Title: TOOL CASES WITH EASY REMOVAL OF STORED ITEMS

Abstract: A tool case (1) has a lid (2) and a base (3), and a panel (5) arranged therebetween. Various structures are used to trap or otherwise retain tools, tool items or other stored items (11), such that they cannot accidentally fall out of their "home" positions, but such that they are readily removable by the user when desired. Such structures include, for example, retractable stops (4), depressions (19) beneath stored items (11), weight-biased pivoting of holders (48), spring biasing of holders (48), trapping of items by the lid (2) or by other item holders (48) within the case (1), and various clip (12) arrangements. Preferably the lid (2) is transparent, and the tools or other items (11) are arranged by height in step-wise fashion, the panel (5) being stepped accordingly, to maximize visibility.
TOOL CASES WITH EASY REMOVAL OF STORED ITEMS

TECHNICAL FIELD

This invention relates to tool cases, particularly those which hold a variety of items, and particularly to features which provide easy access to those items.

It is common to store tools, tool bits, drill bits or other items in tool cases, usually by some sort of snap-in arrangement or similar. Because the stored items generally must be somehow secured so that they do not accidentally move around within the case or fall out of the case when the case is opened, the stored items are often difficult to remove.

DISCLOSURE OF INVENTION

It is an object of the invention to improve on existing tool cases and provide tool cases and tool case features which facilitate secure storage and yet easy removal of stored items.

In the invention, a tool case has a lid and a base, and a panel arranged therebetween, the panel arranged to hold tools, tool components, hardware or the like. Various means are used to trap or otherwise retain tools, tool components or other stored items, such that they cannot accidentally fall out of their “home” positions, but such that they are readily removable by the user when desired. Such means include, for example, retractable stops, depressions beneath stored items, weight-biased pivoting of holders, spring biasing of holders, trapping of components by the lid or by other component holders within the case, and various clip arrangements, the preceding being exemplary only, and not limiting.

Further features will be described or will become apparent in the course of the detailed description which follows.
BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described in greater detail, with reference to the accompanying drawings of the preferred embodiment, in which:

Fig. 1 is a sectional side view of a tool case according to the invention;

Fig. 2 is a sectional side view corresponding to Fig. 1, showing the lid removed from the base and drill bits positioned for removal;

Fig. 3 is a top view of a second embodiment, with the lid removed from the base;

Fig. 4 is a sectional end view of the second embodiment, showing a sloping panel arrangement;

Fig. 5 is a sectional end view of the second embodiment, showing a stepped panel arrangement;

Fig. 6 is a sectional side view of the second embodiment, showing the lid removed from the base;

Fig. 7 is a top view of a third embodiment, with the lid open;

Fig. 8 is a sectional end view of the third embodiment;

Fig. 9 is a sectional side view of the third embodiment, showing the lid closed;

Fig. 10 is a sectional end view of the third embodiment, showing the lid closed;

Fig. 11 is a sectional detail side view of the third embodiment showing the lid closed;

Fig. 12 is a sectional detail side view of the third embodiment, showing the lid open;
Fig. 13 is a detail side view of the third embodiment, showing the lid closed;

Fig. 14 is a detail side view of the third embodiment, showing the lid open;

Fig. 15 is a top view of a fourth embodiment;

Fig. 16 is a detail view of the fourth embodiment, showing the holder;

Fig. 17 is a sectional end view of the fourth embodiment, showing the lid open;

Fig. 18 is a sectional end view of the fourth embodiment, showing the lid closed;

Fig. 19 is a sectional side view of the fourth embodiment, showing the lid open;

Fig. 20 is a sectional side view of the fourth embodiment, showing the lid closed;

Fig. 21 is a top view of a fifth embodiment;

Fig. 22 is a sectional side view of the fifth embodiment;

Fig. 23 is a sectional side view of a sixth embodiment, with the lid open;

Fig. 24 is a sectional side view corresponding to Fig. 23, with the lid closed;

Fig. 25 is a perspective view of a variation of the sixth embodiment;

Fig. 26 is a side view corresponding to Fig. 25;

Fig. 27 is an exploded perspective view of the Fig. 25 case;

Fig. 28 is an assembled perspective view of the Fig. 25 case;
Fig. 29 is a sectional side view of the Fig. 25 case;

Fig. 30 is an exploded sectional elevation of a retention feature for hex bits; and

Fig. 31 is a view corresponding to Fig. 30, with the hex bit installed.

BEST MODES FOR CARRYING OUT THE INVENTION

Figs. 1 and 2 show a first embodiment of a tool case 1 having a top lid 2 and a base portion 3 and an insert panel 5" arranged therebetween. Fixed end stops 13 are used to prevent the components 11, drill bits for example, from sliding too much in the panel. The end stops are preferably moulded in the panel. The component is placed on the panel and held in place by a combination of a clip 12' and a bridge 12. The bridge is used to align the component during insertion into the tool case/clip. Beneath one end 11" of the components are depressions 19 in the panel 5". To remove a component, the one end 11' is pushed down into the depression. This elevates the opposite end of the component, freeing it from the clip 12' but still restrained by the bridge 12. The component can then be easily pulled out for use.

Figs. 3 to 6 show a second embodiment, similar to the first embodiment. The case has a panel that incorporates recesses, stops 10, and different elevations all moulded as part of the panel. In this case rather than there being a depression in the panel, the area for the component is elevated, so that the end effect is the same, i.e. open space beneath the end of the component.

Figs. 7 to 14 show a third embodiment. This embodiment is somewhat similar to the first embodiment, but a stop plate 4 mounted below the panel 5 is biased upwards by means of biasing means 6, for example one or more springs. The biasing means are thus mounted between the base 3 and the stop plate 4. A long lever 22 having an end knob 23 for facilitated manipulation, is pivotably connected to one side of the base and extends across the stop plate and protrudes through the opposite side of the base via
a J-shaped opening 24. The long lever provides a manual means to raise and lower the fingers 10. When the lid is open, the end of the long lever is pushed along the J slot and inserted in the short end (base end or "dead end") of the J to retain it. This lowers the stop plate and makes the components easily accessible. When the lid is closed, a tapered projection 25 on the edge of the lid urges the lever out of the short end of the J and the stop plate is biased upwards, providing the stops for the components.

Figs. 15 to 20 show a fourth embodiment. The panel has recesses (omitted for clarity) accommodating at least one pivotable holder 26. Components 11 are placed in the pivotable holder, which is then attached to the panel by means of pivot pins 27 (preferably moulded on the sides of the pivotable holder) and mounting holes (not shown) through side walls 28 of the recesses. The pivot points are located such that the holder 26 pivots up to expose the components in their free position, when the lid 2 is open. The holder preferably have an enclosed end 29, an open end 30 and a hold down bar 31. The components are inserted into the holder via the open end and securely held by the enclosed end in cooperation with the hold down bar. The holder further has an extension arm 32, preferably integrally moulded with the holder, on one side of said holder protruding from the open end 30. The lid has an activation ridge 33, preferably integrally moulded with the lid, on an inside edge of the lid. Upon closing, the activation ridge depresses the extension arm 32 and urges it flat into the recess preventing removal or dislodging of components held in the holder 26. The holder thus forms an unbalanced see-saw, when it is mounted in a recess of the panel 5, with the heavy end being the enclosed end 29.

Figs. 21 to 22 show a fifth embodiment. The panel has a recess 19' corresponding to the earlier described depression 19, so that one end of the component 11 can be pressed down to free the other end from the clip and elevating it for easy removal. The recess 19' has a sloping floor, as opposed to the depression 19, which has a level floor. Finger access depressions 35 have also been provided for ease of removal, either before or after the component is pressed down with one end into the recess 19'.

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Usually, small power bits 11" (around 25 mm in length) are difficult to remove from their panel holes 36. The section(s) of the panel in which the small power bits are stored can be raised and the fit of the bit in the panel hole can be made loose. In this way, the lid 2 prevents the components from falling out of the panel holes when the lid is closed, yet the bits are easily removed when the lid is opened. The distance between the top surface of the panel and the inner surface of the lid is designated A, and should be of a length that leaves less space between the tip of the small power bit and the lid than the distance the bit is inserted into the panel holes, to prevent the bits from sliding out of the panel holes when the lid is closed.

Longer power bits 11" (e.g. 50 mm in length) are preferably held by clips 12 on angled surfaces 37 or on elevated surfaces to provide space underneath an end as in the first and second embodiments. An end clip 12" is preferably used in the notch of the bit to prevent longitudinal movement, while the clip 12 holds the body of the long power bit. Because of the angular or flat elevated position, finger access is facilitated and removal made easier, because a finger can easily access the under side of the end of the bit.

Figs. 23 and 24 show a sixth embodiment. In this embodiment, tools 11 of varying sizes may be mounted in the case, in recesses whose depths are selected relative to the sizes of the tools such that the lid 2 when closed contacts or comes close to contacting the tools, such that there is no room for them to fall out of their respective recesses. In this case in particular, but also in others as applicable, it is particularly advantageous to use a stepped approach in arranging the tools, in combination with a transparent lid, to maximize visibility of the tools. Thus, longer tools preferably will be at the front of the case, and shorter tools at the back of the case, as can be seen clearly from Figs. 23 and 24. This arrangement provides the consumer with excellent visibility of the tools, secure storage for same, and easy access for same whenever required.

Figs. 25 to 29 show a variation of the sixth embodiment, in which the case has a plurality of externally-mounted pivotable bins 48, in which components are trapped when the bins are rotated to a closed position. Figs. 27, 28 and 29 show a variation in which there are a number of divided compartments 55, and a tray 56 which sits over the
divided compartments, nesting with same and into end compartments thereof in particular. The tray then traps any items which are in the divided compartments. The tray itself has means for holding tools, such as holes 57 which can accommodate screwdrivers, for example. Preferably, as in Figs. 23 and 24, sizing will be adjusted so that the lid 2 when closed is close to the upper end of the screwdriver handles, so that they are trapped in the case. If desired, the case may also be provided with a number of divided compartments 58 along the back wall of the case.

Figs. 30 and 31 show a retention feature for hex bits, which may be used in virtually any of the cases described above as a convenient way of securely retaining the bits 11 while at the same time providing easy access. The panel 5 is provided with a number of recesses 50 into which the bits fit. Each bit typically has an annular groove 51. The panel is provided with a resilient rail 52 extending along just underneath the panel, preferably as an integral part thereof, the rail having a ridge 53 configured to cooperate with the grooves 51 of the bits, to prevent the bits from falling out. However, sufficient resilience is provided so that the bits can be extracted with a minimal amount of force when needed.

INDUSTRIAL APPLICABILITY
The invention provides a tool case with secure storage of items stored therein, but easy removal when removal is desired.
CLAIMS

1. A tool case having a base and a lid securable thereto to define a storage space between said base and said lid, comprising at least one panel in said base having means for holding items selected from the group consisting of tool, tool components and hardware, said tool case having easy-access means for securing said items in said tool case while nevertheless facilitating simple removal when desired, said easy-access means comprising at least one means selected from the group consisting of A, B, C, D and E, where:

   A is a retractable stop means projecting through said panel, movable between a first position in which said items are blocked against movement when said lid is closed, and a second position in which said items may be removed, when said lid is open;

   B is said items being retained by clips, a free end of said items having clearance provided beneath said free end, whereby said free end of said items may be pushed downwardly to cause rotation of said items about a fulcrum point, to release said items from said clips;

   C is item holders pivotally mounted in said base, biased such that when said lid is open, said item holders pivot to an easy-access position, but pivot to a position where items are blocked against removal when the lid is closed;

   D is item holders positioned such that items therein angle away from said base for easy removal, and said lid when closed is positioned close enough to said items to prevent removal thereof;

   E is pivotally mounted item holders, closed by closing of said lid, removal of items from said item holders being blocked when closed, by other item holders.

2. A tool case as recited in claim 1, in which A comprises a stop plate mounted between the panel and the base and biased towards the base by biasing means and movable between an access position, in which the stop plate is moved towards the base and a holding position, in which the stop plate is moved towards the panel, the stop plate having at least one finger, which protrudes through corresponding at least one slot in the panel when the stop plate is in the holding position and which is retracted
through the slot when the stop plate is in the access position, the at least one finger serving as a stop for an item held on the panel when the stop plate is in the holding position.

3. A tool case as recited in claim 1, in which B comprises end stops arranged to prevent items held in the case from sliding, the item being placed on the panel and held in place by a combination of a clip and a bridge, the bridge being used to align the item during insertion onto the panel, depressions are arranged in the panel beneath one end of the items, whereby to remove an item, the one end is pushed down into the depression to elevate an opposite end of the item, freeing it from the clip but still restrained by the bridge.

4. A tool case as recited in claim 1, wherein a stop plate is mounted between the panel and the base and biased towards the lid by biasing means and movable between an access position, in which the stop plate is moved towards the base and a holding position, in which the stop plate is moved towards the panel, the stop plate having at least one finger, which protrudes through corresponding at least one slot in the panel when the stop plate is in the holding position and which is retracted through the slots when the stop plate is in the access position, the at least one finger serving as a stop for an item held on the panel when the stop plate is in the holding position.

5. A tool case as recited in claim 1, wherein the panel has recesses accommodating at least one pivotable holder having items placed in it, the holder being attached to the panel by means of pivot pins and mounting holes through side walls of the recesses, the pivot points being located so that the holder pivots up to expose the items in their free position, when the lid is open, and the holder is pressed down into the recess when the lid is closed.

6. A tool case as recited in claim 1, wherein the panel has at least one recess in which one end of an item can be pressed down to free the other end from a clip and elevating the item for easy removal, the recess having a sloping floor, and where finger access depressions are provided in the panel for ease of removal of the items.
7. A tool case as recited in claim 1, wherein the panel has at least one raised area on which items are mounted, and at least one recess adjacent one end of the items in which one end of the items can be pressed down to free the other end from a clip and elevating the item for easy removal, and where finger access depressions are provided in the panel for ease of removal of the items.

8. A tool case as recited in claim 1, wherein items are stored in raised sections of the panel and the fit of the items in the panel hole is loose, to enable the lid to prevent the items from falling out of the panel holes when the lid is closed, yet making the items easily removable when the lid is opened.

9. A tool case as recited in claim 1, wherein items are held by clips on angled surfaces of the panel, and an end clip holds a notch of the items to prevent longitudinal movement of the items, and the clip holds the body of the items, so that because of the angular position, finger access to the underside of the items is facilitated and removal made easier.

10. A tool case as recited in claim 1, comprising retention means for hex bits, comprising a number of recesses into which the hex bits fit, each bit having an annular groove, the panel being provided with a resilient rail extending along just underneath the panel, said rail having a ridge configured to cooperate with the said annular grooves to prevent the bits from falling out, sufficient resilience being provided so that the bits can be extracted with a minimal amount of force when needed.

11. A tool case as recited in claim 1, wherein items are arranged step-wise within said case such that longer items are at the front of the case, and shorter items are towards the back of the case, the panel being stepped upwardly from front to rear accordingly to provide different heights such that the shorter items remain visible.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 02/01013

Box I  Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. □ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claims Nos.:
   because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. □ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II  Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. □ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. □ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. □ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. □ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
   1 (alternative A), claims 2-11 when dependent on claim 1 (alternative A)

Remark on Protest

□ The additional search fees were accompanied by the applicant’s protest.

□ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1 (alternative A),
   claims 2-11 when dependent on claim 1 (alternative A)

   Retractable stop means

2. Claims: 1 (alternative B),
   claims 2-11 when dependent on claim 1 (alternative B)

   A clearance beneath the free end of the items retained by clips

3. Claims: 1 (alternative C),
   claims 2-11 when dependent on claim 1 (alternative C)

   Item holders mounted pivotally in said base

4. Claims: 1 (alternative D),
   claims 2-11 when dependent on claim 1 (alternative D)

   Item holders positioned such that the items therein angle away from said base

5. Claims: 1 (alternative E),
   claims 2-11 when dependent on claim 1 (alternative E)

   Pivotingly mounted item holders with removal of items from said item holders being blocked when closed, by other item holders
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7

B25H3/00  B25H3/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7  B25H  B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Relevant to claim No.</th>
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<td>US 5 887 715 A (VASUDEVA KAILASH C) 30 March 1999 (1999-03-30) column 2, line 40 - column 3, line 26 figures 1-5 -----</td>
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Further documents are listed in the continuation of box C. X Patent family members are listed in annex.

* Specially categories of cited documents:

A*: Document defining the general state of the art which is not considered to be of particular relevance

E*: Earlier document but not published on or after the International filing date

L*: Document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O*: Document referring to an oral disclosure, use, exhibition or other means

P*: Document published prior to the International filing date but later than the priority date claimed

T*: Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X*: Document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y*: Document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to the person skilled in the art

S*: Document member of the same patent family

Date of the actual completion of the international search: 6 November 2002

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Name and mailing address of the ISA

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