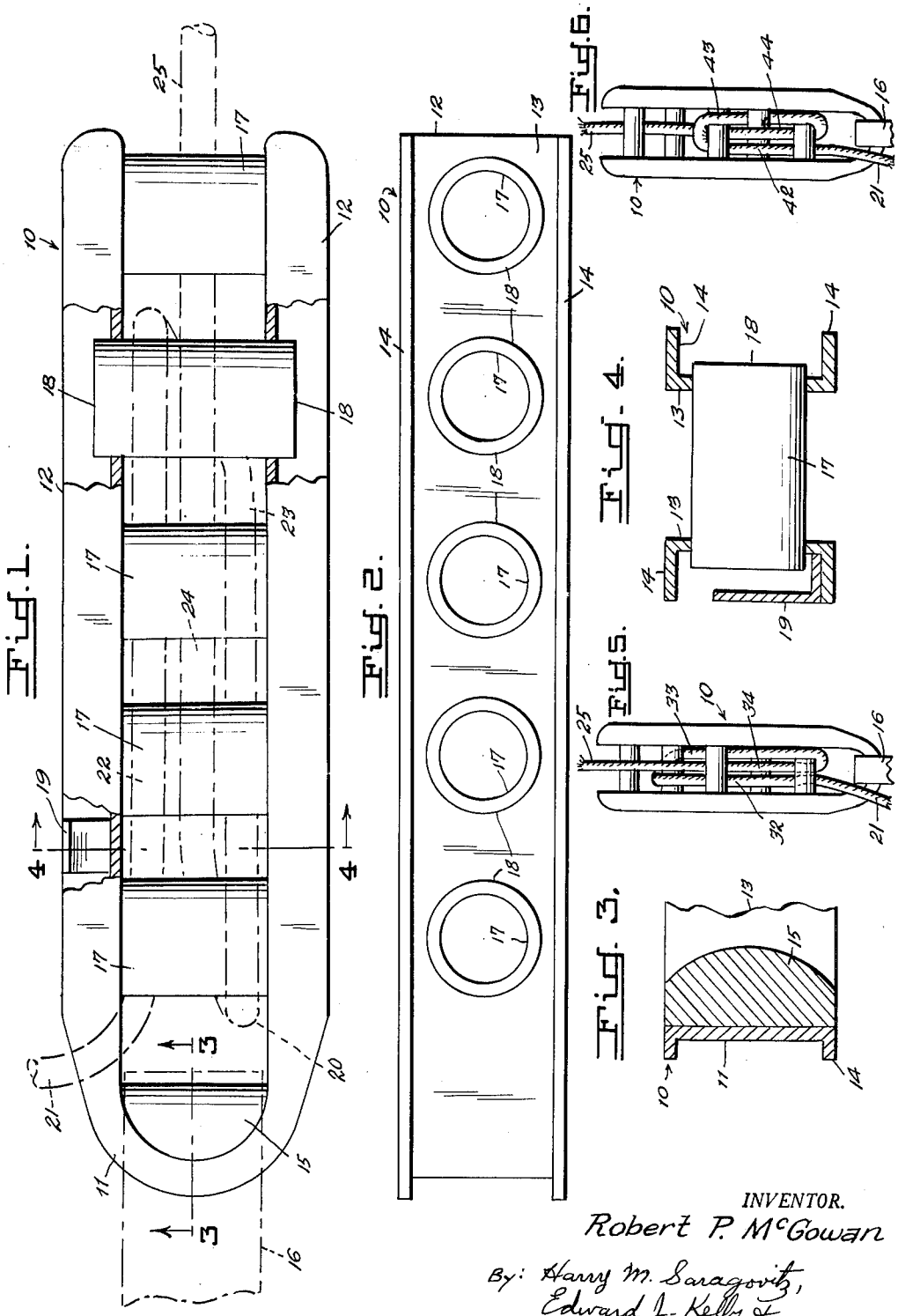
July 12, 1966 R. P. McGOWAN 3,260,328

LINE DESCENT BRAKING DEVICE

Filed June 9, 1964



INVENTOR.
Robert P. McGowan

By: Harry M. Saragovitz,
Edward J. Kelly &
Herbert Berl Attorneys.

United States Patent Office 3,260,328 Patented July 12, 1966

3,260,328

LINE DESCENT BRAKING DEVICE

Robert P. McGowan, Bel Air, Md., assignor to the United States of America as represented by the Secretary of the Army

Filed June 9, 1964, Ser. No. 373,897
2 Claims. (Cl. 182—5)

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

The invention relates to line descent devices wherein cargo or personnel may be lowered along a rope or line at a selected retarded rate of speed. Specifically the device is useful for enabling a parachutist whose parachute is entangled in a tree to lower himself to the ground with reasonable speed but without injury to his hands from friction. Likewise such a device is useful in the same manner as a fire escape. Also, such devices are useful for lowering cargo or personnel from a hovering helicopter to the ground where the terrain or military situation makes it unadvisable to land the craft for normal unloading.

Devices of this character are well known and are disclosed, for instance, in U.S. Patent No. 194,507. However, these devices have the disadvantage of being heavy which is objectionable when used as part of a parachutist's equipment. Also, when used normally they create so much friction that a normal hemp rope is charred or ignited, or, in the case of a modern plastic line, the same can be melted.

With the foregoing in view, it is an object of the invention to provide an improved device of the class described.

A further object is to provide an improved line descent or load lowering device which is air cooled and which includes novel means for dissipating heat which is generated by the friction of the passage of the device along the suspended rope or line.

A further object is to provide in a novel line descent device, novel reeving of the rope or line through the same to permit the speed of descent to be varied as required and to prevent jamming of the line.

Other objects and advantages reside in the particular structure of the invention, the structure and design of the several elements of the same, combinations and subcombinations of such elements with each other and/or with a suspended rope or line, all of which will be readily apparent to those skilled in the art upon reference to the attached drawing which illustrates one species of the invention and to the following specification wherein the invention is described and claimed.

In the drawing:

FIGURE 1 is a front view of one species of the invention parts being broken away and shown in vertical section;

FIGURE 2 is a side elevational view of the same;

FIGURE 3 is a fragmentary vertical sectional view taken substantially on the plane of the line 3—3 of FIGURE 1;

FIGURE 4 is a cross sectional view on the line 4—4 of FIGURE 1;

FIGURE 5 is a view like FIGURE 1 but on a reduced scale and showing a different method of reeving the line through the frame; and

FIGURE 6 is a view like FIGURE 5 but showing still another method of reeving the line through the device.

Referring specifically to the drawing wherein like reference characters designate like parts in all views, and referring at first to FIGURES 1, 2 and 3, 10 designates generally the novel frame of the invention which

may be of various forms. In the species illustrated, frame 10 is U-shaped and comprises a bight 11 and two parallel legs 12. These are of channel configuration and comprise a web 13 and side flanges 14. The webs 13 of the legs 12 are adjacent to each other so that the flanges 14 thereof extend laterally outwardly of the webs in opposite directions. The flanges 14 in the area of the bight 11 are of reduced height and the bight itself is reinforced by a solid insert 15, FIGURES 1 and 3, which is secured therein in any suitable manner as by being welded. Insert 15 provides a base for any suitable load-supporting harness suggested at 16 in FIGURES 1, 5 and 6.

The legs 12 are connected together by hollow cylindrical rungs 17 which extend through the webs 13 and which include free open ends 18 which extend beyond such webs for a purpose to be apparent. Rungs 17 are secured into webs 13 by any suitable means as by being welded thereto. The open ends of the rungs 17 provide air passages through the same. A line clip 19 is welded or otherwise secured to one of the flanges 14, FIGURES 1 and 4, to provide means for readily releasably securing the line or rope 20 when the device is not being used. This preserves the line 20 in a properly rove arrangement and ready for instant use when the need arises.

FIGURES 1, 5 and 6 illustrate three arrangements or methods of reeving the line or rope 20 through the rungs 17. In this connection, it has been discovered that where the line is rove as in U.S. Patent 194,507 aforesaid, the descent is much too rapid and the single run of rope going around alternate rungs has a tendency to tilt the frame whereby the rope tends to jam against one side rail or the other to the extent that the descent may even be stopped entirely. With this in view, there has been designed a number of ways of reeving the rope or line 20 through the rungs of which three have been illustrated.

In FIGURE 1, the running end 21 of the line 20 is passed under the lowermost rung 17 at the left side of the frame and then alternately over and under succeeding rungs to provide a left hand run 22. After the topmost rung, the line is crossed over the right side of the frame and alternately passed downwardly under and over successive rungs 17 along the right side rail or leg 12 to provide a right hand run 23. The line 20 is now extended upwardly over and under alternate rungs 17 between runs 22, 23 to provide a center run 24. An upward extension 25 of such center run 24 provides the standing end of the line 20 which is secured to any suitable fixed object, not shown, to anchor the rope. If desired, the arrangement can be reversed to have the center run merge into the running end of the line 20.

In operation, with the line 20 rove as in FIGURE 1, the standing end of the line securely anchored and a suitable load attached to harness 16, the frame 10 will descend at a retarded speed. At the same time, the heat generated by the friction of the rope or line passing over the rungs 17 is largely dissipated by the hollow air cooled rungs 17 and the fins provided by the webs 13, flanges 14 and the free ends 18 of the rungs. Thus, a temperature is maintained which is below the charring point of the usual hemp or like rope or below the melting point of a nylon line. This arragement permits a relatively rapid descent while at the same time provides a lightweight device which can be easily carried by a paratrooper or by a lightweight helicopter without inconvenience.

When the device is not in use, an adjacent portion of either the standing or running end of the line 20 is extended along one leg of the frame and forced behind clip 19 to secure the line in a properly rove relation to the frame. If desired, a clip such as 19 may be provided on the other leg of the frame for the other end of the line 20. This arrangement permits a rapid release of the line when

it is desired to use the same. At the same time, as the clip is between the flanges **14** and the line **20** is held between the clip **19** and a web **13**, it is protected against being dislodged accidentally.

The frame is preferably made in its entirety of lightweight material having a high coefficient of heat conductivity. Suitable materials would be the lightweight metals such as aluminum, magnesium, or their alloys or even copper or silver and alloys thereof in view of their excellent heat conducting properties.

The reeving of the line **20** in FIGURES 5 and 6 use the same principle of left hand, center and right hand runs of rope or line but in FIGURE 5 the runs **32, 34** and **33** engage only the four lowermost rungs **17** while in FIGURE 6 the runs **42, 44** and **43** engage only the three lowermost rungs. Obviously, these last arrangements are adapted for use with lighter loads or when a more rapid rate of descent is desired than is permitted by the arrangement of FIGURE 1. While a frame having five rungs has been shown, it is obvious that more or less rungs could be used. Likewise, while rungs **17** having lengths sufficient to permit three runs or rope to be arranged side-by-side, it is obvious that longer rungs would permit more runs of rope to be used while always causing the center run which turns into either the standing or running end of the line to emerge from the center of the frame to prevent jamming in use. Where more than three runs are used, both the standing and running ends of the rope should emerge from the center part of the frame **10**.

Thus, while there has been shown and described what is now thought to be a preferred embodiment of the invention, it should be understood that the same is susceptible of other forms and expressions. Consequently, the invention is not considered to be limited to the exact structure shown and described hereinabove but only as hereinafter claimed.

I claim:

1. In a cargo or personnel lowering device of the type wherein a frame has a tortuous passage therethrough through which a rope is rove and wherein a load carried by said frame descends therewith along said rope at a retarded rate of speed, the improvement comprising said frame being of inverted U-shaped configuration and including a bright and legs, said legs being of channel shape and including webs and spaced flanges, said webs being

adjacent each other, said flanges of one leg extending laterally outwardly thereof in the opposite direction to said flanges of the other leg, vertically spaced hollow rungs connecting said legs together to provide said tortuous passage, said rungs being open at both ends to provide air passages therethrough, said frame and rungs being formed of lightweight metal having a high rate of heat conductivity, and said webs and flanges providing cooling fins for dissipating heat generated in said rungs by the friction of the passage of the same along said rope.

2. In a cargo or personnel lowering device of the type wherein a frame has a tortuous passage therethrough through which a rope is rove and wherein a load carried by said frame descends therewith along said rope at a retarded rate of speed, the improvement comprising said frame being of U-shaped configuration comprising a pair of laterally spaced elongated frame members of channel form each including a central web and two side flanges connected by a bight portion, said flanges extending laterally outwardly of said webs in opposite directions, a plurality of tubular rungs connecting said webs of said frame members, said rungs each having two ends open to the atmosphere and projecting laterally outwardly of said webs between said flanges, a load supporting harness secured to said bight portion, said frame members and rungs being formed of lightweight material having a high rate of heat conductivity, and said webs and flanges as well as said outer ends of said rungs comprising fins for dissipating heat generated in said rungs by the passage of the same along said rope.

References Cited by the Examiner

UNITED STATES PATENTS

194,507	8/1877	Wan Wie	188—65.4
289.050	11/1883	Wilcox	188—65.3
293,689	2/1884	Usborne	188—65.3
297,883	4/1884	Ware et al.	188—65.3
536,866	4/1895	Gerald	188—65.3
656,507	8/1900	Brown	188—65.5
771,794	10/1904	Davis	188—65.3
810,306	1/1906	Robbins	24—129
3,119,435	1/1964	Greenman	182—228

MILTON BUCHLER, *Primary Examiner.*

G. E. A. HALVOSA, *Assistant Examiner.*