

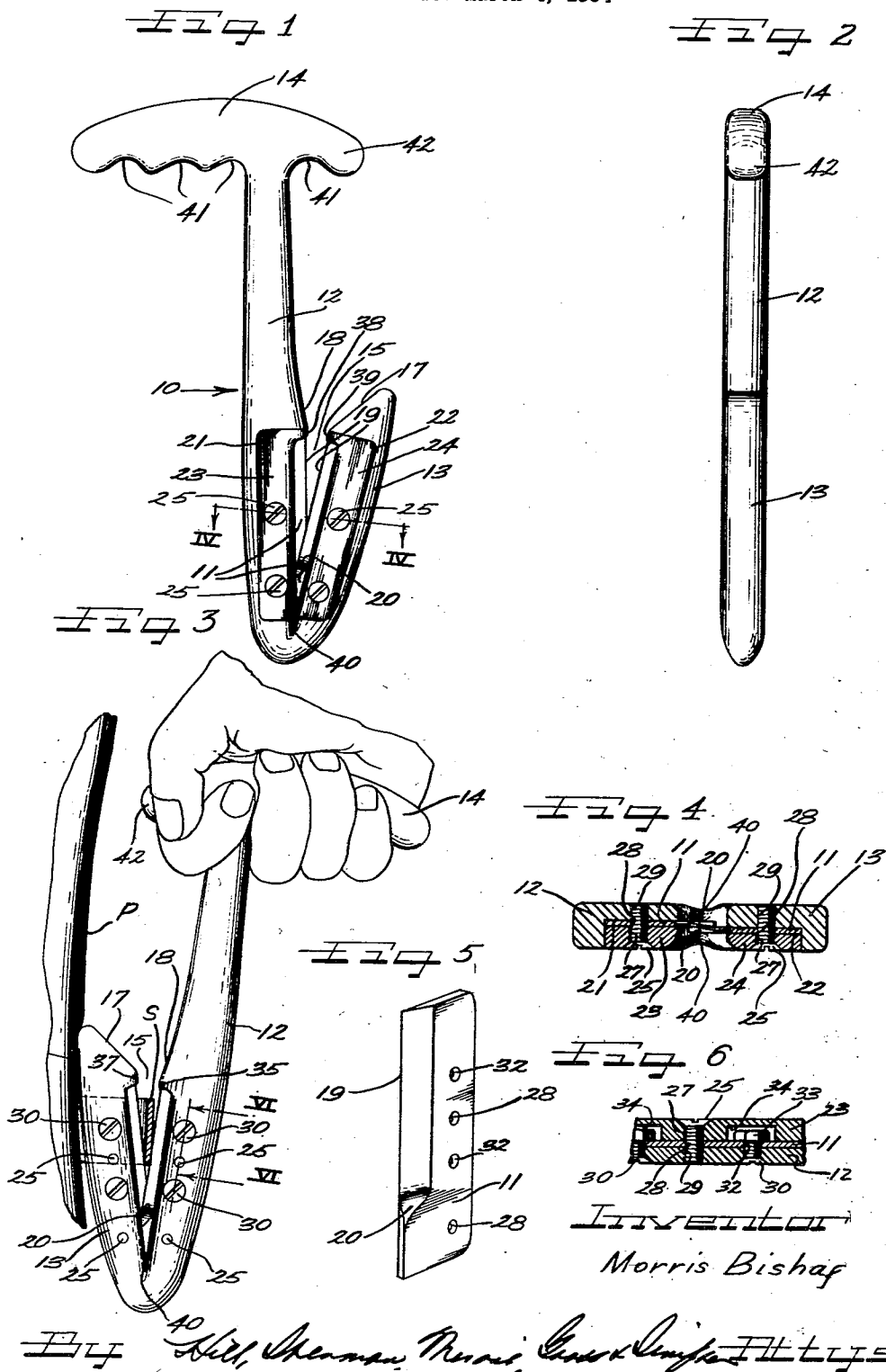
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RESCUE KNIFE

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RESCUE KNIFE

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The present invention relates to a novel rescue knife especially adapted for cutting retaining straps, harness straps, and the like used on or in association with persons who have befallen accidents or conditions requiring them to be released for escape or removal from the restraint of the straps or harness.

Parachutists, airplane accident victims, and others restrained from escape from an untenable or dangerous situation by safety straps, harnesses, and the like can oftentimes be released in rescue or self-escape operations only by cutting them free from the restraining straps or harness. Often, as a life-saving measure such release must be accomplished with great speed if life is to be saved. Following jumps by parachutists under warfare or military maneuver conditions they frequently encounter situations where danger of loss of life is greatly increased if time must be taken to open buckles or catches on the parachute harness, and frequently where rescues must be effected the latches, buckles or other attaching means for the harness may be inaccessible or difficult to open due to the victims position or condition. Victims of airplane accidents must often be released from their safety belts with great speed due to the presence of or danger of fire. Under these and similar circumstances it is highly desirable to cut the person free from the restraining straps or harness without delay in the interests of safety.

An important object of the present invention is to provide a device which is especially adapted for release and rescue of persons from restraining straps or the like, by providing efficient means for cutting the straps.

Another object of the invention is to provide a novel, efficient rescue knife structure which is so constructed and arranged that even tightly attached or binding straps can be safely engaged and severed from a person.

A further object of the invention is to provide a rescue knife construction that is especially adapted for safe use both with respect to the user or wielder of the knife and the body of the person from whom a strap must be removed or released by severance.

Still another object of the invention is to provide a rescue knife construction which is provided with a manipulating handle structure affording efficient operating leverage in a balanced manner enabling the most effective operation of the device as a substantial extension of the arm leverage of the wielder of the device.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying drawings, in which:

Figure 1 is a side elevational view of a rescue knife structure embodying the features of the present invention;

Figure 2 is a front elevational view of the rescue knife structure;

Figure 3 is a side elevational view of the knife structure from the opposite side to that seen in Fig. 1 and demonstrating how the device may be used;

Figure 4 is an enlarged fragmentary sectional view taken substantially on the line IV—IV of Fig. 1;

Figure 5 is an enlarged perspective view of one of the pair of knife blades used in association in the rescue knife assembly; and

Figure 6 is an enlarged fragmentary sectional detail view taken substantially on the line VI—VI of Fig. 3.

A rescue knife construction embodying the present invention preferably comprises a one-piece supporting member 10 carrying a pair of cooperatively related knife blades 11. For light weight consistent with strength of high safety factor, the supporting member 10 may be molded or cast from light weight metal such as aluminum, magnesium alloy, or the like, or it may be molded from a synthetic plastic material of suitable strength.

One of the knife blades 11 is supported adjacent one end of an elongated rigid lever body portion 12 of the supporting member, while the other of the knife blades 11 is carried in cooperative relation to the body carried knife blade by a divergently-related terminal hook-like extension portion 13 on the knife-carrying end portion of the body portion 12. At its opposite end, the body portion 12 has a transversely extending handle 14.

The construction and relationship of the several cooperating portions of the supporting member 10 is such that the device can be conveniently grasped by the handle 14 in either hand of a wielder of the knife, substantially as depicted in Fig. 3 for engaging and cutting a strap S on or in association with the body of a person P. The person's body P may be that of a different person from the knife wielder being rescued, or it may be the body of the knife wielder himself, such as a parachutist for effecting quick release from the strap S by severing the same.

To facilitate severing engagement of the strap S, the knife-supporting portion of the lever body 12 and the hook terminal 13 are related in generally V-fashion to provide a strap-receiving and guiding throat 15 of substantial depth therebetween with a flaring mouth provided by a sloping lead-in surface 17 on the distal end portion of the hook terminal 13 and a generally complementary lead-in cam surface 18 opposite thereto on the adjacent portion of the lever body 12.

Mounting of the complementary, cooperative blades 11 is in an efficiently centered, balanced and protected relation within the strap-receiving throat 15. To this end, each of the blades 11 comprises an elongated steel plate of fairly rigid nature but sufficiently thin to be mounted within respectively the knife-carrying body 12 and the hook extremity 13. Each of the knife blades 11 is beveled along one longitudinal margin from one face to provide a sharp knife edge 19 coincident or in a plane with the opposite face of the knife blade. As best seen in Fig. 5, the beveling and knife edge formation extends from one end of the blade through the major extent of the beveled edge margin and terminates in an oblique lead-out cam surface 20 sloping angularly toward the corner of the margin opposite the side of the margin that has the knife edge 19. It will be understood that the knife blades 11 are generally structurally, and functionally identical, but complementary in formation so that on one of the blades the knife bevel is formed on one face, while on the other of the blades the knife bevel is formed on the opposite face and also the opposite longitudinal margin of the blade so that in cooperative assembly the knife edges can be disposed contiguously in substantially scissors relationship as shown in Figures 1, 3 and 4.

For receiving the knife blades 11 and supporting the same rigidly, the body lever portion 12 and the hook terminal portion 13 are provided with respective longitudinal knife blade seating recesses 21 and 22 which are generally complementary in outline to the end and blunt longitudinal edge shape of the respective knife blades 11 and opening into the throat 15. The width and rela-

live inclination of the blade-seating recesses 21 and 22 is such that when the blades are seated firmly therein the knife edges 19 of the blades are disposed in scissors-crossing relation spaced a short distance from the respective lead-out cam surfaces 20 and with the knife edges diverging complementary to the throat 15 to form a sharp wedge-shape strap-receiving and cutting angle therebetween. In a practical construction an angle of approximately 15° between the knife edges 19 has been found quite satisfactory. In order to accommodate the flat sides of the knife edges 19 in flat face-to-face relation in the assembly, the seating recess 21 is preferably inset relative to the seating recess 22 a distance equal to approximately the thickness of the knife blade 11 received in the recess 21. Moreover, in the assembly, as best seen in Fig. 4, the knife edges meet in a substantially centered plane common to the body portion 12 and the terminal portion 13 of the device.

Retention of the knife blades 11 in their respective seating recesses is effected by means such as respective clamping plates 23 and 24 secured in clamping relation to the knife blades in respectively the seating recess 21 and the seating recess 22. For surface smoothness and freedom from projections or crevices on or in which cloth or other objects might catch, the clamping members 23 and 24 are in flush external surface relation to the supporting member 10 and peripherally the clamping members fit closely within the boundaries defining the recesses within which received. Moreover, it will be observed in Fig. 4 that the clamping members are in differential thickness complementary to the difference in depth of the blade-receiving recesses. Herein the clamping plate member 23 is thicker by approximately the thickness of one of the knife blades 11 than the clamping member 24.

Removable attachment of the clamping members 23 and 24 is effected by means such as machine screws 25, two of which may be used with each of the clamping members. Each of the attachment screws 25 extends through a hole 27 provided therefor in the respective clamping plate and through a registering hole 28 in the knife blade and is threaded into a registering tapped hole 29 in the lever body 12 or the terminal hook portion 13, as the case may be. The heads of the screws 25 are countersunk flush into the surface of the associated clamping plate.

While the clamping plates 23 and 24 and the screws 25 will afford substantial attachment for the knife blades 11, additional, rigidifying anchorage may be provided for the knife blades by respective pairs of anchoring screws 30 (Figs. 3 and 6) extending freely through respective bores 31 in the portions of the supporting member 10, and freely through registering respective apertures 32 in the knife blades, into threaded engagement with respective nuts 33 clamping against the knife blades accommodated within respective clearance cavities 34 in the overlying clamping plates.

As a safety measure, the upper or divergent ends of the knife edges 19 are protectively enclosed within or between respective overhanging, opposing projections 35 and 37 on the body lever 12 and the hook terminal 13 (Fig. 3) at the mouth end of the throat 15, cooperating with complementary opposing respective projections 38 and 39 on the clamping plates 23 and 24. Below the protective projections the knife blades 11 are preferably exposed throughout the beveled knife edge portions thereof.

For freedom of escape of the severed ends of a strap member below the convergence of the knife edges 19, the respective sloping lead-out surfaces 20 on the blades at the lower ends of the knife edge bevels merge with smooth portions of the supporting structure therebelow and lead generally toward outwardly tapering downwardly directed lead-out grooves 40 at the respective op-

posite sides of the heel portion joining the lever body 12 with the hook terminal portion 13, as best seen in Figs. 1, 3 and 4.

In order to provide for positive and highly efficient control of the rescue knife assembly by the user, the handle 14 is so constructed and related to the elongated body portion 12 of the device that slippage or jerking of the device out of the user's hand is virtually precluded, while a firm grasp is retained thereon, and torque strains are practically eliminated. To this end, the handle 14 is, first of all, constructed to fit the user's hand conveniently and therefore comprises an elongated member the upper surface of which is formed on a longitudinal arc smoothly rounded-off transversely, while the undersurface is provided with a series of finger-accommodating, smoothly contoured grip indentations 41. In addition, the handle is disposed on a longitudinal axis which is generally right angular to the axis of the body portion 12 and lying generally in a plane with the longitudinal axis of the hook terminal 13. This is best visualized on comparison of Figs. 1 and 2. The major extent of the elongated handle 14 is disposed rearwardly of the body portion 12, that is to the opposite side from which the terminal hook portion 13 extends, so that juncture of the body portion 12 with the handle is between the notches or depressions 41 that accommodate the forefinger and the middle finger of the hand which grasps the handle. Thereby the forefinger loops about the handle and the front portion of the juncture of the body portion 12 with the handle and the thumb of the grasping hand naturally overlaps the looped forefinger, as shown in Fig. 3, substantially opposite and in line with the strap-receiving and severing throat 15. While thus grasped in use, moreover, the rescue knife assembly comprises substantially a direct extension of the lever provided by the user's forearm so that powerful direct pulling force can be applied through the forearm in manipulating the device for severing a strap.

It should also be noted that the handle 14 has the forward extremity portion thereof located as a protective buffer 42 overlying and projecting forwardly relative to the underhooked fore- or index finger so that in use the index finger will be protected from objects against which the forward extremity of the handle may be drawn, while manipulating the device into strap-cutting position. However, as best seen in Figs. 1 and 3, the buffer extremity 42 of the handle is disposed rearwardly relative to the tip of the hook extremity 13, considered with respect to the longitudinal axis of the body portion 12. Hence, unimpeded approach toward and engagement of a strap by the generally upwardly and outwardly directed hook terminal tip into engagement behind a strap to be severed can be effected with a rapid, certain motion. Note also, that the forward end portion of the handle 14 slopes on its upper surface downwardly generally toward the hook terminal so as to avoid any possibility of the buffer terminal of the handle catching on anything to impede a strap-severing stroke of the rescue knife assembly.

Not only for avoiding corners or projections that might get caught on clothing or other objects against which the rescue knife assembly may be moved in operation, but also to avoid hurting the body of the person being rescued, all superficial surfaces of the device that may come in contact with the person's body are preferably reasonably smoothly contoured with rounded surfaces, and at least without any corners or projections that might dig in or pinch or catch on the person's body. This is especially true of the hook terminal 13 which is the most likely part of the device to contact the person's body closely, as shown in Fig. 3. It will be observed that the tip of the hook terminal is rounded off and that the longitudinal outer surface of the hook terminal is rounded off not only transversely but also longitudinally.

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It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention.

1. In a rescue knife structure especially adapted for releasing a person from a strap or belt by severance thereof, a body or shank portion of substantial length having at one end thereof a transverse handle projecting to a minor extent to one side of the shank and to a major extent to the opposite side so that it can be grasped with a forefinger looped around the minor portion and the remaining fingers looped about the major portion, the opposite end of the shank having a diagonally divergent integral terminal portion defining with the adjacent portion of the shank a generally V-shaped hook, the shank and handle and terminal portion being of substantially uniform thickness and smooth and free from projections or joint or crevices that might catch on fabric or the like, said terminal portion and the handle lying in the same plane with the tip of the terminal portion projecting from the same side of the shank as the minor portion of the handle and to a slightly greater distance from the shank than the end of the minor portion, the terminal portion and the adjacent portion of the shank being recessed substantially coextensively on one lateral side along the V-hook to at least the center of thickness of the shank and terminal portion, a pair of overlapping knife blades beveled respectively from one face to the other along one longitudinal margin to provide respective sharp cutting edges which overlap adjacent the center of the bight portion of the hook and with the edges divergently related substantially the same as the shank and terminal portion, and clamping means securing said blades in place, said clamping means being disposed flush with the adjacent lateral side

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surfaces of the shank and the terminal portion so as to conform generally to the smooth contours of the structure.

2. A rescue knife structure as defined in claim 1, wherein the juncture surfaces between the shank and the terminal portion in the bight of the V-hook adjacent each side of the blades are divergently outwardly tapered downwardly away from the overlapping portions of the blades and generally in line with the point of divergence of the blade edges to provide smooth lead-out surfaces.

3. A rescue knife structure as defined in claim 1, wherein both the shank and the tip portion of the terminal portion are provided with lead-in surfaces tapering toward a throat overhanging the respective divergent upper ends of the blades.

4. A rescue knife structure as defined in claim 1, wherein said clamping means comprises clamping plate structure with screws securing the plate structure removably in clamping relation to the blades, the screws being disposed within the adjacent external surface contours of the plates and of the shank and terminal portions.

5. A rescue knife structure as defined in claim 4 wherein said plate structure comprises separate plate member respectively clamping each of the blades.

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