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.

In rope splicing, it is customary to spread or separate the strands and weave through or between them the strands to be connected therewith or incorporated therein, all as is well understood. Various devices are used for separating the strands and one very common type being that known as a marlin-spike. The most usual form of this type is a cylindrical bar or rod having one pointed end. The pointed end is forced between the plies until they are amply spread, when it is removed and the connecting ply is inserted through the opening. With many types of rope, that is a practical method, but if the rope is a tight formation such separation is very difficult. Likewise, if the fiber is easily damaged such a method is not practical. Tow ropes used in quantity with glider planes are, in many instances, of nylon. They are very tightly twisted and their fibers are easily damaged. It is extremely difficult to separate the plies with a marlin-spike and even where that is possible, serious fiber damage is probable. Even if it be assumed that it would be practical to separate the strands with such a tool, there still remains the objection that as the tool is withdrawn there is nothing to maintain that spread condition to permit threading through of the strand of the connecting rope.

The present invention eliminates or minimizes the above and other objections and provides a simple efficient and compact rope lacing, threading or splicing tool capable of ready low cost quantity production.

The present invention is an improvement on the invention disclosed in my prior Patent Number 2,390,805 granted December 11, 1945.

Through considerable use it was found that the tubular sleeve left in the rope for guiding therethrough a splicing strand was frequently tightly gripped by the separated strands and difficult to remove. An improvement over that patent comprised in the present invention overcomes that disadvantage and provides a grip by which the sleeve may be readily removed.

In order to more clearly disclose the construction, operation and use of the invention, reference should be made to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings, like reference characters designate the same parts in the different views.

In the drawings:
Fig. 1 is a side elevation;
Fig. 2 is a perspective view, applied;
Fig. 3 is an elevation of a rope section with the spacing sleeve in place;
Fig. 4 is a top plan view of Fig. 3;
Fig. 5 is a bottom plan view of Fig. 3;
Fig. 6 is a fragmentary longitudinal cross section of Figure 1, on line 6—6; and
Fig. 7 is a fragmentary sectional detail on line 7—7 of Fig. 6.

Referring to the drawings in detail 1 indicates a bar, rod or post shown as cylindrical although any other practical shape or form may be used. A simple form or type of grip or handle 2 is disposed as a T-head, in the form of a rod of smaller diameter passed through the upper end of 1. The lower end of 2 is bored out or otherwise provided with a suitable socket 3 to freely receive the cooperating upper end of a bit shank 4. Where that bore 3 and shank 4 are cylindrical, as shown, it is necessary to prevent relative rotation or turning movement between them, as will be well understood. Where they are not cylindrical rotation is prevented by their respective shapes.

In the form illustrated, the upper end of the shank 4 is provided with a diametrical slot or notch 5 adapted to fit about or receive a pin or bar 6 which bridges socket 3 diametrically at a short distance from its inner end. Obviously, various other driving connections between 1 and 4 may be used as desired. Bit 4, it will be noticed, may be readily slipped into and out of operative position within socket 3.

On the bit shank 4 is removally mounted a tubular spacing sleeve 7. Sleeve 7 should have an interior diameter approximately equal to the outer diameter of the strand which it is desired to use in splicing, for a purpose to be later disclosed. Likewise, its length should be appreciably greater than the diameter of the rope in which the splice is to be made. Sleeve 7 is car-
3

rired on shank 4 between the end of the stem or bar 1 of the handle and a supporting shoulder 8 formed on the bit shank 4. Accordingly, that part of shank 4 between 1 and 8, when assembled, will be of the same length as sleeve 7. The operative part of the bit is a spiral blade 8 extending from shoulder 8 to the outer end 10. The pitch of the spiral blade should be approximately that of the rope strands of the rope on which the tool is to be used. At the upper end, as will be clearly seen, the spiral merges into the shoulder 8. The radial width of the shoulder 8, it will be noticed, is approximately that of the radial thickness of sleeve 7, so that the outer edge of shoulder 8 and the outer face of sleeve 7, when assembled, are in substantial alignment.

In order to prevent accidental slipping out or dropping out of the shank 4 and the sleeve 7, a friction holding device is provided. In the preferred form this is a small ball bearing 11 reciprocally mounted in a radially disposed bore or socket 12 and maintained in operative position by a coil spring 13. At the outer end socket 12 is protected by relating over the edge to intercept the ball. In this way, the ball, under spring pressure, will yieldingly engage the inner wall of socket 3. Likewise, it will have the same yielding or frictional engagement with sleeve 7, preventing the sleeve from accidentally slipping off of the shank. Other frictional holding devices may be similarly used, though that shown is the preferred one.

As is well known, the entry of a corkscrew is facilitated by the spiral formation. In its operation there is both a longitudinal and a rotary movement resulting in a wedging action. Where there is only a longitudinal thrust a turning action between strands of a rope in separating them from splicing, with no wedging action, more force is required. In my former patent, sleeve 1 was left free to rotate relatively to shank 4. After spiral 8 had been corkscrewed between the strands and sleeve 7 reached the entrance thus made, 4 being free to turn within 1, no combined turning and thrusting action could be imparted to 7 by 4. Instead, 7 had to be pushed longitudinally through between the strands.

In the case of the tool of my Patent 2,390,505 with tightly woven or wound ropes it was found that the tubular sleeve 7 sometimes became so wedged or bound as to be difficult to remove, making, rather than eliminating, delays.

In order to compel rotation of sleeve 7 by and with 4 and 8 so that rotary motion will be imparted to it simultaneously with its longitudinal motion, thereby attributing a corkscrew effect, sleeve 7 is provided with one or more longitudinally extending ears, wings or lugs 14 extending axially from its upper edge and adapted to be removably seated in corresponding cooperating notches or seats 15 extending axially into the free end of 4. Lugs 14 and notches 15 constitute simple positive coupling means compelling rotation of parts 4, 1 and 7 together.

In order to facilitate removal of sleeve 7 from between closely woven or wound strands a finger grip or handle 16 is provided on the upper end of sleeve 7. The finger grip shown and preferred forms, substantially, a T with sleeve 7 and may be a narrow plate with down turned tips or ends. That is a simple, efficient and economical construction. Various other grips may be used. By such a grip the sleeve may be instantly removed from the most tightly wound or woven rope.

4

By this invention the strands of any rope may be quickly and easily separated or spread and definitely maintained amply separated during splicing and the separating or spacing sleeve may be easily and quickly removed.

It is thought that the construction, operation and use of the invention will be clear from the preceding detailed description.

Many changes may be made in the construction, arrangement and disposition of the several parts of the invention within the scope of the appended claims without departing from the field of the invention and it is meant to include all such within this application wherein the form of the invention has been illustrated purely by way of example and with no thought or intention to, in any degree, limit the application thereby.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A rope splicing tool comprising a handle provided with a concentrically disposed socket extending longitudinally into one end thereof, a bit shank of substantially the same cross sectional area as that of said socket removably mounted in said socket in non-revolving relation to said socket, said shank being provided with a radially extending shoulder disposed at a distance from the adjacent handle end, in assembled relation, a tubular sleeve removably mounted on said bit shank between said shoulder and said adjacent handle end, and a handle carried by said sleeve for withdrawal of said sleeve from a rope.

2. A rope splicing tool comprising a handle provided with a concentrically disposed socket extending longitudinally into one end thereof, a bit shank of substantially the same cross sectional area as that of said socket removably mounted in said socket in non-revolving relation to said socket, said shank being provided with a radially extending shoulder disposed at a distance from the adjacent handle end, in assembled relation, a tubular sleeve removably mounted on said bit shank between said shoulder and said adjacent handle end, and means connecting said handle and said sleeve and compelling rotation together.

3. A rope splicing tool comprising a handle provided with a concentrically disposed socket extending longitudinally into one end thereof and having an axially directed notch forming said socket, said socket and extending through the free end of said handle, a bit shank of substantially the same cross sectional area as that of said socket removably mounted in said socket in non-revolving relation to said socket, sleeve being provided with an axially extending lug, in assembled relation, seating in the socket said axially directed notch and coupling the sleeve and handle to compel rotation together.

4. A rope splicing tool comprising a handle provided with a concentrically disposed socket extending longitudinally into one end thereof, a bit shank of substantially the same cross sectional area as that of said socket removably mounted in said socket in non-revolving relation to said socket, said shank being provided with a radially extending shoulder disposed at a distance from the adjacent handle end, in assembled relation, a tubular sleeve removably mounted on said bit shank between said shoulder and said adjacent
5. A rope splicing tool comprising a handle provided with a concentrically disposed socket extending longitudinally into one end thereof, a bit shank of substantially the same cross sectional area as that of said socket removably mounted in said socket in nonrevoluble relation to said socket, said bit being twisted about its longitudinal axis on a pitch substantially that of the rope strands on which it is to be used, said shank being disposed at a distance from the adjacent handle end, in assembled relation, a tubular sleeve removably mounted on said bit shank between said shoulder and said adjacent handle end, and a handle carried by said sleeve for withdrawal of said sleeve from a rope.

ELMER H. BORGELT.