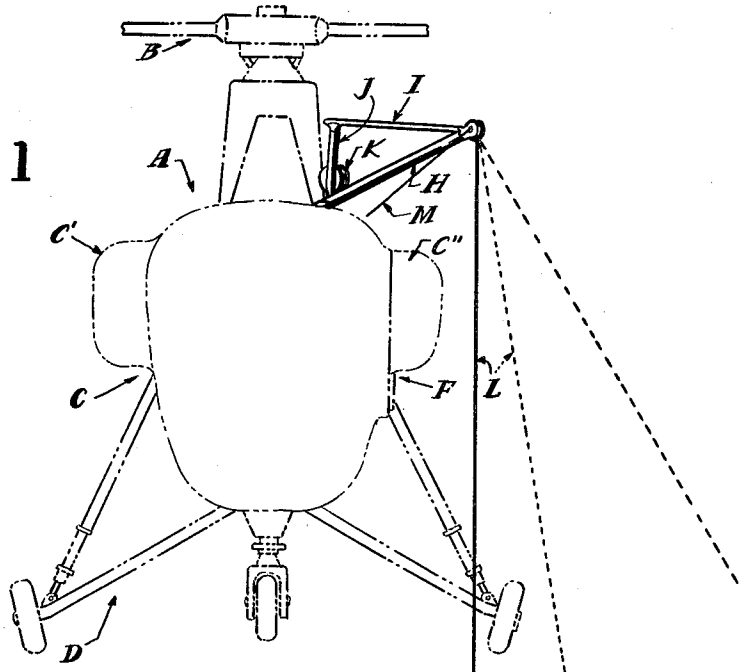
March 20, 1956 F. M. JOHNSON 2,738,939

PERSONNEL RETRIEVER FOR HELICOPTERS

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Fig 1



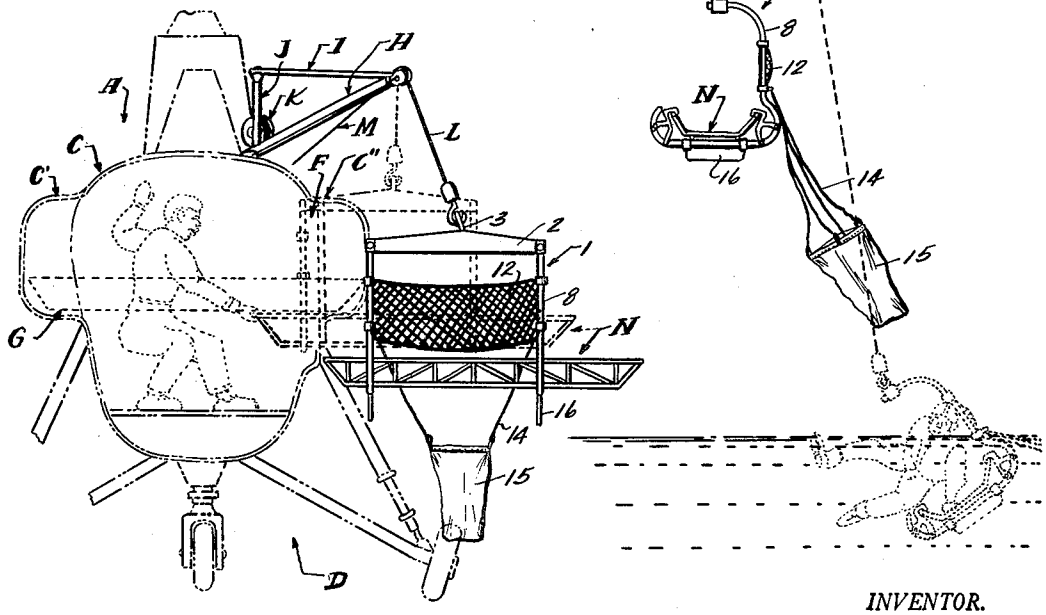


Fig 2

INVENTOR.
FRANCIS M. JOHNSON

BY Charles E. Wagner and Wade Coontz
HIS ATTORNEYS

March 20, 1956 F. M. JOHNSON 2,738,939

PERSONNEL RETRIEVER FOR HELICOPTERS

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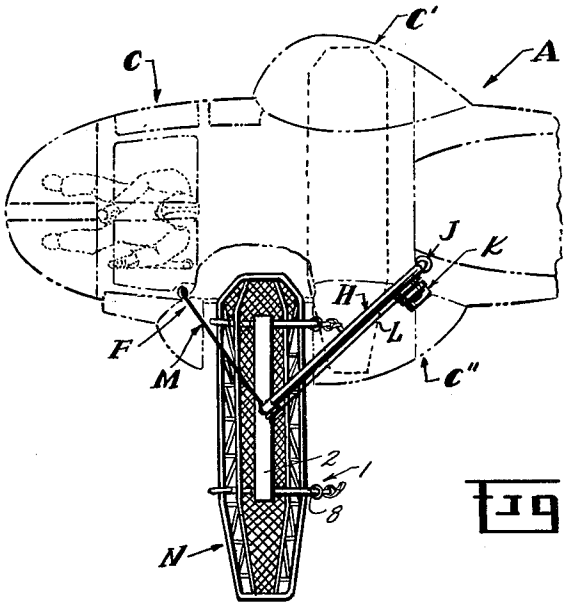


Fig 3

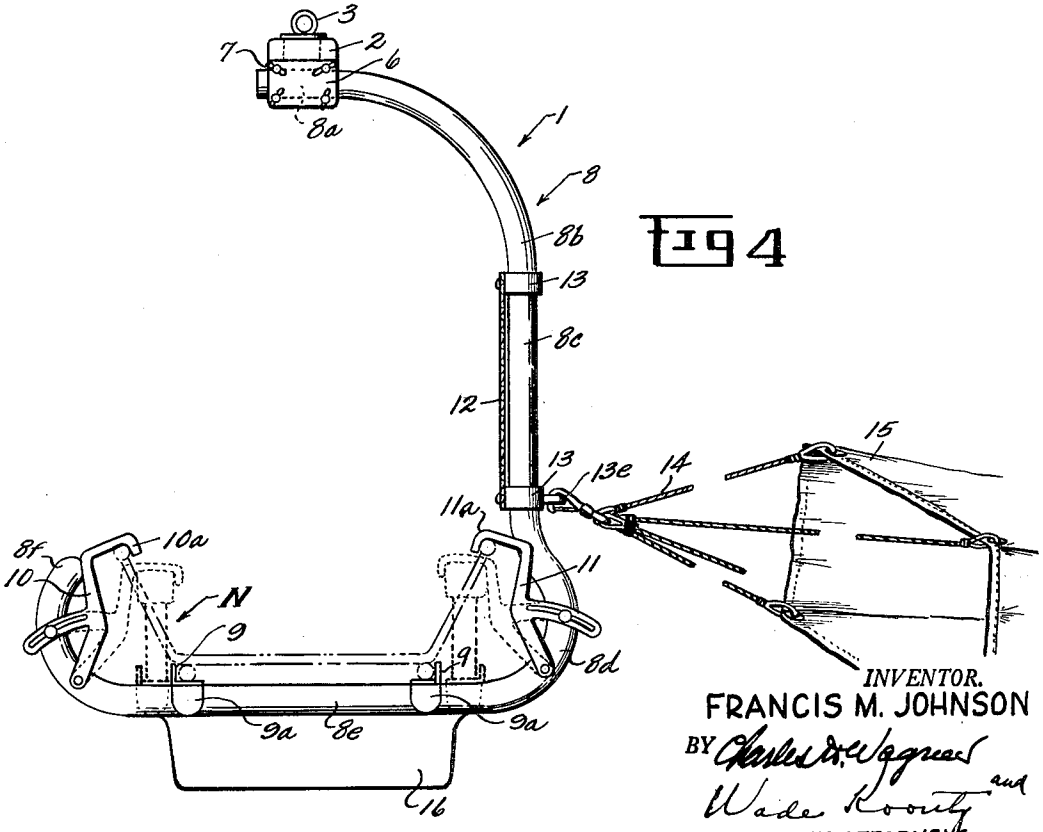


Fig 4

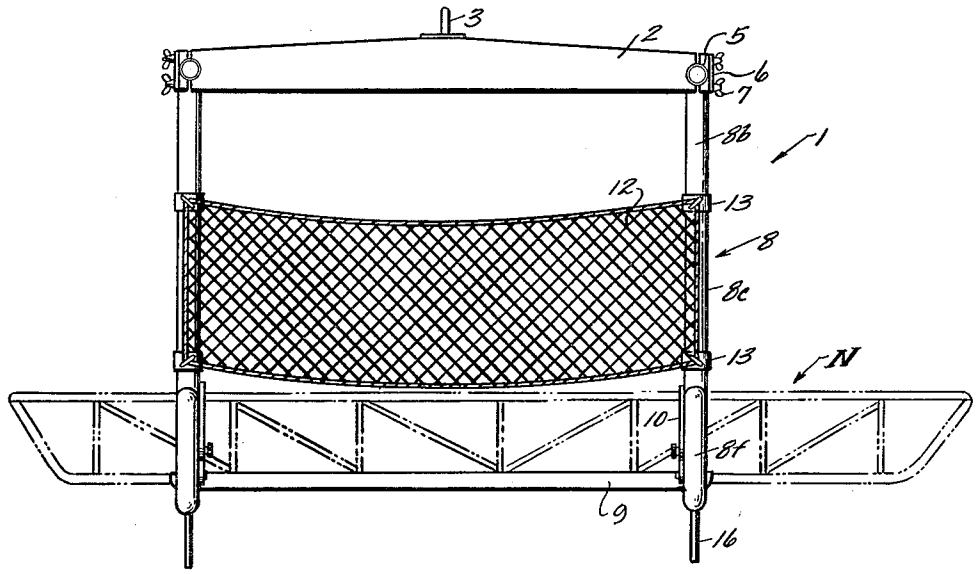
INVENTOR.
FRANCIS M. JOHNSON
BY Charles D. Wagner and Wade Rooney
HIS ATTORNEYS

March 20, 1956 F. M. JOHNSON 2,738,939

PERSONNEL RETRIEVER FOR HELICOPTERS

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Fig 6



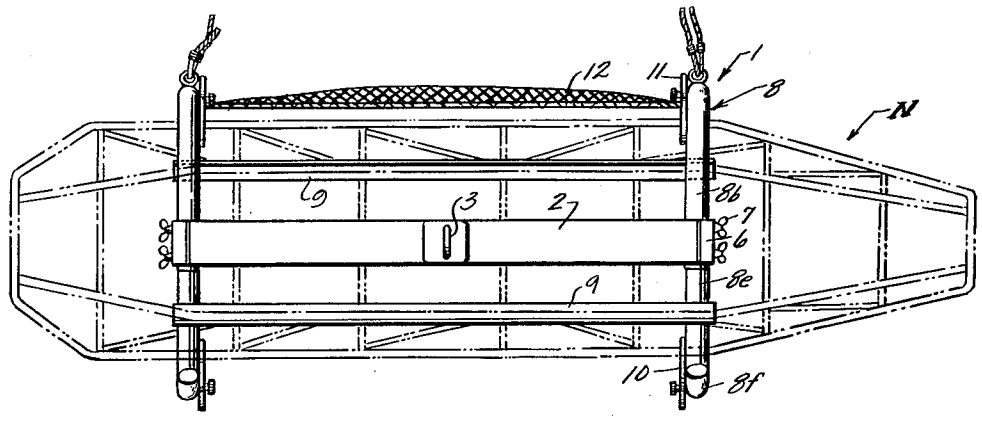


Fig 5

INVENTOR.
FRANCIS M. JOHNSON
BY Charles R. Wagner
Wade Koontz et al
HIS ATTORNEYS

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2,738,939

PERSONNEL RETRIEVER FOR HELICOPTERS

Francis M. Johnson, Dayton, Ohio, assignor to the United States of America as represented by the Secretary of the Air Force

Application July 13, 1954, Serial No. 443,176

6 Claims. (Cl. 244—137)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to aircraft personnel rescue devices and apparatus designed for picking up personnel, incapacitated or otherwise, primarily from the water by helicopter.

The device consists of an external hoist on the aircraft with a lifting cable therefrom having at its lower end a fork shaped cradle with an elongated basket or litter carrier to receive the personnel therein, and having a screen or net baffle at the rear side thereof above the top edge of the basket, and means such as fins or a sea anchor drag on the cradle to position the cradle and basket or litter carrier thereon oriented transversely to the direction of movement of the cradle and the submerged basket thereon through a body of water in a tilted position to submerge the advancing or front side of the basket and front or open end of the cradle at a lower elevation below the water surface than its rear sides, whereby the cradle and basket can be towed crosswise to a position under the personnel or an object in the water and the baffle or net will engage and position the personnel over the basket, so that upon elevation of the cradle and basket, the incapacitated personnel will be caught, oriented and deposited in the basket for elevation by the hoist and cable into the supporting and towing aircraft.

A further object is the provision of a foldable type of cradle of the multiple fork type comprising a horizontal lifting bar at the opposite ends of which a substantially C- or L-shaped lifting bar is rotatably adjustable about a horizontal axis in a vertical plane with a netting baffle stretched in a vertical position between the backs of the lifting forks or C bars with its bottom edge slightly above the bottom arms of the C-shaped bars, including means for fixing the directions of the planes of the C-shaped bars parallel to each other and transverse to the horizontal lifting bar, also including drag means connected to both of said C shaped bars for controlling the directions of the planes of the C'-shaped bars, so as to dispose them parallel to the direction of the horizontal movement of the lifting bar, when the latter is connected substantially above its center to suspension-drag cable extending from a helicopter, and means on the C bars for positioning and securing an elongated personnel receiving basket or litter carrier on the bottom arms of the C' bars perpendicular thereto in front of the netting baffle.

A further object is the provision of a helicopter having a side opening therein to receive the elongated personnel or litter receiving basket endwise therethrough, and a lifting cable boom or crane with its inner end connected on the aircraft at one side of said opening and its outer end attached to be positioned substantially above the said side opening, in a substantially vertical plane extending transversely to the longitudinal axis of the aircraft, and through said side opening.

A further object is the provision of an open sided cradle

adapted to receive an elongated personnel receiving basket, such as a "Stokes" litter therein, in a horizontal position, including latch means on the cradle for securing the basket within the open side of the cradle and including drag means fixed to the cradle at the rear side thereof for orienting the open side of the cradle, and the side of the basket facing in the direction of movement of the cradle when freely suspended substantially above its center and dragged or towed horizontally through a fluid medium, such as a body of water.

A further object includes the combination of a sea anchor attached to the closed side of the cradle for tilting the open side thereof downwardly in the direction of movement of the cradle when towed in a horizontal direction through a body of water while suspended from a single point located substantially centrally above the cradle.

A further object is the provision of elongated stabilizing vanes means projecting vertically downward below the bottom of the cradle parallel to each other substantially at right angles to the longitudinal axis of the basket or litter carried on the cradle or forked carrier.

Other objects and advantages will become apparent from the following description and accompanying drawings in which like reference characters refer to like parts in the several figures.

Figure 1 is a somewhat diagrammatic front view of a helicopter rescue aircraft embodying my invention the full lines illustrating my improved personnel retriever being lowered into a body of water, including a "Stokes" type litter carrier secured in the open side cradle, dotted lines illustrating the position and attitude of the cradle and basket when towed by the helicopter in scooping up an object, such as an injured or incapacitated person floating in the water.

Figure 2 is a fragmentary view, somewhat similar to Fig. 1, the full lines showing the cradle and basket elevated to the receiving opening in the side of the aircraft and turned to dispose the end of the basket or litter in alignment with the receiving opening. Dotted lines illustrating the cradle further elevated and drawn toward the side of the aircraft, the dot and dash lines illustrate the basket or "Stokes" type litter released and removed from the C shaped arms of the cradle and stowed within the helicopter out of the way.

Figure 3 is a top plan view of the arrangement shown in Fig. 2, illustrating the extensions or "blisters" at the opposite sides of the helicopter for receiving the opposite ends of the carrier basket or "Stokes" type litter.

Figure 4 is an enlarged and detail view of the open sided cradle, illustrating the attached sea anchor, the "Stokes" litter or personnel basket being shown in dotted lines.

Figures 5 and 6 are top plan and side views respectively of the cradle, the personnel basket being illustrated thereon in dotted lines.

Referring particularly to Figures 1, 2, and 3, the reference letter A indicates a helicopter type of air rescue aircraft having the usual rotor B, fuselage or cabin portion C, and landing gear D. The fuselage C is formed with side blisters C' and C'', and a side entrance opening or door F located in the forward portion of the blister C'' and fuselage portion, the blisters C' and C'' being formed preferably to include horizontal shelf portions G to support the opposite ends of an elongated personnel rescue basket or litter of the type shown at N, conventionally known as a "Stokes" litter, disposed horizontally crosswise of the longitudinal axis of the helicopter.

A crane or boom H is mounted with its lower end or foot secured on the top of the fuselage C, at one side of the longitudinal axis aforesaid, rearwardly of the shelf portion G, the boom H inclining upwardly and outwardly

from its lower end with its outer end disposed to swing substantially horizontally over the vertical center through the side opening C'', perpendicular to the aforesaid longitudinal axis. The outer end of the boom may be supported by a brace I connected to a standard J, above the foot of the boom E.

A power operated cable winch K is provided, being reversibly driven by any suitable control means within the helicopter in a conventional manner, the winch K having a cable drum and a lifting, lowering, and towing cable L thereon reeved over a suitable pulley at the outer end of the boom H, and having my improved air-rescue apparatus, indicated generally at **1**, attached to the lower end of the cable L.

The boom H is preferably swingable by a manipulating cable M attached to the outer end of the boom, as shown in Figure 3, providing means for swinging the boom H over the side opening C'' to dispose the air-water rescue apparatus in position in the opening C'' to receive or remove the litter of the type set forth as indicated at N into or from the interior of the aircraft A.

Referring more particularly to Figures 4, 5, and 6, my litter carrier **1** comprises a horizontal lifting bar **2** having an eye **3** at the longitudinal center theerof to which the lifting cable L is suitably connected, as for instance by a clevis or snap hook **4**. The bar **2** is preferably of light weight box girder construction having transverse horizontal semi-circular recesses **5** formed in the opposite ends, over which are secured complementary semi-circular recessed caps **6**, clamped in place by the screw fasteners **7**, the complementary recesses in the ends of the bar **2** and caps **6** having their axes parallel to each other in a horizontal plane, receiving the upper extremities **8***a* of a pair of spaced parallel lifting forks or C-shaped bars **8**.

The C-shaped lifting bars or forks **8**, best seen in Figure 4, comprise the cylindrical upper extremities **8***a* disposed for pivotal (folding) adjustment in the complemental recesses aforesaid (unless the cap members are tightened securely), the bars **8** curving outwardly and downwardly at **8***b* from one side of the horizontal bar **2**, as shown in Figure 4, to provide parallel vertical rear bars or stanchions **8***c*, the bars then curving rearwardly, downwardly and then extending horizontally forward as indicated at **8***d*, to provide horizontal supporting bars **8***e* directly under the main lifting bar **2**, perpendicular thereto, the outer or front ends of the horizontal supporting bar portions **8***e* being curved upwardly as shown, and indicated at **8***f*.

A pair of flanged litter supporting rails **9** are mounted on the lower supporting bar portions **8***e* being flanged, and similar to angle irons, for supporting a personnel receiving litter carrier or basket of the type known as a "Stokes" litter below the longitudinal center of the lifting bar **2**. The rails **9** are preferably mounted on clips **9***a*, clamping the round outer surface of the supporting bar portion **8***e* so that they may be adjusted toward or away from each other on the bar portions **8***e* to support other types of conventional litter baskets such as a somewhat conventional stretcher.

The rails **9** connect the two C-shaped bars together at their lower supporting portions **8***e* for maintaining parallelism between the depending supporting vertical portions or stanchions **8***c*.

A pair of latch members **10** and **11** are pivotally connected to the C-shaped bars at their front and rear lower portions, these latches having hooked ends **10***a* and **11***a* disposed to engage the top edge of the litter carrier and retain the same securely in position within the C-shaped fork members, on the supporting rails **9**, as shown in Figure 4.

A rectangular net member, as indicated at **12**, is stretched between the two vertical stanchions **8***c*, being secured thereto by rings or collars **13**, to dispose the lower edge of the net **12** slightly above the top rear edge of the litter basket N, the net **12** extending upwardly above the rear edge of the basket a material distance to form a flexible open mesh baffle between the stanchions at the rear of the litter for a distance up to the curved portions **8***b* of the C-shaped bars **8**.

As shown in Figures 5 and 4 the lower collars **13** are provided with eyes or rings **13***e* which may be connected to bridle member **14** connected to a "sea anchor" **15**. If desired rudder members or stabilizing fins **16** may be provided, projecting downwardly a suitable distance below the C bars to further stabilize the personnel retriever as it is dragged or towed through the water partly submerged for personnel, or article pick-up purposes by a helicopter.

Operation

As before set forth, a primary object of the invention is to allow the operating personnel of a helicopter to retrieve or pick up personnel (incapacitated or otherwise) from the sea (or from land areas where landing is not possible). The pilot of the helicopter A hovers the aircraft at the lowest possible altitude directly above the personnel to be rescued. The co-pilot, or medical attendant, places the litter carrier N in the open side of the fork shaped retriever **1**, latching the litter in place by the latch members **10** and **11** and operates the winch K to pay out the cable L to lower the device **1** to the ground or into the water, allowing the personnel to be rescued to get into the litter and be hoisted aboard the aircraft. The one point cable suspension from the end of the boom H in front of the side entrance F permits the carrier and litter to be swung end first into the entrance, at the proper elevation whereby the ends of the litter can be disposed on the shelf portions G at one side of the opening where the attendant, or pilot, if alone, can render the necessary "first aid," if required. It might, under some circumstances, require an attendant to go down with the litter to assist the personnel into the basket. The carrier, however, can be dragged over the ground in the proper direction, if desired, and by use of a drag, in place of a sea anchor, or by the engagement of the fins be oriented for a substantial "scoop up" of the personnel, the netting **12** at the rear preventing the personnel from rolling across the basket N, between the stanchions and out the other side. Here it should be observed that in dragging the carrier the front side or edge will be much lower or depressed than its rear side to facilitate the "scoop up" action.

In a water or sea rescue, even when the personnel to be rescued is completely incapacitated, and floating "prone" (supported by his "Mae West") the rescue can be easily and quickly accomplished. The carrier **1** is lowered (as before) into the water, and preferably the small sea anchor and bridle **15** and **14** are attached as shown in the drawings. The pilot should maneuver the helicopter to deposit or position the carrier **1** with its basket in the water so that its direction of drag is at right angles to the direction of the prone floating personnel. The further dragging maneuver of the helicopter across the floating personnel, with the carrier and litter thereon slightly submerged tilts the approaching side of the litter will down below the surface of the water so that it passes under the rescued personnel. The net **12** stretched between the backs of the C-shaped bars, engages the personnel, substantially orienting the same to a position above the center of the litter. Upon elevation of the helicopter (or the reeving in of the cable) the personnel "pick up" is safely and satisfactorily accomplished and the basket can be elevated and swung into the aircraft, as previously set forth.

Helicopter "pick up" of articles and other inanimate objects can be easily made from the sea or ground in the same manner. The litter carrier or a suitable mesh basket is lowered into the water and slightly submerged, keeping the net **12** sufficiently above the surface to catch the article being picked up as the elongated basket or litter pick-up device **1** passes under the article, thus re-

taining the article above the litter as the basket is raised by an upward pull or reeving in of the cable L.

The carrier 1 as shown is also collapsible or foldable if desired, when not in use. The rails can be removed in an obvious manner, freeing the two spaced litter supporting C forks 8. Loosening the caps 6 permits the two bars 8 to be swung upwardly against the main or horizontal lifting bar. The net 12 being flexible will permit this collapsing operation.

In the collapsed condition the carrier occupies considerable less space in the helicopter when not in use, and it is obvious that it can be "readied" for a rescue operation in a minimum amount of time. The eye 3 is secured to the lifting cable L, the two C forks 8 swung down in parallel relation stretching the net 12, the two support rails 9 snapped or otherwise secured in position on the horizontal fork portions 8e, properly spaced apart to receive and support the litter N that it is desired to use. The caps 6 can be tightened if desired to further rigidify the carrier structure. Suspending the carrier within the helicopter by the cable L and manipulating of the boom H by the manipulating cable M, with the open side facing the litter (or litters) N resting on the shelf portions G in the blisters, the pilot or assistant can easily and conveniently pull the litter forward into the carrier 1 and lock the same securely (in front of the net 12) and resting on the rails 9, by the latch members 10 and 11.

The rudders of fins 16 on the bottom of the C bars, not only assist in orienting the carrier 1 while the same is dragged through a body of water from its central support point at 3, but they reduce and control any "yawing" tendency during the dragging operation, thus materially stabilizing the drag path through the water, or over the ground.

The above description and accompanying drawings are employed for exemplary purposes, rather than in a limiting sense, therefore it should be noted that various minor changes may be made in the details of construction without departing from the scope or spirit of the invention as defined in the accompanying claims.

I claim:

1. In a personnel rescue apparatus, a helicopter aircraft having a litter receiving opening in the side thereof, a lifting crane having a boom connected at its lower end above the top of said opening at one side thereof having its outer end swingable to a position above said opening outwardly thereof in a vertical plane through said opening, a cable winch carried by the aircraft, cable means controlled by said winch reeved over and extending downwardly from the outer end of the boom, an open sided cradle connected to the lower end of the cable means at a point above the center of the cradle, an elongated open top basket cradled within said open sided cradle and adapted to be received end first through said opening into the aircraft, and drag means connected to the side of the cradle opposite the open side thereof for tilting the open side of the cradle downwardly to dispose the open side thereof facing in a direction opposite the drag means to dispose the basket transverse to the direction of drag with its side adjacent the open side of the cradle below the level of its opposite side, when the cradle is partly submerged in a body of water and dragged therethrough by said cable means.

2. In a personnel rescue apparatus, a helicopter aircraft having a litter receiving opening in the side thereof, a lifting crane having a boom connected at its lower end above the top of said opening at one side thereof, having its outer end swingable to a position above said opening outwardly thereof in a vertical plane through said opening, a cable winch carried by the aircraft, cable means controlled by said winch reeved over and extending downwardly from the outer end of the boom, an open sided cradle connected to the lower end of said cable means at a point above the center of the cradle, an elongated open top litter basket cradled within said open sided cradle, adapted to be received end first through said opening into the aircraft, drag means connected to the side of the cradle opposite the open side thereof for offering resistance to movement of the cradle horizontally by said cable means, for tilting the open side of the cradle downwardly and facing in the direction of said longitudinal movement, to dispose the basket litter transverses to said horizontal direction of movement with the side thereof adjacent the open side of the cradle below the level of its opposite side, when the cradle is partly submerged in a body of water and moved horizontally therethrough at the end of said cable means, said cradle means comprises an elongated lifting bar connected above its center to the cable means, a pair of substantially C-shaped basket supporting cradle bars, each having a horizontal basket supporting portion at its bottom, and depending from the opposite ends of the lifting bar in parallel relation to each other with their open sides facing in the same direction and adapted to receive an elongated open topped basket therein on the horizontal basket supporting portions, a net fixed between the two C-shaped bars at the rear of the opening in the C-shaped bars and extending upwardly in a substantially vertical plane, adapted to extend upwardly from the top of the basket at the rear side thereof when the basket is carried on said C-shaped bars, said drag means being connected to said C-shaped bars and extending at the closed side thereof for orienting the cradle with its open side facing forwardly, when the cable means moves the cradle and basket in a horizontal plane through a body of water, while suspended from the aircraft, whereby to tilt the open side of the cradle and the side of the basket adjacent said open side when carried by the cradle, downwardly and toward the direction of movement of the cradle, whereby said net means carried by the cradle immediately above the basket at the rear side thereof stops an object from passing over the basket in a position directly above the basket, when the cradle and basket are moved under an object supported in a body of water, in the path of movement of the cradle means through said body of water in a partially submerged condition.

3. Apparatus as claimed in claim 2 including latch means carried by said C-shaped bars for retaining an elongated basket therein, below and in front of said net means.

4. Apparatus as claimed in claim 2 including parallel fin members fixed to said C bars for directing the cradle through said body of water in a direction substantially parallel to the direction of drag movement of the cable means by said aircraft.

5. In a personnel rescue apparatus, a lifting bar adapted to be suspended from a point above its center for movement horizontally in a predetermined direction, a pair of basket supporting bars extending laterally from the opposite ends of the lifting bar in the same direction and curving downwardly and then inwardly in a horizontal direction under the lifting bar terminating in an upcurved end portion to form spaced parallel open sided C bars having horizontal bottom portions adapted to receive an elongated personnel litter carrier basket therein below the lifting bar at substantially parallel to the lifting bar in front of the closed portion of the C bar and within the open side of the C bars, latch means connected to the C bars for retaining engagement with the said basket, and a sea anchor connected to the C bars for orienting said cradle and basket in a direction perpendicular to the movement of the lifting bar, above a body of water, when said cradle is dragged through the body of water.

6. In a personnel retriever device for use with a helicopter, a lifting bar, means for connecting the lifting bar above its center to a cable for suspension and horizontal movement, a pair of open sided C-shaped cradle bars, each having a horizontal end portion journalled in the lifting bar for swinging movement upwardly against the lifting bar, said C-shaped bars curving rearwardly and

downwardly, each terminating in a horizontal supporting bottom portion curving upwardly at its front ends, retaining means carried by the opposite end of the horizontal portion for releasably retaining a personnel receiving elongated litter basket of the "Stokes" litter type therein, supported on said horizontal portions between said downwardly and rearwardly curved portions and said upturned ends, an elongated rectangular net baffle stretched between said spaced rearwardly and downwardly curved portions in rear of said basket and extending upwardly from the top of the rear side of the basket, means on the lifting bar for retaining said lifting C' bars in spaced parallel relation to each other, and a sea anchor including a bridle connected to both of said C' bars adjacent the lower edge of said net for orienting the cradle to dispose the open side thereof facing forwardly, when the cradle is suspended from a point above the lifting bar intermediate its ends and moved horizontally while the basket is submerged in a body of water and is dragged through said water horizontally from the suspension point.

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