third form is similar to the two earlier forms, cross-rod 30*b*, wedge 39*b*, arms 41*b*, and cross-pin 42*b* being the substantial equivalents of the respective members 30, 39, 41 and 42 of the form of the invention shown in Figs. 1 to 4, and of the parts 30*a*, 39*a*, 41*a* and 42*a* of the form shown in Figs. 5 to 8.

While the invention that has been illustrated and described is now regarded as the preferred embodiments, the constructions are, of course, subject to modifications without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular forms of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A buckle for connecting two strap ends comprising a first member, a second member, a first pivot pivotally connecting said members, the first member being provided with a portion on one side of the pivotal connection of the members and adapted to connect with one strap end and with a cam-wedge portion on the other side of said

pivotal connection, the second member being provided with a wedge portion in opposed relationship to said cam-wedge portion of the first member to grip the other strap end therebetween and over which wedge portion said other strap end is trained, the cam-wedge portion having a strap-gripping face formed to progressively approach the wedge portion, opposed pull on the strap ends holding said face of the cam-wedge portion and wedge portion in strap-gripping alignment, a second pivot on the second member and parallel to the first pivot, and a swingable arm on the second pivot and connected to one of said members to rotationally move said one member relative to the other against the mentioned pull on the strap ends and to strap-releasing position relative to the other members.

2. A buckle according to claim 1: the wedge portion of the second member being fixed on said second member, and an extension on the first member in the path of swingable movement of the arm and engaged by said arm to move the cam-wedge portion of the first member relative to the fixed wedge portion of the second member.

3. A buckle for connecting two strap ends comprising first and second wedge members having gripping faces between which one strap end is gripped and over one of which said latter strap end is trained, a first pivot connecting said wedge members, the first wedge member comprising a cam-wedge rotational on the pivot connecting the members and on an axis parallel to the strap-gripping face of the second wedge member, the cam-wedge of the first member having its strap-gripping face formed to progressively approach the gripping face of said second wedge member, a second pivot provided on the second wedge member spaced from and parallel to the pivot that connects the members, a swingable member on said second pivot connected to one wedge member to rotationally move one of the wedge members relative to the other wedge member and to a strap-releasing position, and a portion on the first wedge member adapted to connect to the other strap end.

4. The buckle according to claim 3: the first-named wedge member comprising a semi-cylindrical part carried by and movable with the swingable member to the mentioned strap-releasing position.

5. The buckle according to claim 3: the first-mentioned wedge member comprising a roller mounted for free rotation on the axis of movement of the swingable member, and interengaged cams on the swingable member and the cam-wedge member and engaged by movement of the swingable member to move the cam-wedge member to strap-releasing position.

6. The buckle according to claim 3: the first-mentioned wedge member including a frame having side plates carrying the pivot between the two wedge members, abutments provided on said side plates, and a bail-like member pivotally carried by the swingable member and having a portion in latching engagement with the abutments to releasably lock said swingable member against release movement.

7. The buckle according to claim 3: the first-mentioned wedge member including a frame having side plates carrying the pivot betweeen the two wedge members, abutments provided on said side plates, and a bail-like member pivotally carried by the swingable member and having a portion in latching engagement with the abutments to releasably lock said swingable member against release movement, said bail-like member having a slot therein to pass the free end of the strap end that is gripped between the wedge members.

8. A buckle for connecting two strap ends comprising two wedge members between which one strap end is gripped and over one of which said latter strap end is trained, both wedge members being rotationally mounted on parallel axes, a frame connecting said axes, the second wedge member comprising a cam-wedge having a strap-gripping face curved to progressively approach the gripping face of said first wedge member, a pair of arms fixed with and movable with said first wedge member around the axis of rotation thereof, the first wedge member comprising a semi-cylindrical part movable, upon movement of said arms, to the mentioned strap-releasing position, and means connecting the other strap end to the wedge member that comprises the cam-wedge.

9. A buckle for connecting two strap ends comprising two wedge members between which one strap end is gripped and over one of which said latter strap end is trained, both wedge members being rotationally mounted on parallel axis, the second wedge member comprising a cam-wedge having a strap-gripping face curved to progressively approach the gripping face of said first wedge member, a pair of arms fixed with and movable with said first wedge member around the axis of rotation thereof, the first wedge member comprising a semi-cylindrical part movable, upon movement of said arms, to the mentioned strap-releasing position, a frame having side plates and mounting the axes of the wedge members, abutments provided on said side plates, and a bail-like member pivotally carried by said arms and having a portion in latching engagement with the abutments to releasably lock the arms and the wedge member affixed thereto against release movement, and means connecting the other strap end to the wedge member that comprises the cam-wedge.

10. In a buckle to connect two strap ends, two wedge members having opposed parallel strap-gripping faces, a pivotal connection between the wedge members, one member being rotational on the pivotal connection relative to the other, the gripping face of said rotational member being formed to progressively approach the gripping face of the other member, manually operable swingable means carried by the mentioned other member, having camming engagement with the rotational member, to rotate the latter to move said progressively formed gripping face away from the gripping face of said other wedge member to release a strap end gripped therebetween, and a portion on the rotational member adapted to connect to a second strap end.

11. In a buckle of the character described, two wedge members having opposed parallel strap-gripping faces, a pivotal connection between the wedge members, one member being rotational on the pivotal connection relative to the other, the gripping face of said rotational member being curved to progressively approach the gripping face of the other member, cam means on the rotational member and having a curvature parallel to the curvature of the gripping face thereof, a pivotally swingable frame having arms, cam means on said arms and having operative engagement with the cam means of the rotational member to rotate the latter and move its progressively curved gripping face away from the grip-

ping face of the other wedge member to release a strap gripped therebetween.

12. In a buckle of the character described, two wedge members having opposed parallel strap-gripping faces, a pivotal connection between the wedge members, one member being rotational on the pivotal connection relative to the other, the gripping face of said rotational member being formed to progressively approach the gripping face of the other member, lateral projections on the end of the rotational wedge member most adjacent to the other wedge member, a pivotally swingable frame having arms, cam means on said arms and having operative engagement with said projections on the rotational member to rotate the latter and move its progressively curved gripping face away from the gripping face of the other wedge member to release a strap gripped therebetween.

13. In a buckle according to claim 12: said swingable frame being carried by said other wedge member on a pivot spaced from the pivot connecting the wedge members.

14. In a buckle according to claim 12: said other wedge member being provided with a pair of transversely spaced fixed arms, the relatively rotational wedge member being loosely fitted between said arms, and the mentioned pivotal connection between the members comprising laterally directed pin ends residing in aligned holes provided in said arms.

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