ABSTRACT: An industrial blade holder combination with the blade being mounted on a carrier and selectively movable to retracted and operative positions including a position in which the blade is readily removable for replacement, the combination including a blade magazine for replacement blades, the magazine being replaceably mounted in the handle and arranged to enable individual blades to be dispensed therefrom for insertion in the handle while the magazine remains in the handle.
RETRACTABLE BLADE KNIFE

BACKGROUND AND FIELD OF THE INVENTION

The invention is concerned with industrial knives of the type comprising a handle adapted to hold a blade replaceable by a new blade when, through use or other conditions, the blade becomes worn or damaged. Blades of this general character have been provided in which the blade is selectively movable to an operative position or to a retracted position in which the cutting edge is protected against damage and against injury to persons.

Many varied designs have been heretofore employed or proposed of the general character concerned. Representative U.S. Pat. comprise Robinson, Jr., No. 3,107,426 and Gringer No. 3,192,624. In the forms as disclosed in these patents, new blades are contained in the handle, but substitution of a new blade in the operative position requires removal of means holding the handle halves together to enable release of the used blade and to obtain access to the new blade in the handle for substitution in the operative position.

The U.S. Pat. to Nissen, No. 3,025,598 shows an industrial knife in which the blade is described as removable without taking the handle apart, but in that case the blade is of special shape, having a tail portion with an enlarged inner end designed to cooperate with specially shaped complementary elements in the handle to lock the blade therein except when in a certain position. The blade in that case accordingly has a special shape and is not reversible as distinguished from the blade in the present invention, and as disclosed in the two previously mentioned patents, which has a symmetrical trapezoidal shape and is reversible in the holder when the cutting edge portion at the exposed area becomes worn or damaged.

THE PRESENT INVENTION

The handle and blade combination of the present invention obviates the disadvantages, particularly noted above, and others as well. In general, it embodies in the handle a blade carrier for holding and shifting the blade to operative and retracted positions constructed and arranged in conjunction with handle elements so that the blade may be readily removed by a simple manipulation and the blade reversed to present a new cutting edge area or replaced by a new blade. New blades are made readily available in the handle without separating the handle parts.

The new blades are contained in the handle preferably in a magazine which is removably and replaceably mounted in a cavity in the handle and arranged so that individual blades may be withdrawn for use without removal of the magazine until the contents thereof are exhausted.

Other features and physical elements and advantages will be made apparent by consideration of a representative embodiment of the invention. Accordingly, in connection with the description, reference should be had to the accompanying drawings in which:

FIG. 1 is a top plan view of the complete handle arranged on edge;

FIG. 2 is a plan view of the handle with the top half of the casing removed and showing the magazine embodied in the handle;

FIG. 3 is a fragmentary view of the left end of FIG. 2 showing a blade mounted in the blade carrier in retracted position;

FIG. 4 is a vertical section through the plane 4-4 of FIG. 1;

FIG. 5 is a view in perspective of the blade carrier;

FIG. 6 is a top plan view of another form of the handle and magazine combination with a modified blade carrier and means for removal of the blade;

FIG. 7 is a plan view of the handle and magazine combination in FIG. 6 with the top half of the handle removed and showing the magazine located in the handle;

FIG. 8 is a vertical section on the plane 8-8 of FIG. 6;

FIG. 9 is a vertical section similar to FIG. 8 but with the blade carrier moved outwardly to the blade release position;

FIG. 10 is a top plan view of the blade magazine with portions broken away to show, in part, at the right-hand section the blade withdrawal tray and portions of the lower half of the magazine;

FIG. 11 is a bottom plan view of the magazine, that is reversed from the view of FIG. 10;

FIG. 12 is a vertical section taken on the plane 12-12 of FIG. 10;

FIG. 13 is a vertical section taken on the plane 13-13 of FIG. 10; and

FIG. 14 is a vertical section taken on the plane 14-14 of FIG. 10.

Referring to the embodiment of the invention shown in FIGS. 1 to 5, the knife 10 includes two complementary halves 11 and 12 held together by suitable means such as the screw 13 extending through the casing half 12 and threaded into the casing half 11. The handle halves may be made of lightweight aluminum or suitable plastic. Slightly mounted in the handle is the blade carrier 15 shown as an individual element in perspective in FIG. 5. The carrier includes a main plate section 16 having a lower flange portion 17 adapted to receive the cutting edge 18 of the blade 19 and a section 16 having a rear lug 20 adapted to engage and locate the blade as indicated in FIG. 3. The carrier may be made for the most part at least as a stamping of sheet steel or other spring metal material.

The blade may vary in shape and character but in the present instance, it is shown of conventional form, being symmetrical with the shape in general form of a trapezoid. The rear edge (upper in FIG. 3) of the blade is provided with a pair of semicircular notches 21 in the rear one of which is engaged a lug 22 bent forward as shown in FIGS. 2, 3 and 5 from the upper portion of the plate section 16. The notches 21 are arranged symmetrically with respect to a vertical centerline, the blade being reversible and the lug 22 in each case will engage in the rear notch 21.

As shown in FIG. 4, the carrier and the blade thereon are adapted to move longitudinally of the handle between the guide ribs 30 and 31 of the casing half 12 and opposed ribs or lands 32 and 33 of the casing half 11.

Extending to the rear of the carrier 15 is a flexible leaf spring portion 34 carrying a manually engageable tab or finger piece 35 connected by means of a support 36. The leaf portion or finger 34 also carries a pair of upstanding latching lugs 37, the function of which will be described shortly. The opposed handle halves 11 and 12 have cutaway portions 40 and 41 respectively extending longitudinally in the top edge of the handle to form opposed recesses into which the finger piece 35 may be depressed to release the latching means. The two opposed handle halves are also cut away to form a longitudinally extending slot 45 among the rectangular portion 36 of the finger piece 35 may move. Below the guideway 45 each of the handle halves is provided with a series of downwardly facing notches 46, 47, 48 and 49 into which the lugs 37 on the carrier 15 are adapted to engage, the spring finger 34 being biased upwardly to cause such engagement when the carrier is in an appropriate position for a particular pair of the notches and the finger piece 35 is released. As shown in FIG. 3 the lugs 37 are engaged in the rearmost notch 46 and the blade 19 is in a fully retracted position. Upon depressing the finger piece 35 the blade carrier may be selectively moved forwardly into the positions determined by the notches 47 and 48 where the blade is, what may be termed, partially exposed, and upon further advance to the notch 49, the blade is fully exposed for cutting as shown in phantom in FIG. 2.

As an important feature of the knife, means are provided whereby the blade may be entirely removed from the handle in the foremost forward position of the carrier and blade, comprising that shown in FIG. 2. The carrier 15 includes an upstanding plate portion 52 shaped as shown in FIG. 5 which has a finger tab 53 at the top and a laterally extending lug 22, heretofore described, stamped out from the sheet metal. The
plate portion 52 is mounted on an extension of a section 54 of the blade carrier. As a consequence, the blade portion 55 and 56 defining the sheet metal portion 54. The handle half 11 is cut away on the surface facing the other handle half to provide a longitudinal slot 57, which is a continuation of the main slot 45, but of narrower dimension sufficient only to receive the thin plate portion 52 of the blade carrier. The slot 57 is enlarged laterally at the outer end to form a rectangular notch 58 adapted to permit the lateral movement to the left of the plate portion 52 when the carrier and blade are in their extreme forward position. Such deflection of the plate 52 releases the lug 22 from the notch 21 of the blade 19 permitting the blade to be freely withdrawn. Similarly, a new blade may be inserted by lateral deflection of the plate 52 and upon release after the blade is in position, the lug 22 engages in the notch 21 of the new blade.

As indicated particularly in FIG. 2, the handle has a cavity in which is located a supply of new blades. The blades are contained in a magazine M insertable at the bottom edge of the handle as arranged in FIG. 2. Referring to FIGS. 10 to 14, the magazine comprises three major upper portions, a base portion 60 shown in the magazine appears in FIG. 10, a lower casing half 61, comprising the top part in the reversed position of FIG. 11 and a movable tray portion 62 shown in part in plan in FIG. 10 and in cross section in FIGS. 12, 13 and 14. The magazine parts are preferably composed of a suitable molded plastic material such as a acetal resin available commercially under the trademark "Delrin". Mounted within the magazine casing, as shown particularly in FIG. 12, is a stack of blades B, the blades being omitted in the showing of FIG. 10. The bottom plate or casing half 61 has a pair of spaced abutments 63 and 64 upon which the stack of blades resets when the casing half 60 is uppermost as in FIG. 10. The top half of the casing shown, particularly in the left portion of FIG. 10, includes a pair of elastic guides 70 and 71 which may be formed integrally with the casing half 60 through the provisions of cuts 72 and 73. The fingers 70 and 71 are biased inwardly so as to engage the stack of blades B and urge them into contact with the supporting abutments 63 and 64 regardless of the position of the magazine unit M.

Movable mounted between the two casing halves 60 and 61 is the tray 62, previously mentioned which has an outer flange portion 80 adjacent to which the cutting edge of the bottom blade is normally located. The tray may be variously mounted for outward and inward movement but in the present case, it is conveniently mounted for pivotal movement on the pin 81 which may be cast integral with the plate or casing half 61, the pin extending through the casing half 60. A further pin 82 joins the opposite ends of the casing halves. The pins may be secured by any suitable means and correspondingly, the casing halves secured together. Since the materials for the magazine are preferably plastic material, the parts may be ultrasonically sealed together.

The tray has a trapezoidal section 62a adapted when the tray is in its inward position to be located between the two abutments 63 and 64 of the lower half of the casing 61 and to be underneath the lowermost blade, the blade stack overlapping onto the abutments 63 and 64. The tray 62 also includes a tab 62b adapted to be received in a notch 83 in the casing plate 61 and to extend beyond the plate as shown in FIGS. 12, 13 and 14. Preferably the tray 62 has a detent element to releasably hold it in closed position as indicated at 84.

The plate 61 has a pair of vertical ribs 86 adapted to engage in the notches 21 at the rear edge of the blades and serve as a locating and guiding means for the blades as they progressively move toward the abutments 63, 64 when the successive blades are removed. As may be seen in FIG. 14, the bottom end of the ribs 86 are tapered upwardly and outwardly for a purpose to be more fully described. As a cooperative action, the tray 62 is provided at the rear edge with a small rectangular extension 87 (FIGS. 2 and 14) on which are located two boss portions spaced and located to engage under the bottom ends of the ribs 86. The inner ends of the boss portions are bevelled off as indicated in FIG. 14 but the forward edges have square shoulders 89. Accordingly, as the tray 62 is swung inwardly, the boss portions 87 slide underneath the bottom ends of the ribs 86 and in this position, the forward shoulders 89 of the boss portions engage against the blade edge in the notches 21 and upon swinging the tray outwardly, a blade is carried thereon to an exposed position as shown in FIG. 2 where the blade may be picked up and inserted in the operative end of the handle as heretofore described.

Means for releasably mounting the magazine in the handle are embodied comprising in the present form of the invention a pair of elastic fingers 90, integral with the top plate 60, the fingers each having an enlargement or knob 91 adapted when the magazine is fully inserted to engage in complementary notches in the cavity of the handle. The outer edge face of the magazine preferably coincides with the edge surface of the handle so as to form a smooth article, the handle half having a smooth notch 93 thereon to receive the tab 62a of the dispensing tray. For ready removal of the magazine, the top of the handle, as viewed in FIG. 2, has a smooth depression or cutout portion 95 whereby finger pressure may be exerted directly on the magazine to push it outwardly, releasing the elastic finger 91 from engagement in the complementary notches in the handle.

In the modified form shown in FIGS. 6 to 9 the overall arrangement is generally the same, although in this case, the magazine is insertable at the same edge of the handle as the element for adjusting the blade carrier is located, and the specific means for adjusting and releasing the blade differ in details from that of FIGS. 1 to 5. In this modified form, the blade carrier 98 has only the single fingertip piece 100 which corresponds in general to the fingertip piece 35 of FIG. 5. For increased stability the carrier preferably is provided with a rear extension 98a offset to one side by a bend at approximately the point 99a and 99 which may be formed integrally with the elastic guides in the casing half 11. The offset permits the extension 98a to pass to one side of the magazine M. The tab 100 is mounted on an elastic spring finger 101 which has lugs 102 engageable in notches 46, 47, 48 and 49 as in the form of FIGS. 1 to 5. For removal of the blade from the carrier, however, the carrier has one additional forward position beyond the locking notch 49 and, while engaged, the carrier may be advanced to where the locking lug 103 is carried beyond the outer end of the handle. For this purpose, when the stub support 100a for tab 100 reaches the end of the slot 104 (corresponding to the slot 45 shown in FIG. 1) it engages against a shoulder 105 comprising a temporary stop. However, an offset notch is provided in the form of a slot portion 106 comprising an extension of main slot 104 offset to the left in FIGS. 8 and 9. Therefore, by moving the fingertip piece 100 to the left it may enter the slot portion 106. The carrier may then be further advanced and the blade carried with it by reason of the lug 107 engaging the rear edge of the blade. FIG. 9 shows the parts just prior to the support 100a for the finger tab 100 entering the slot portion 106, and FIG. 9 shows the parts after the support has entered slot 106.

In this latter position, the lug 103 has moved out of the blade notch 21 and the blade may be freely withdrawn and reversed as to position or a new blade inserted and pushed inwardly with the carrier initially to the outermost locked position.

Various further modifications and changes may be made in the handle and operating parts and in the magazine comprising different embodiments of the principles of the invention. Accordingly, it is intended that all matter contained herein shall be interpreted as illustrative and not in a limiting sense.

Claim:
1. In a knife having a handle, a blade carrier mounted for longitudinal slideable movement in a longitudinal passage therein to position selectively the blade in exposed operable or retracted protected positions, a first manually engageable tab connected to said carrier for effecting longitudinal movement thereof, and a second manually engageable tab having an elastic connection to said carrier with a locking lug engagea
ble in an opening in the blade, said tab being moveable in an advanced blade exposed position to release said locking lug from the blade opening thereby to permit removal of the blade from the handle.

2. A knife in accordance with claim 1 in which said first and second tabs are moveable along a common slot in the handle.

3. A knife in accordance with claim 2 in which said handle is comprised of opposed complemental halves and said slot along which the tabs are moveable is at an upper edge at the corresponding junction of the two halves and said first tab has an elastic connection to said carrier with a lug selectively positionable in notches at the under edge of said slot.

4. A knife in accordance with claim 2 in which said slot has an offset portion corresponding to said advanced position thereby to receive and permit lateral movement of said elastic support and correspondingly release the blade at said advanced position.

5. In a knife having a handle, a blade carrier mounted for longitudinally sidable movement in a longitudinal passage therein to position selectively the blade in exposed operable or retracted positions, said handle having a longitudinal slot along one edge, a manually engageable tab extending outwardly through said slot having an elastic connection to said carrier, a locking lug mounted on said blade carrier engageable in an opening in said blade, said slot comprising a track with an offset portion at its outer end providing a shoulder limiting advance of the carrier and blade to a locked cutting position, said elastic connection permitting lateral movement thereof into the slot offset portion and further advance of the carrier for removal of the blade.

6. A knife in accordance with claim 5 in which said tab has a carrier positioning lug selectively engageable in notches at the inner edge of the slot releasable by inward depression of the tab transverse to said lateral movement of the elastic connection and tab.