March 25, 1969 W. E. ATKINSON 3,434,314

DRAWBOLT LATCHING DEVICE WITH COMBINATION LOCKING MECHANISM

Filed Sept. 21, 1967 Sheet 1 of 2

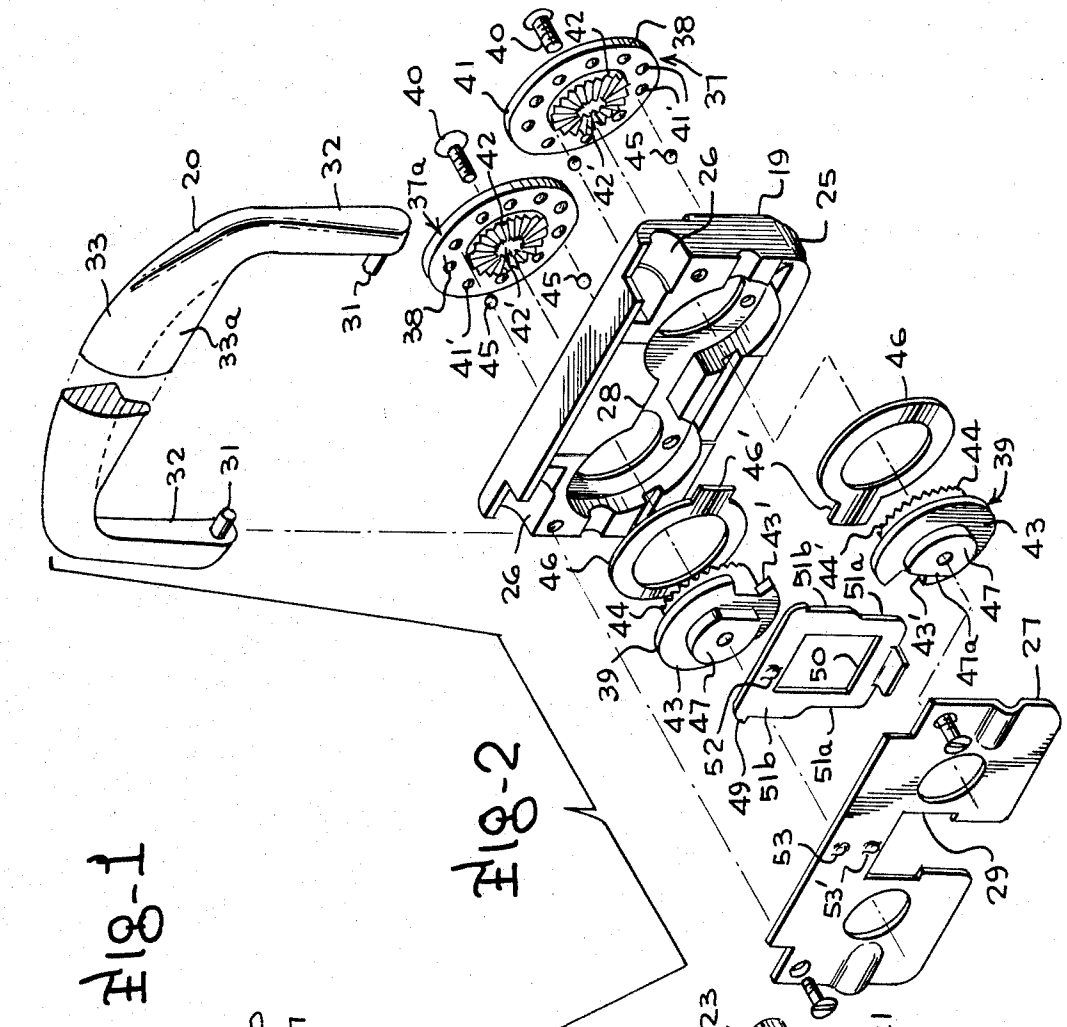


FIG 2

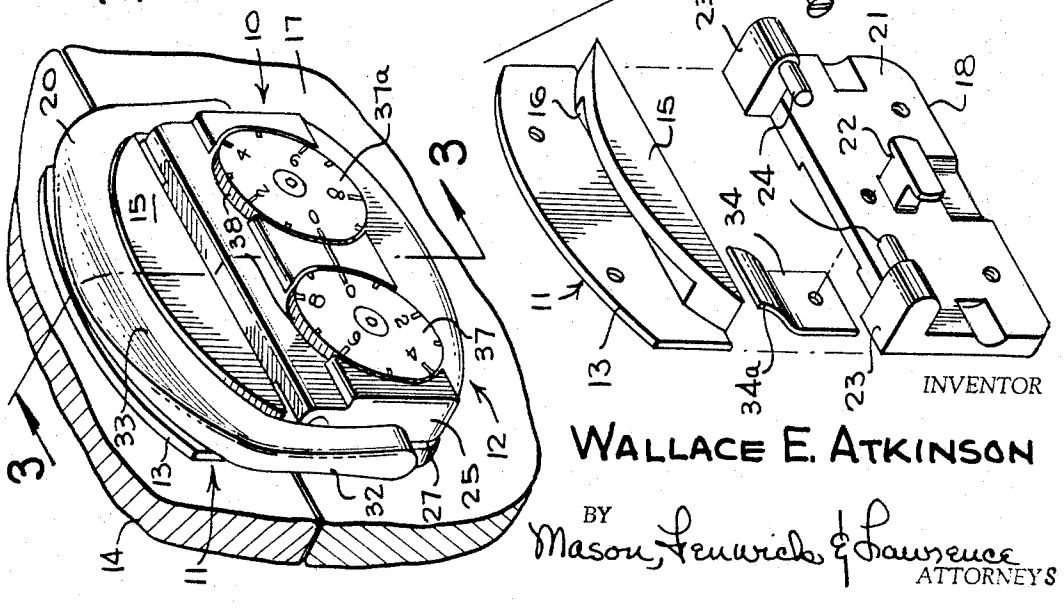


FIG 1

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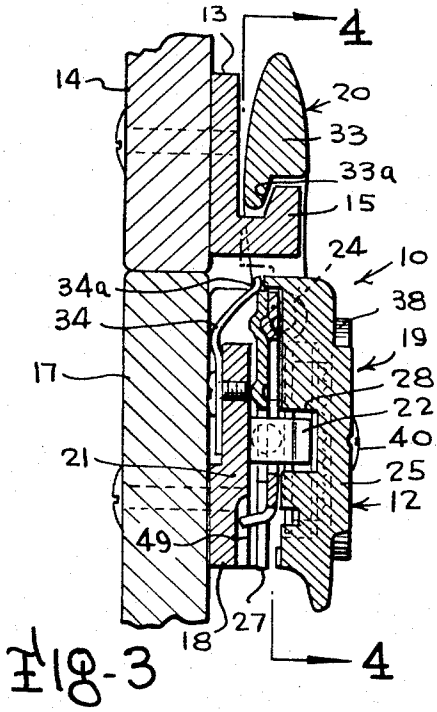


Fig-3

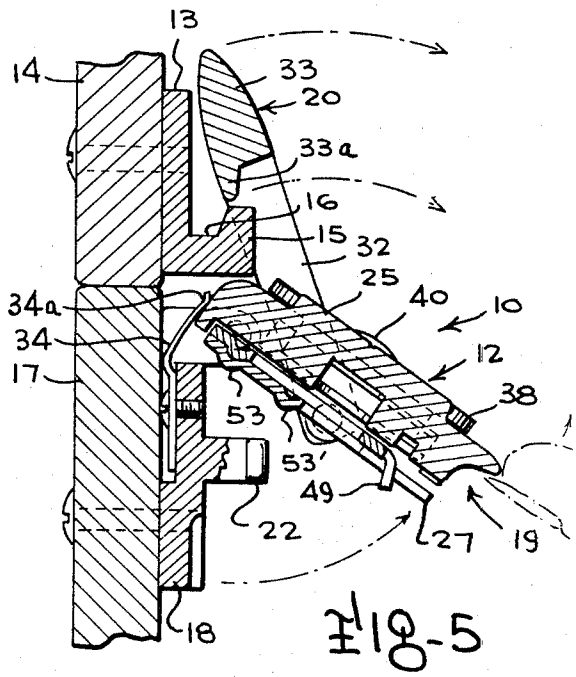


Fig-5

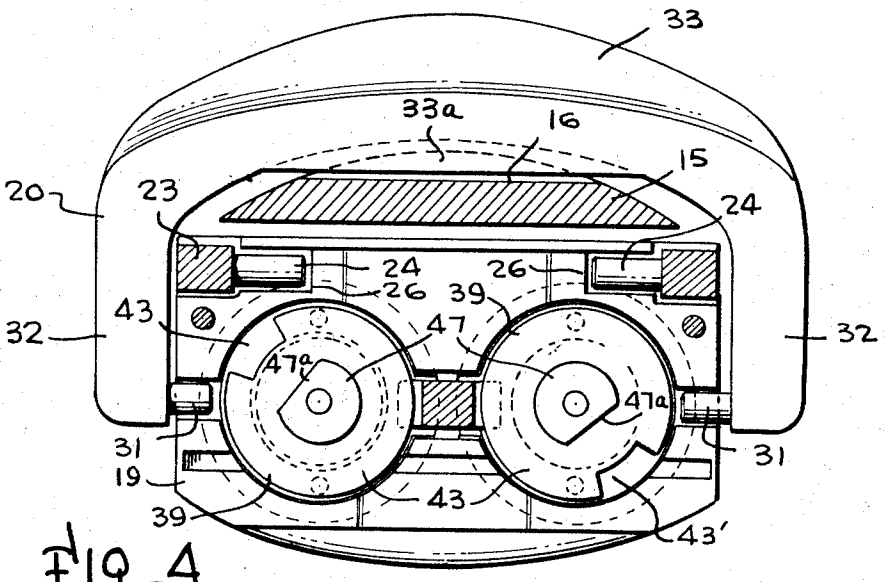


Fig-4

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Patented Mar. 25, 1969

3,434,314

DRAWBOLT LATCHING DEVICE WITH COMBINATION LOCKING MECHANISM

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Filed Sept. 21, 1967, Ser. No. 669,553

Int. Cl. E05b *37/12;* A45c *13/10*

U.S. Cl. 70—76

10 Claims

ABSTRACT OF THE DISCLOSURE

A drawbolt latching device for luggage receptacles and the like comprising a keeper mounted on the luggage cover having a circular segment projection and a drawbolt assembly mounted on the luggage body including a flat mounting base, a drawbolt body of generally rectangular, laterally elongated configuration pivoted to the base adjacent the line of separation between the luggage sections, a shackle pivoted to the drawbolt body eccentrically of the body pivot axis to be encircled about the keeper projection and latch the latter against the drawbolt assembly, the base having a T-shaped locking stud projecting into the drawbolt body, and the drawbolt body having plural dial and tumbler wheel assemblies disposed on parallel axes wherein the tumbler wheels have peripheral gates registrable with the head of the stud as the proper combination of dial positions of the dials to release the drawbolt body for pivotal movement to unlatch the shackle from the keeper.

The present invention relates in general to latching devices especially adapted for application to containers or receptacles, such as luggage, having separable parts to be releasably secured in closed position, and more particularly to a drawbolt latching device incorporating a combination locking mechanism for use on luggage cases and similar containers having a cover section hinged to a body section, the drawbolt latching device including a pivoted shackle member carried by a lock body incorporating a combination locking mechanism adapted to be supported on one of the separable container sections, for example, the body section, the shackle being coactive with a suitably formed keeper on the other container section, such as the cover section, to latch the container sections together in closed position.

An object of the present invention is the provision of a novel drawbolt latching device incorporating a pivoted drawbolt shackle and plural combination dial assemblies for locking the shackle in a latching position or unlocking the shackle for manual movement to a released position.

Another object of the present invention is the provision of a novel drawbolt latching device with combination locking mechanism adapted for use with hinged separable container parts, wherein the drawbolt latching device includes a drawbolt body portion carrying a pivoted drawbolt shackle for cooperation with the keeper and having a combination locking mechanism for locking the drawbolt body portion at a position restraining the shackle in interlocking relation with the keeper and for releasing the drawbolt body upon dialing of a

selected combination to permit movement thereof in a manner releasing the shackle from the keeper.

Another object of the present invention is the provision of a novel drawbolt latching device with combination locking mechanism as described in either of the two preceding paragraphs, wherein novel structure is provided for setting the particular combination of the combination locking mechanism.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a fragmentary perspective view of a drawbolt latching device with combination locking mechanism constructed in accordance with the present invention, shown in latched condition on a portion of the luggage receptacle;

FIGURE 2 is an exploded perspective view of the components of the drawbolt latching device;

FIGURE 3 is a vertical tranverse section view, taken along the line 3—3 of FIGURE 1;

FIGURE 4 is a section view taken along the line 4—4 of FIGURE 3, showing the pivoted portion of the drawbolt body assembly as it would appear in rear elevation with the backing plate removed;

FIGURE 5 is a vertical section view taken along a plane similar to the plane 3—3 of FIGURE 1, but illustrating the drawbolt body in outwardly swung position releasing the shackle from the keeper.

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, the drawbolt latching device of the present invention is indicated generally by the reference character **10** and comprises two basic sections, the keeper section **11** and the latching section **12**. The keeper section **11** is, in the illustrated embodiment, an integral body having a relatively thin, flat base plate portion **13** adapted to be disposed against the front wall of one of the separable container sections, such as the cover section **14** and suitably apertured to be secured thereto by any conventional fastening means such as rivet studs, fastening screws or the like. Projecting outwardly from the base plate portion **13** of the keeper **11** is a keeper latching formation **15**, here shown in the form of a segment of a circle, having an upwardly opening trough or recess **16** extending straight across the latching formation **15** and formed in the convex arcuate surface of the latching formation.

The latching section **12** in the illustrated example is adapted to be mounted on the lower tray or body section **17** of the luggage receptacle and comprises, as the basic element thereof, a mounting base member **18** adapted to be secured directly against the forward surface of the front wall of the luggage body section **17**, a drawbolt body portion **19** pivotally supported on the mounting base portion **18**, and a generally U-shaped drawbolt shackle **20** pivotally supported to the drawbolt body portion at an axis eccentric to the hinge axis between the drawbolt body portion **19** and the mounting base member **18** for movement of the shackle into and out of latching relation with the keeper latching formation **15**. The mounting base member **18** comprises a flat base portion

21 adapted to lie flat against the front surface of the luggage front wall having an outwardly projecting, T-shaped locking stud 22 projecting forwardly from the center thereof and a pair of hinge knuckle formations or ears 23 at the upper opposite corners thereof having inwardly facing trunnions 24.

Hingedly carried by this mounting base member 18 is the drawbolt body portion or assembly 19 comprising a massive drawbolt body member 25 having rearwardly opening trunnion sockets 26 in the upper opposite corners thereof, conforming generally to the configuration of the trunnions 24 to receive the latter and rotatably support the body member 25 on the mounting base member 18, the trunnions 24 being retained in the sockets 26 by a backing plate 27 similar in configuration to the drawbolt body member 25 secured to the latter and extending in rearwardly overlying relation to the trunnions 24. The body member 25 is also provided with a rearwardly opening, transversely elongated center recess 28 to receive the head portion of the T-shaped locking stud 22 therein and the portion of the shank of the stud 22 adjoining the head thereof, and the backing plate 27 is similarly provided with cutout 29 to accommodate passage of the head portion of the locking stud 22 into and out of the center recess 28.

In approximate horizontal alignment with the center recess 28 are a pair of shackle trunnion sockets in the lateral edges of the drawbolt body member 25 spaced eccentrically from the axis of the trunnions 24, for receiving inwardly facing shackle trunnions 31 at the ends of the legs 32 of shackle 20. The cross piece 33 of the shackle 20 extending between the ends of the legs 32 remote from the shackle trunnions 31 is of a generally arcuate configuration concentric with the arcuate surface of the keeper latching formation 15, defining an opening to closely fit around the keeper latching formation 15 and having a lip 33*a* projecting toward the shackle trunnions 31 from the cross member 33, conforming substantially in cross section and length to the recess 16 in the keeper latching formation 15 to interfit in the recess 16 when the shackle is in latching position and the drawbolt body portion 19 is in its normal latching position parallel to the base portion 21 of the mounting base member 18. A leaf spring 34 is fixed to the rear face of the base portion 21 of mounting base member 18 in a suitable recess therein and has a curved end portion 34*a* extending into engagement with the upper center portion of the drawbolt body portion 19 in a manner to resiliently bias the drawbolt body portion 19 into either the latching position illustrated in FIGURE 3, wherein the body portion is parallel to base member 18, or to the unlatching position wherein the body portion 18 is swung outwardly from the base member 18 about the axis of the trunnions 24.

It will be apparent that in the unlatching position of the drawbolt latching device 10, the drawbolt body 19 is swung outwardly to the position illustrated in FIGURE 5, shifting the axis of the shackle trunnions 31 outwardly and upwardly somewhat from the position occupied by that axis when the drawbolt body portion is in the latching position, thereby elevating the cross member 33 and its lip 33*a* a sufficient distance relative to the keeper latching formation 15 to lift the lip 33*a* upwardly and out of the latching formation recess 16 to free the luggage cover section 14 for movement away from the luggage body section 17. To latch the luggage section in closed condition, the shackle 20 is positioned in surrounding relation to the keeper latching formation 15 in such manner that the cross member 33 of the shackle extends upwardly and around the convex arcuate surface portion of the keeper latching formation 15, and the shackle lip 33*a* registers with the latching formation recess 16, whereupon the drawbolt body portion 19 of the latching section 12 is swung downwardly about the axis of the trunnions 24 into parallelism with its underlying mounting base member 18. The corresponding downward and inward movement of the axis of the shackle trunnions 31 during such movement of the drawbolt body portion 19 draws the shackle 20 downwardly an appropriate distance to nest the shackle lip 33*a* in the keeper latching formation recess 16 and draw the flat lower surface of the latching formation 15 downwardly against the flat top surface of the drawbolt body member 25, thus securing the latching section 12 and keeper section 11 together in latched condition.

The axis of the trunnions 24 defining the pivot axis for the drawbolt body portion 19 being located somewhat outwardly of the axis of the shackle trunnions 31 relative to the plane of the adjoining front wall of the luggage, an "over-center" type action is produced during movement of the drawbolt body 19 to the latching position, whereby the plane connecting the axis of the shackle trunnions 31 and the shackle lip 33*a* nested in the keeper latching formation recess 16 lies inwardly or somewhat toward the luggage wall from the axis of the trunnions 24, thereby restraining the drawbolt body 19 against accidental outward movement about its trunnion axis 24 to its unlatching position.

In order to provide for combination locking or unlocking of the drawbolt latching device 10 in the latching condition, the drawbolt body member 25 includes a combination locking mechanism comprising a pair of dial and tumbler wheel assemblies indicated generally by the reference characters 37, 37*a*. Each of these dial and tumbler wheel assemblies 37, 37*a* is of like construction, and includes an externally exposed combination dial member 38 and a tumbler wheel member 39 axially aligned with and located rearwardly of associated dial member 38 and releasably assembled therewith by suitable fastening means, such, for example, as screws 40. Each of the dial members 38 has a forward cylindrical dial portion 41 exposed forwardly of the drawbolt body member 25 for manual manipulation, preferably recessed in correspondingly configurated wells in the front surface of the drawbolt body member 25, provided with a knurled or roughened periphery and with graduation markings and numbers on the front surface thereof adjacent the periphery. An integral hub portion 42 extends rearwardly or inwardly from the cylindrical dial portion 41 and terminates in an inwardly facing surface 42′ having interlocking formations such as serrations, saw teeth, radial ridges and the like thereon. The tumbler wheel 39 disposed rearwardly in coaxial alignment with the dial member 38 is seated in a correspondingly configurated, rearwardly opening well or cavity in the drawbolt body member 25, and has a rearmost cylindrical tumbler wheel portion 43 provided with a radially outwardly opening peripheral gate or recess 43′ at selected angular position thereon, as is customary with combination lock tumbler wheels and includes a forwardly projecting integral hub portion 44 of smaller diameter corresponding to the diameter of the hub portion 42, similarly provided with interlocking, forwardly facing surface 44′ having similar interlocking formations such as serrations, saw teeth or the like thereon to interfit with the corresponding formations on the surface 42′.

The inwardly or rearwardly facing surfaces of the larger diameter cylindrical dial portions 41 of dial members 38 each has a plurality of detent recesses 41′, at selected angular positions along a circumferential path of a diameter intermediate that of the hub portion 42 and the outer periphery of the dial portion 41, to receive portions of detent balls 45 suitably located in recesses in a drawbolt body member 25 so as to register with detent recesses 41′ and frictionally restrain the dial member 38 at angular positions corresponding to the dial graduations thereon. Detent balls 45 are retained in their accommodating apertures and resiliently biased outwardly toward the detents 41′ by annular spring members 46 associated with each of the dial members 38, disposed immediately rearwardly of the location of the detent balls

45 and surrounding the hub portion 42 of the associated dial member. The tumbler wheels 39 also have smaller diameter generally annular bosses projecting rearwardly therefrom, indicated by the reference character 47, having a flat 47*a* along a portion thereof extending into circular openings of similar diameter in the backing plate 27 which coact with the openings in the drawbolt body member 25 through which the hub portions 42 extend to journal the dial and tumbler wheel assemblies 37, 37*a* about their respective axes. The larger diameter tumbler wheel portions 43 lie in a common plane disposed slightly inwardly or toward the luggage wall from the head of the T-shaped locking stud 22 and peripherally lap beneath the adjacent portions of the head of the locking stud 22 except when the tumbler wheel gates 43′ register with the head of the locking stud 22. When the dial members 38 are disposed at the appropriate angular positions for the selected combination of the lock, the tumbler wheel gates 43′ are disposed in registry with the head of the locking stud 22 to accommodate outward unlatching pivotal movement of the drawbolt body portion 19 about the axis of the trunnions 24. At all other angular positions of the combination dial members 38, uninterrupted peripheral portions of the tumbler wheels 39 underlie the head of the locking stud 22 and thus prevent such outward unlatching pivotal movement of the drawbolt body portion 19. It will be noted from the foregoing description of the operation of the latching device that the drawbolt body portion 19, hereinabove referred to, acts as a drawbolt lever which is actuated in a manner similar to the lever of conventional drawbolt latches to move the drawbolt shackle pivoted to the lever eccentrically of the lever axis in an appropriate manner relative to the keeper between the keeper latching position, wherein the keeper is securely latched against the body portion 19, and an open or released position freeing the keeper from the shackle for opening movement of the luggage cover section 14.

It will be noted that the ring-shaped or annular spring members 46 for biasing the detent balls 45 toward the detent recesses 41′ are of a somewhat bowed configuration and have locating projections 46′ adapted to project into the center recess 28 in the drawbolt body member 25 to appropriately orient the springs 46 so that the outwardly bowed portions of the springs bear against the detent balls 45 above and below the axis of the dial and tumbler wheel assemblies 37, 37*a* to urge them outwardly toward the detent recesses 41′.

To permit resetting or changing of the combination of the lock mechanism, the drawbolt body portion 19 is also provided with a captive slide 49, movable along an axis perpendicular to the axis of the trunnions 24, having a center opening 50 through which the T-shaped locking stud 22 passes, and relatively offset, axially spaced lateral edge portions 51*a*, 51*b*, located adjacent the bosses projecting rearwardly from the tumbler wheel portions 43. A detent nose 52 is formed on the uppermost portion of the captive slide 49, cooperating with a pair of detent sockets 53, 53′ to frictionally restrain the captive slide 49 at either the raised position, shown in FIGURE 3, or a relatively lower position. The lateral edge portions 51*b* of the captive slide 49 are so located relative to the bosses 47 on the tumbler wheel portions 43 that, when the captive slide is in the lower position registering the detent nose 52 with the detent socket 53′, the edge portions 51*b* abut the flats 47*a* of the bosses 47 when the dial and tumbler wheel assemblies 37, 37*a* occupy the angular positions for the existing combination of the lock and thereby hold the tumbler wheel members 39 against rotation. When the captive slide 49 is in its upper position registering the detent nose 52 with the detent socket 53, the lateral edge portions 51*a* of the slide 49 are disposed alongside the tumbler wheel bosses 47 and are spaced radially a sufficient distance from the axis of the tumbler wheel members to permit free rotation of the tumbler wheels. The screws 40 which assemble together the dial member 38 and tumbler wheel member 43 of each of the two dial and tumbler wheel assemblies 37, 37*a* in one satisfactory embodiment are Allen head screws having a forwardly opening, non-round socket in the head, and are also headed or upset on the opposite or inner end so that they cannot be completely withdrawn from the dial and tumbler wheel sub-assemblies. For example, the screws 40 are such that about two complete revolutions of the screws is sufficient to disengage or release the teeth or serrations on the interlocking surfaces 42′, 44′ of the dial member 38 and tumbler wheel member 39 to allow independent rotation of the dial member 38, and the inner heads or upsetting formations on the screws are located so as to permit the two full revolutions of the screws while preventing complete withdrawal of the screws from the tumbler wheel members 39.

To change or rest the combination of the latching device the existing combination is dialed by manual angular adjustment of the dial members 38, the drawbolt body portion 19 is lifted outwardly about the axis of the trunnions 24 to the open or shackle releasing position and the captive slide 49 is pulled downwardly to the full extent of its travel so as to register the detent nose 52 with the detent socket 53′. The drawbolt body 19 is then returned to the closed position in parallelism with the mounting base member 18, and the Allen head screws 40 are unscrewed to the necessary extent, for example, two full turns, to disengage the serrations on the hub surfaces 42′, 44′. The dial members 38 can then be manually rotated to the desired new combination number positions, while the tumbler wheel members 39 are restrained against rotation by engagement of the lateral edge portions 51*b* of the captive slide 49 with the flats 47*a* on the bosses 47 of the tumbler wheel members 39. The screws 40 are then tightened, to re-engage the serrations on the surfaces 42′, 44′, the drawbolt body portion 19 is again lifted to the open position, and the captive slide 49 is returned to its former position registering the detent nose 52 with the detent socket 53.

While but one specific embodiment of the drawbolt latching device has been particularly shown and described, it is apparent that various modifications may be made therein within the spirit and scope of the invention, and it is desired, therefore, that only such limitations be placed thereon as are imposed by the prior art and set forth in the appended claims.

I claim:

1. A drawbolt latching device adapted to be mounted on coplanar mounting surfaces of separable parts of a container adjacent a line of separation therebetween, comprising a keeper to be affixed to one of said mounting surfaces adjacent said line including a raised keeper formation projecting outwardly from said surface, a drawbolt assembly to be mounted on the other of said mounting surfaces adjacent said line including a mounting base to be fixed to said other of said surfaces having a locking member projecting outwardly relative to said surface including rigid lateral extensions spaced from said mounting base, a drawbolt lever member pivotally supported on said mounting base for arcuate movement about a first pivot axis paralleling said surface between a latching position against said base and a release position extending outwardly therefrom, a generally U-shaped shackle having a cross-member and a pair of legs pivoted remote from said cross-member to said lever member for arcuate movement about a second pivot axis spaced eccentrically relative to said first pivot axis to encircle said keeper formation and draw the same and its associated separable container part to closed position upon arcuate movement of said lever member about said first pivot axis from said release position to said latching position, said lever member having a plurality of rotatable combination dial assemblies including a pair of peripherally gated rotatable tumbler wheels supported by said lever member about

parallel, spaced axes of rotation extending substantially perpendicular to the plane of said mounting surfaces when the lever member is in latching position locating said pair of tumbler wheels in flanking relation to opposite portions of said locking member, said tumbler wheels having uninterrupted peripheral portions lying between said lateral extensions and said mounting base when the tumbler wheels are out of alignment with selected angular positions forming a selected combination for the dial assemblies to lock the lever member against releasing movement from said latching position to said release position and the peripheral gates of said tumbler wheels being aligned with said lateral extensions for passage of the latter therethrough to permit said releasing movement of the lever member at said selected angular positions of said tumbler wheels.

2. A drawbolt latching device as defined in claim 1, wherein said locking member of said mounting base is a T-shaped locking stud integral with said base at substantially the center of said base having a head portion spaced outwardly from said base defining said lateral extensions, said tumbler wheels being located respectively on opposite sides of said locking stud with their axes in a common plane including the head portion of said stud and the gatings of said tumbler wheels being sized to pass therethrough the part of said head portion extending toward the respective tumbler wheels during releasing movement of the lever member when the gatings of the respective tumbler wheels are aligned with said common plane.

3. A drawbolt latching device as defined in claim 2, wherein said drawbolt lever member is a generally rectangular body having a substantially straight flat edge immediately adjacent said line of separation, said dial assemblies including a pair of cylindrical dial members having circular front faces provided with graduation markings exposed at a front face of said lever member respectively rotatable about the axes of rotation of said tumbler wheels for manual adjustment of the angular positions of the latter with said circular front face lying in a common plane substantially flush with a front face of said lever member.

4. A drawbolt latching device as defined in claim 1, wherein said drawbolt lever member is a generally rectangular body having a substantially straight flat edge immediately adjacent said line of separation, said dial assemblies including a pair of cylindrical dial members having circular front faces provided with graduation markings exposed at a front face of said lever member respectively rotatable about the axes of rotation of said tumbler wheels for manual adjustment of the angular positions of the latter with said circular front face lying in a common plane substantially flush with a front face of said lever member.

5. A drawbolt latching device as defined in claim 3, wherein said lever member body has lateral ends lying substantially perpendicular to said line of separation, said shackle legs having end portions pivotally mounted in said lateral ends at locations spaced farther from said line than said first pivot axis and said shackle cross-member joining said legs adjacent said line and extending in a convex arc therebetween, and said keeper formation having a front elevation configuration which is substantially a segment of a circle concentric with the convex arc of said cross-member to nest in closely conforming relation in the space defined between said cross-member and said flat edge of said latch member body in the latching position of the device.

6. A drawbolt latching device as defined in claim 4, wherein said level member body has lateral ends lying substantially perpendicular to said line of separation, said shackle legs having end portions pivotally mounted in said lateral ends at locations spaced farther from said line than said first pivot axis and said shackle cross-member joining said legs adjacent said line and extending in a convex arc therebetween, and said keeper formation having a front elevation configuration which is substantially a segment of a circle concentric with the convex arc of said cross-member to nest in closely conforming relation in the space defined between said cross-member and said latch member body in the latching position of the device.

7. A drawbolt latching device as defined in claim 1, wherein said lever member is a generally rectangular body having lateral ends lying substantially perpendicular to said line of separation, said shackle legs having end portions pivotally mounted in said lateral ends at locations spaced farther from said line than said first pivot axis and said shackle cross-member joining said legs adjacent said line and extending in a convex arc therebetween, and said keeper formation having a front elevation configuration which is substantially a segment of a circle concentric with the convex arc of said cross-member to nest in closely conforming relation in the space defined between said cross-member and said latch member body in the latching position of the device.

8. A drawbolt latching device as defined in claim 7, wherein the dial member and tumbler wheel of each of said dial assemblies are spaced along a common axis of rotation for the respective assemblies and include confronting toothed surfaces to be releasably interfitted together for coordinating rotation of each tumbler wheel with its associated dial member, means operable from externally of the device for selectively locating each dial member at spaced coupled and uncoupled positions along its axis relative to its associated tumbler wheel, said tumbler wheels each including substantially cylindrical hub portions having a flat extending along a chord thereof, and a manually adjustable stop member on said lever member having stop surfaces disposable at a selected condition of said device in engagement with said flats when said tumbler wheels occupy said selected angular positions to restrain the latter against rotation responsive to rotation of their associated dial members at the uncoupled positions of said dial members to permit independent angular adjustment of the latter to establish new combinations for the dial assemblies.

9. A drawbolt latching device as defined in claim 5, wherein the dial member and tumbler wheel of each of said dial assemblies are spaced along a common axis of rotation for the respective assemblies and include confronting toothed surfaces to be releasably interfitted together for coordinating rotation of each tumbler wheel with its associated dial member, means operable from externally of the device for selectively locating each dial member at spaced coupled and uncoupled positions along its axis relative to its associated tumbler wheel, said tumbler wheels each including substantially cylindrical hub portions having a flat extending along a chord thereof, and a manually adjustable stop member on said lever member having stop surfaces disposable at a selected condition of said device in engagement with said flats when said tumbler wheels occupy said selected angular positions to restrain the latter against rotation responsive to rotation of their associated dial members at the uncoupled positions of said dial members to permit independent angular adjustment of the latter to establish new combinations for the dial assemblies.

10. A drawbolt latching device as defined in claim 1, wherein each of said dial assemblies includes a circular dial member for controlling the associated tumbler wheel, the dial member and tumbler wheel of each of said dial assemblies are spaced along a common axis of rotation for the respective assemblies and include confronting toothed surfaces to be releasably interfitted together for coordinating rotation of each tumbler wheel with its associated dial member, means operable from externally of the device for selectively locating each dial member at spaced coupled and uncoupled positions along its axis

relative to its associated tumbler wheel, said tumbler wheels each including substantially cylindrical hub portions having a flat extending along a chord thereof, and a manually adjustable stop member on said lever member having stop surfaces disposable at a selected condition of said device in engagement with said flats when said tumbler wheels occupy said selected angular positions to restrain the latter against rotation responsive to rotation of their associated dial members at the uncoupled positions of said dial members to permit independent angular adjustment of the latter to establish new combinations for the dial assemblies.

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U.S. Cl. X.R.

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