

[54] COMBINATION LOCK CONSTRUCTION

[72] Inventor: Wallace E. Atkinson, Petersburg, Va.

[73] Assignee: Long Manufacturing Co., Inc., Petersburg, Va.

[22] Filed: March 19, 1971

[21] Appl. No.: 126,108

[52] U.S. Cl. 70/70, 70/312

[51] Int. Cl. E05b 65/52, E05b 37/02

[58] Field of Search 70/66, 67, 70, 312, 80

[56] References Cited

UNITED STATES PATENTS

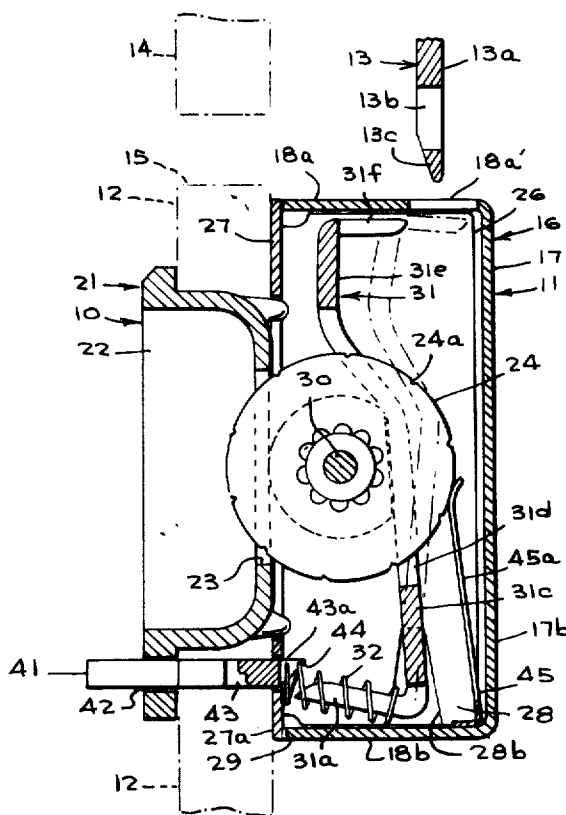
2,136,493 11/1938 Denerich 70/312 X

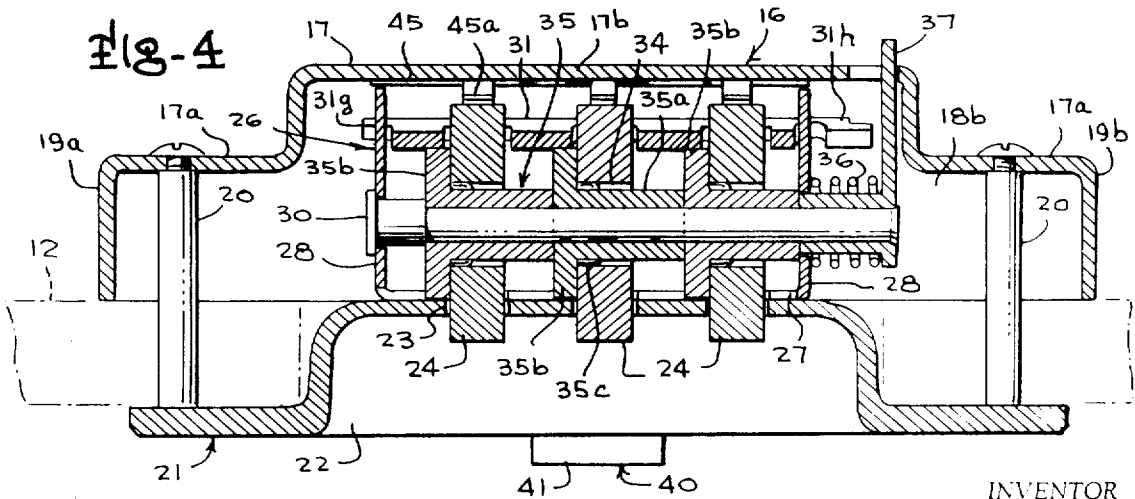
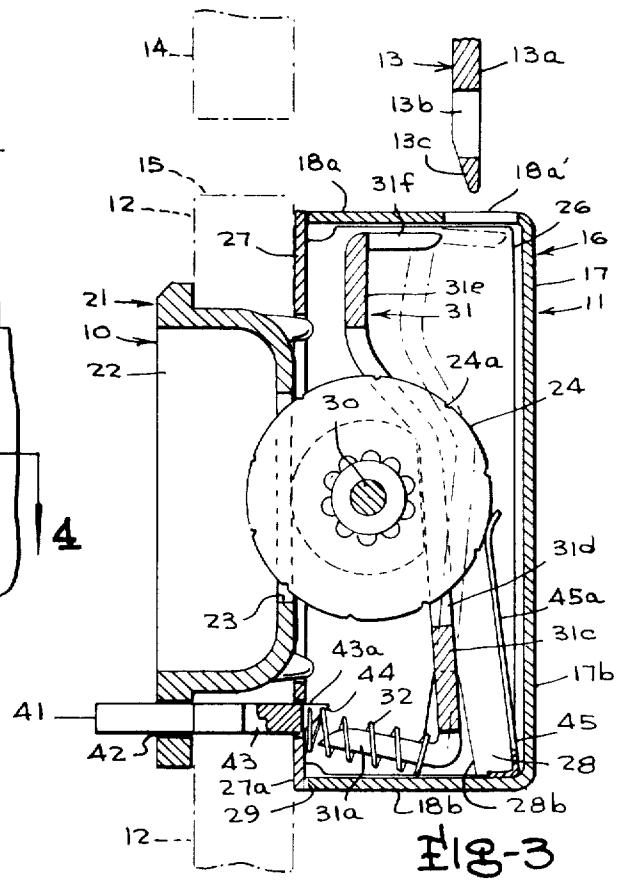
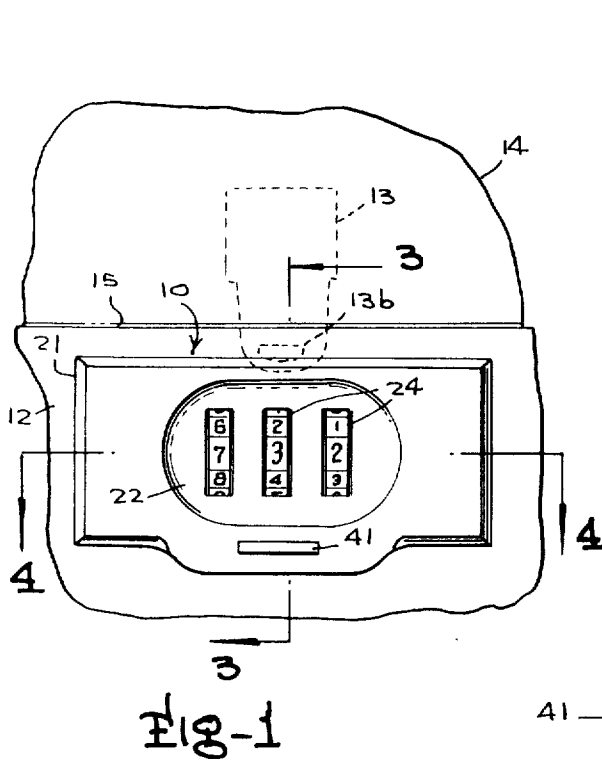
Primary Examiner—Albert G. Craig, Jr.
Attorney—Mason, Fenwick & Lawrence

[57] ABSTRACT

A combination lock for luggage cases and the like, including a keeper having an apertured end, to be mounted on one of the luggage case sections, and a latching sub-assembly to be mounted on the other case section. The latching sub-assembly includes a set of changeable combination dial wheels, and a tiltable fence biased to unlocking position having a latch tongue to interfit into the keeper aperture and having a forwardly projecting foot portion. A manual pushbutton member is provided to engage the foot portion and force the fence to tilt to unlocking position when the proper combination has been dialed and the pushbutton is pushed inwardly, notwithstanding that the keeper may tend to hold the fence in locking position due, for example, to over-packing of the luggage.

10 Claims, 4 Drawing Figures





INVENTOR

WALLACE E. ATKINSON

BY
Mason, Fenwick & Lawrence
ATTORNEYS

COMBINATION LOCK CONSTRUCTION

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to combination lock devices adaptable for application to containers or receptacles, such as luggage cases having separable sections to be releasably secured in closed position, and more particularly to a latching and locking mechanism for luggage cases having a plurality of rotatable combination dial members incorporated therein adapted to be individually set to a predetermined combination of dial numbers together with a manual pushbutton to positively force release of the mechanism from locking position when the proper combination has been dialed.

Combination locks have been used for many years in a wide variety of locking applications, but such combination locks have for the most part been of relatively complex and expensive construction involving a plurality of peripherally gaited tumbler wheels operating from a single dial. Such conventional combination lock structures, because of their size, expensive manufacture, and complex construction, have been generally considered unsuitable for ordinary portable luggage cases and like applications. Some combination locks for luggage cases have been marketed, having a keeper fixed to one of the luggage sections, such as the lid section, and having a latch and lock mechanism mounted in a housing carried by the other luggage section, wherein a plurality of combination dial members having numbers on their peripheries visible at the front of the casing are mounted on a common axis and control a fence member which is restrained in locking engagement with the keeper when the dial wheels are not set at the proper combination positions.

A weakness of the last-mentioned type of construction as normally produced is that internal pressure caused by overpacking of the suitcase or luggage case maintains such tension between the keeper and the fence member of the lock that the fence does not move away from the keeper under its ordinary spring bias to release the lid of the case when the proper combination of numbers is dialed on the dial wheels. This property of such locks creates great difficulties for the consumer. These locks are of the changeable combination type so that the customer can set his own combination for the lock when the lock is in unlocked condition. The consumer buys a suitcase and puts his own combination into the lock, usually committing it to memory without writing the combination down. If the consumer over-packs his suitcase, so that the pressure of the keeper surfaces on the fence member prevent the fence member from shifting to release position when the proper combination is dialed, he becomes perplexed when he dials the remembered combination on the lock, but the lid doesn't automatically open. Frequently the customer then becomes confused, and tries to dial variations of the remembered number which of course are to no avail, and may ultimately destroy the luggage case or the lock in attempting to gain forceable entry.

An object of the present invention, therefore, is the provision of a novel combination lock and latching mechanism for luggage cases, including a plurality of combination dial members controlling locking and releasing of a tiltable fence structure to be associated with the keeper, together with a pushbutton member which is activated following dialing of the combination to forceably shift the fence member to release position, notwithstanding that the keeper may be exerting pressure on the fence member tending to restrain it in locking position.

Another object of the present invention is the provision of a novel combination lock and latching mechanism for luggage cases and the like, wherein a keeper fixed to one of the luggage sections is interlocked by a tiltable fence controlled by plural combination dial wheels, and wherein means are provided for applying a releasing force to the fence member when the combination has been dialed to insure movement of the fence to releasing relation relative to the keeper when overpacking or stresses on the luggage tend to restrain the fence against normal releasing movement.

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.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a front elevation view of a combination lock device embodying the present invention, showing the same on a luggage case;

FIG. 2 is an exploded perspective view of the combination lock device;

FIG. 3 is a vertical section view taken along the line 3—3 of FIG. 1, with the device in unlocked condition; and

FIG. 4 is a horizontal section view taken along the line 4—4 of FIG. 1, with the device in locked condition.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, the combination lock and latching mechanism of the present invention is indicated generally by the reference character 10, and comprises a lock sub-assembly 11, which may, for example, be mounted on the lower or body portion 12 of the suitcase, and a keeper 13 which may be mounted on the separable cover section 14 of the luggage case. The lock portion and keeper may be mounted on the front wall of their respective receptacle sections, as shown in FIG. 1, adjacent the plane of separation 15 between the luggage body portion 12 and cover section 14. The keeper 13 in the illustrated embodiment is an integral member fixed against the inner surface of the front wall portion of the cover section 14 by any suitable means such as rivets or other conventional fastening devices, and has an upper mounting portion disposed against the inner surface of the front wall portion of the luggage cover and a downwardly extending tongue portion 13a having a keeper aperture 13b therein entirely surrounded by peripheral portions of the tongue 13a. The forwardly facing surface of the lower portion of the keeper tongue 13a is inclined rearwardly and downwardly as indicated at 13c, when viewed in lateral profile or in the section plane shown in FIG. 3, for a purpose to be later described.

The lock sub-assembly 11 comprises a generally box-like housing 16 including relatively shallow end portions and a deeper center portion, bounded by a rear wall 17, top and bottom walls 18a and 18b, and end walls 19a and 19b, all formed, for example, from sheet metal. The rear wall portions 17a bounding the shallow or end portions of the housing are apertured, in the illustrated embodiment, for passage of fastening screws into tapped openings in mounting posts 20 extending rearwardly from the face plate 21, or to receive rivets extending rearwardly from the face plate 21. The face plate 21 in the illustrated embodiment is mounted against the front surface of the associated wall of the luggage case section in forwardly covering relation to the housing 16, and includes a forwardly opening concave well 22 having laterally spaced, vertically elongated rectangular slots 23 therein through which segments of a plurality of dial wheels 24 pass to permit observation of the numbers on the peripheries of the dial wheels 24 and manual manipulation of the dial wheels to the desired combination positions.

Within the deeper center portion of the housing 16 bounded rearwardly by the rear wall portion 17b is a frame 26 for supporting the combination lock mechanism. The frame 26 is a channel shaped member formed from sheet metal, having a vertical front wall portion 27 and rearwardly projecting flanges defining end walls 28. The frame 26 is frictionally held in position within the housing 16 by short upper and lower extensions 27a in the central region of the front wall 26a which are tightly fitted in rectangular recesses 29 in the top and bottom walls 18a, 18b of the housing 16, for example by staking the lateral edges of the recesses 29 toward the center of the recess to securely hold the frame extensions 27a.

The end walls or flanges 28 of the frame 26 have circular openings 28a in the mid-region thereof between the top and bottom edges to rotatably and slidably support a shaft 30 on which the dial wheels 24 are mounted in a manner to be described hereinafter, and have somewhat downwardly divergent slots 28b opening through the lower edges of the end walls 28 to receive portions of a fence 31 and tiltably support the fence for movement toward and away from the shaft 30. The fence 31 is continuously biased toward the shaft 30 by a coil spring 32 which surrounds a narrow forwardly projecting finger-like extension 31a at the bottom center of the fence and bears against the lower region of the body portion 31c of the fence and the rear surface of the front wall 27 of frame 26. A pair of forwardly projecting foot portions or flange segments 31b flank the finger portion 31a and extend forwardly of the generally vertically extending body portion 31c of the fence to a position near the front wall 27 of the frame 26. The body portion 31c is a generally flat panel-like part of sheet metal having vertically elongated openings or recesses 31d therein for accommodating the dial wheels 24 and having a forwardly offset extension 31e in the upper center thereof terminating at its upper end in a rearwardly extending latching tongue 31f adapted to interfit in the keeper aperture 13b when the aperture portion of the keeper tongue has been projected downwardly through the slot 18a' in the top wall 18a of the housing into proper alignment with the tongue 31f. The lower region of the body portion 31c of the fence has a lug 31g at one end thereof fitted in one of the slots 28b of the frame end walls 28 and has a stop arm 31h at the other end of the body portion 31c to be located outwardly of the adjacent frame end wall 28 and connected to the rest of the body portion by a shallow web portion 31i at the bottom of the fence which is disposed in the other slot 28b.

The dial wheels 24, three of which are provided in the illustrated embodiment, have dial numerals on the peripheries thereof so as to be visible to the operator from the front of the unit, and have shallow V-shaped grooves 24a transversely spanning the dial peripheries in parallelism with the axis of the shaft 30 and located between the successive numbers on each dial wheel. The dial wheel assemblies may be of the construction illustrated and described in my U.S. application Ser. No. 757,073 filed Sept. 3, 1968, now U.S. Pat. No. 3,555,860 dated Jan. 19, 1971 wherein each dial wheel 24 has an axial bore 34 extending therethrough provided with a plurality of concave notches in the inwardly facing surface thereof, 10 such notches being present in the illustrated example. The dial wheels 24 are journaled on the shaft 30 in coaxial relation along the common axis of the shaft by means of hubs 35, each of the same construction, associated with the respective dial wheels 24. Each of the hubs 35 has a center bore through which the shaft 30 extends to support the hubs for rotational and axial sliding movement on the shaft, and includes a relatively smaller diameter, substantially cylindrical body portion 35a of a diameter corresponding to the minimum diameter of the bore 34 in the associated dial wheel 24 for relative rotation therein, and a larger diameter collar formation 35b of larger diameter than the minimum diameter of the bore 34 adapted to butt against the confronting face of the adjacent dial wheel 24. A plurality of eccentrically located, axially elongated interlocking pins or lugs 35c, one of which is illustrated in FIG. 2, project axially from the collar formation 35b along a portion of the axial length of the body portion 35a to be received in the notches in the inwardly facing surface of the bore 34 and interlock the associated dial wheel 24 with the hub 35 against relative angular movement at any of the ten selected angular positions corresponding to the ten dial numbers on the periphery of the dial wheel 24.

The stack of hubs 35 associated with the plurality of dial wheels 24 are in successive abutment with each other along the shaft 30 so as to be movable along the axis of the shaft 30 as a unit. The stack of hubs 35 is biased toward one end of the shaft 30, for example toward the left hand end as viewed in FIG. 4, by a coil spring 36 surrounding the shaft 30 and compressed between the adjacent end wall 28 of the frame 26 and

the combination change lever 37 fixed on the end of the shaft 30. The combination change lever 37 extends rearwardly through an opening therefore in the rear wall 17 of the housing 16, which is elongated laterally to permit lateral movement of the change lever 37 in the direction of the axis of the shaft 30 towards the opposite end of the shaft from a normal position to a disengaging position decoupling the hubs from their associated dial wheels. The change lever 37 is normally prevented from being moved from its normal position toward the disengaging position by the stop arm 31h which has a projection at its top end lying immediately along-side the end portion of the change lever 37 when the fence is in the locking position to prevent movement of the lever from its normal position. The lever 37, however, has a notch 37a therein which becomes aligned with the projection on the upper end of the stop arm 31h when the fence moves to the unlatching position to thereby permit movement of the combination change lever 37 and the shaft 30 axially to the disengaging position wherein the interlocking pins or lugs 35c are withdrawn from the notches in the bore 34 of the associated dial wheels 24.

The collar portions 35b of the hubs 35 each have a flat or relieved portion 35b' at a selected angular position thereon, which, when the associated dial wheels and hubs are angularly positioned so that the flats are parallel and face toward the body portions of the fence 31, coact with the portions of the fence body 31c between the slots 31d to permit forward tilting movement of the fence 31 from the locking position indicated in broken lines in FIG. 3 to the unlocking position illustrated in solid lines in FIG. 3. This amount of angular tilting movement of the fence 31 withdraws the latching tongue 31f from the aperture 13b of the keeper tongue permitting withdrawal of the keeper tongue from the lock housing 16.

When it is desired to change the combination of the lock, the operator dials the proper combination on which the lock has been set, and upon tilting movement of the fence 31 to the forward unlatching position, and opening of the luggage case to obtain access to the rear free end portion of the combination change lever 37, the change lever can be moved axially toward the releasing position to shift the hubs 35 to disengaged positions relative to their associated dial wheels 24. The dial wheels may then be manually adjusted to the desired angular positions representing the new combinations selected for the lock, and the combination change lever 37 is then returned to the normal position again interlocking the hubs with their associated dial wheels.

To provide for positive tilting movement of the fence 31 to the release position against possible frictional restraining force of the surfaces of the keeper aperture 37b with the latching tongue 31f when the suitcase has been overpacked, a manual pushbutton 40 is provided, having a forward portion 41 extending through and slidably supported in a slot 42 in the face plate 21 for inward and outward reciprocative movement, and having an inner actuator portion 43 slidable in a slot 27b in the front wall of the frame 26 and terminating in an inclined inner surface portion 44 forming a cam surface adapted to engage the forward, inclined end portions of the feet 31b of the fence 31 to force the forward ends of the feet 31b downwardly when the pushbutton is moved inwardly toward the rear wall of the housing and thereby forcibly rotate the fence through its forward tilting stroke to withdraw the latching tongue 31f from the keeper aperture 13b. The pushbutton 40 has laterally projecting ear formations 44 between the front portion 41 and the rear portion 43 to be located between the face plate 21 and the front wall 27 of the frame 26, and the pushbutton is resiliently biased to the outwardly or forwardly projected position by reason of engagement of the rearwardly facing surface of center recess 43a in actuator 43 with the upper forward portions of the spring 32. A detent spring member 45 is provided at the lower rear of the deeper center portion of the lock housing, and includes a right angle bottom portion which is held against the corner at the juncture of the rear wall portion 17b and bottom wall 18b by the frame 26, and a plurality of

upwardly extending and somewhat forwardly inclined detent fingers 45a to engage the peripheries of the dial wheels 24 and frictionally restrain the dial wheels at the angular positions to which they are manually adjusted by engagement of the slightly rounded upper portions of the detent fingers 45a in the V-shaped grooves on the peripheries of the dial wheels 24.

What is claimed is:

1. A combination lock device for separable container sections of a luggage case, comprising a keeper to be affixed to one of the sections having a keeper end portion projecting toward the other section, a latching assembly to be affixed on the other section including a housing into which said keeper end portion projects when the container is closed, a set of plural rotatable combination dial wheel assemblies disposed in axially spaced coaxial relation along a common axis, a tiltable fence member supported adjacent the dial wheel assemblies spanning the set for angular movement toward and away from said common axis between locking and unlocking positions about a fence pivot axis paralleling said common axis, said dial wheel assemblies including means normally restraining said fence member at said locking position and admitting movement thereof to said unlocking position only when said dial wheel assemblies occupy a selected combination of angular positions, said fence member having a latching formation spaced from the fence pivot axis to be interfitted into latching relation with said keeper end portion when the fence member is at said locking position and to be withdrawn from the keeper end portion at the unlocking position of the fence member, spring means biasing said fence member to said unlocking position, said fence member having an extension projecting forwardly therefrom, and an outwardly biased manual push-button member at the front of the lock device having a cam surface formation movable into the housing to engage said extension on the fence member and positively force the fence member to tilt to unlocking position by manual inward force on the push-button member.

2. A combination lock device as defined in claim 1, wherein said keeper end portion has an aperture adjacent the free end of the keeper to be located within the housing in the closed position of the container sections, and said fence member includes a body portion having said pivot axis adjacent one edge thereof and having a latch tongue at an opposite edge thereof forming said latching formation and extending substantially perpendicular to said keeper to project through said keeper aperture and retain the keeper end portion in said housing when the fence member is in locking position.

3. A combination lock device as defined in claim 2, wherein said extension of said fence member is a forwardly projecting foot formation integral with the fence body portion extending substantially perpendicular thereto, said cam surface formation of said push-button member having a shape to engage and force the forward end of said foot formation in a direction to rock the fence member about its pivot axis from locking position to unlocking position.

4. A combination lock device as defined in claim 1, including a shaft for said dial wheel assemblies, each dial wheel assembly comprising an outer annular wheel member having a central bore and an indicia bearing periphery and an inner hub slidably and rotatably journaled on said shaft and extending entirely through the bore of the associated wheel member, and said hubs being disposed in endwise abutting stacked relation on said shaft and each having a circumferential portion coaxial with said fence member to restrain the latter in locking position and a flat at a selected angular position for admitting unlocking movement of said fence member.

5. A combination lock device as defined in claim 2, including a shaft for said dial wheel assemblies, each dial wheel assembly comprising an outer annular wheel member having a central bore and an indicia bearing periphery and an inner hub slidably and rotatably journaled on said shaft and extending entirely through the bore of the associated wheel member, and said hubs being disposed in endwise abutting stacked relation on said shaft and each having a circumferential portion coaxial

ing with said fence member to restrain the latter in locking position and gating means at a selected angular position for admitting unlocking movement of said fence member.

6. A combination lock device adapted to be mounted on upper and lower separable container sections of a luggage case or the like adjacent a line of separation therebetween, comprising a keeper to be affixed to the upper section having a keeper end portion projecting toward the lower section, a latching assembly to be affixed on the lower section including a housing having an upper wall adjacent said line of separation and a lower wall, the upper wall having a slot for passage of the keeper end portion into the interior of the housing, a set of plural rotatable combination dial wheel assemblies disposed in axially spaced coaxial relation along a common axis paralleling said line of separation, a tiltable fence member supported adjacent the dial wheel assemblies spanning the set for angular movement toward and away from said common axis between locking and unlocking positions about a fence pivot axis adjacent said lower wall and paralleling said common axis, said dial wheel assemblies including means normally restraining said fence member at said locking position and admitting movement thereof to said unlocking position only when said dial wheel assemblies occupy a selected combination of angular positions, said fence member having a latching formation at its upper portion adjacent said upper wall to be interfitted into latching relation with said keeper end portion when the fence member is at said locking position and to be withdrawn from the keeper end portion at the unlocking position of the fence member, spring means biasing said fence member to said unlocking position, said fence member having an extension projecting forwardly from the lower portion thereof, and an outwardly biased manual push-button member at the front of the lock device supported for rectilinear reciprocation in a path perpendicular to said pivot axis and having a cam surface formation movable in the housing to engage said extension on the fence member and tilt the fence member to unlocking position by manual inward force on the push-button member.

7. A combination lock device as defined in claim 6, wherein said keeper end portion has an aperture therein and said fence member has a latch tongue projecting rearwardly substantially perpendicularly from the upper end portion of the fence member to extend through the keeper aperture in interlocking relation therewith at the locking position of the fence member, the cam surface formation on said push-button member being active when the dial wheel assemblies occupy the selected angular positions and the push-button member is pushed rearwardly to apply forces on said extension for positively forcing the fence member to tilt to unlocking position overcoming any restraints against unlocking movement exerted by the keeper against the latch tongue.

8. A combination lock device as defined in claim 7, wherein said extension of said fence member is a forwardly projecting foot formation integral with the fence member extending substantially perpendicular thereto, said cam surface formation of said push-button member having a shape to engage and force the forward end of said foot formation in a direction to rock the fence member about its pivot axis from locking position to unlocking position.

9. A combination lock device as defined in claim 6, wherein said extension of said fence member is a forwardly projecting foot formation integral with the fence member extending substantially perpendicular thereto, said cam surface formation of said push-button member having a shape to engage and force the forward end of said foot formation in a direction to rock the fence member about its pivot axis from locking position to unlocking position.

10. A combination lock device as defined in claim 7, including a shaft for said dial wheel assemblies, each dial wheel assembly comprising an outer annular wheel member having a central bore and an indicia bearing periphery and an inner hub slidably and rotatably journaled on said shaft and extending entirely through the bore of the associated wheel member, and said hubs being disposed in endwise abutting stacked relation

on said shaft and each having a circumferential portion coact-
ing with said fence member to restrain the latter in locking
position and a flat at a selected angular position for admitting
unlocking movement of said fence member.

* * * * *

5

10

15

20

25

30

35

40

45

50

55

60

65

70

75