Aug. 16, 1927. C. C. SUNDERLAND 1,639,236

ROPE SOCKET

Filed Nov. 17, 1926

Fig. 1.

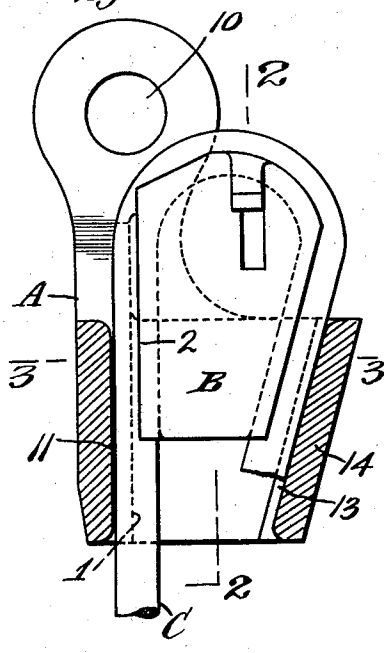


Fig. 2.

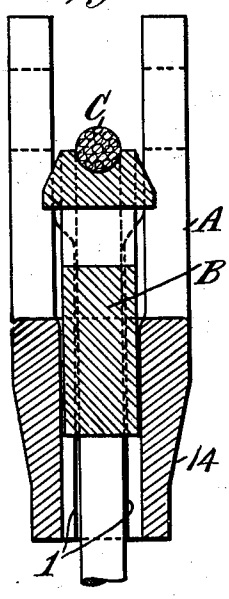


Fig. 3.

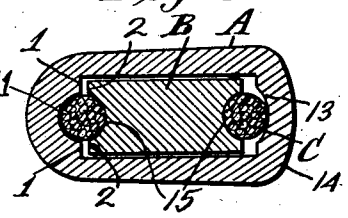


Fig. 6.

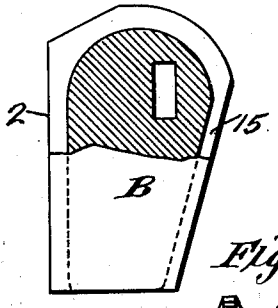


Fig. 7.

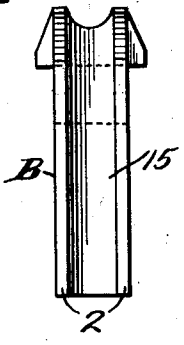


Fig. 4.

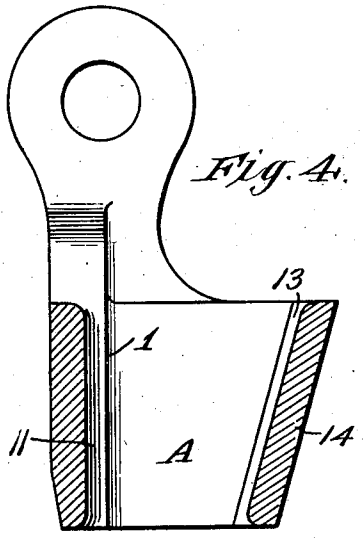
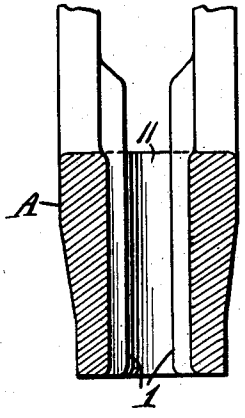


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ROPE SOCKET.

Application filed November 17, 1926. Serial No. 148,808.

This invention relates to improvements in rope sockets.

It is the especial object of the present invention to provide a rope socket of the sliding wedge type, which shall not only be comparatively small as compared with prior sockets of this type as designed for use with the larger sizes of wire ropes, but which shall have a higher efficiency than such prior sockets and hold the ropes under tensions more closely approaching the ultimate strength of the ropes than heretofore, while at the same time avoiding abuse of the strand wires in any part of the socket.

In prior sockets of this type it has been the general custom to proportion the length of the socket sheath in direct ratio to the diameter of the rope with which the socket was to be used, and as generally constructed the length of the socket sheath in such prior sockets was at least five times the diameter of the rope; that is, with a 1″ rope, a socket sheath at least 5″ in length was considered necessary, for a 2″ rope a socket sheath at least 10″ in length, and so on. Under normal operating conditions, wire ropes are as a rule subjected to only about one-fourth of their ultimate strength, and such proportioning of the prior sockets was based on such conditions of use. As a matter of fact, however, there are many instances where such ropes, and especially the larger sizes of ropes, are subjected to tensions far in excess of the above tension. In these larger sizes of wire ropes it is customary, also, in order to retain as far as possible the flexibility of the rope, to increase the number of wires per strand, rather than increase the size of the individual strand wires proportionately to the size of the rope. This quality of flexibility is, of course, most important where these ropes are used with small drums or sheaves. The live end of the rope in such prior sockets is depended on solely or chiefly to carry the load, and this results in over-compression of and injury to the strands. This is especially so with the larger sizes of ropes, so that, for example, if a 2″ rope is to be subjected to tensions closely approaching the ultimate strength of the rope, a socket sheath for such a rope, to avoid such over-compression and injury, should be at least four times as long as that required for a 1″ rope, or at least 20″ long, which is obviously impractical from a commercial standpoint.

Briefly stated, the present socket comprises means for limiting the pressure of the wedge member on the live end of the rope, so that a large part of the load is transferred to the base of the wedge and the dead end of the rope, thus effectively preventing abuse of the strand wires of both larger and smaller sizes of wire ropes, and at the same time providing a socket for the larger sizes of wire ropes that is of small size as compared with prior sockets of this type.

For a full understanding of the invention, a construction embodying the same in a preferred form will now be described in connection with the accompanying drawings, and the novel features of the invention then be pointed out in the claims.

In the drawings—

Figure 1 is a side elevation, partially in section, of the improved socket as it appears in use under no or light tension;

Figures 2 and 3 are sections on the lines 2—2 and 3—3, respectively, of Fig. 1;

Figures 4 and 5 are views similar to Figs. 1 and 2, of the socket sheath without the wedge, and

Figures 6 and 7 are, respectively, a side elevation partially in section, and an edge view looking to the left in Fig. 6, of the wedge member.

Referring now to the drawings, and particularly Figs. 1 to 3, A indicates a socket sheath provided with the usual securing eye 10 and groove 11 for the live end of the rope. The opposite wall of the sheath is inclined, as usual, and has formed on the inner side thereof a groove 13 of less depth than the groove 11, and which, if desired, may be given a shape like that shown to permit spreading of the rope end under pressure and thus secure a larger holding surface. The groove 11 is preferably semicircular in cross-section, as shown, and of a size to snugly fit the rope to be attached to the socket. The sheath A should be of such thickness that when the groove 11 is formed therein, shoulders or stops 1, of substantial thickness, will be provided lying parallel to the sides of the groove, for a purpose hereinafter described. These stops preferably are in line with the socket eye 10, as shown, but this is not essential. The slid-

ing wedge member B, which as usual is arranged to loosely fit within the sheath, is provided with a groove 15 of the same shape as groove 11, the groove 15 extending entirely around the edge of the wedge member with the exception of the narrow end portion. If properly proportioned, the wedge B will be sufficiently thick to provide shoulders or stops 2 lying parallel to the groove 15, the grooves 11 and 15 and the shoulders or stops 1 and 2, lying oppositive each other, respectively, when the parts are assembled. The wedge B is preferably of a size with respect to the sheath so that when a rope C is attached to the socket it will occupy approximately the position shown in Fig. 1, that is, with the stops 1, 2 on the live rope side of the socket, only slightly separated.

With the parts formed as shown and described, it will be clear that when a rope of the proper size is attached to the socket, as shown, for example, in Fig. 1, the shoulders 1, 2 on the sheath and wedge, respectively, at the live rope side of the socket, will be but slightly separated, and less so than the shoulders at the opposite side 14 of the socket in which the dead end of the rope is held. In the best embodiments of the invention, the proportioning of the socket parts with respect to the rope diameter should be such that the shoulders or stops 1, 2 on the live rope side of the socket will meet when a predetermined tension or load on the rope is reached. This action may be varied, as above described, but the stops 1, 2, for the best results, should meet when the tension or load on the rope has reached about one-fourth of the ultimate strength of the rope, so that compression of the strand wires on the live end of the rope will then cease before there is danger of shearing or breaking the same. When the stops 1, 2 thus meet, the larger portion of the tension on the rope will be transferred to the base of the wedge member and the dead end of the rope. Excellent results are secured with the socket parts designed so that approximately only 25% of the rope tension will be imposed on the live end of the rope in the socket, while 50% of such tension will be transferred to the rope at the base of the wedge, and the remaining load, or about 25% thereof, will be carried by the dead end of the rope, but other distribution of the load may be used. The sheath and wedge are shown of uniform taper throughout, but the common practice of different tapers on the wedge and sheath may be followed, if desired.

It will be understood that the invention is not to be limited to use with wire ropes made up of a plurality of strands which are formed of smaller wires, but that it may be used with advantage with other types of ropes or cables, such as cables consisting of but a single strand, and that various changes in the construction and arrangement of the parts shown and described may be made while still retaining the invention defined by the claims.

What is claimed is:

1. A rope socket, consisting of a plurality of members movable relatively to each other and arranged to grip a rope between them, and means for limiting the gripping pressure of said members on a portion of the gripped surface of the rope to distribute the load on different parts of the rope.

2. A rope socket, consisting of an outer member, an inner member movably mounted therein and arranged to co-operate with said outer member to grip a rope at a plurality of points, and stops adjacent a portion of the gripping surface for limiting the gripping pressure of the socket members at said surface to distribute the load on different parts of the rope.

3. A rope socket, consisting of a sheath, a movable wedge mounted therein and arranged to co-operate with the sheath to grip a rope, and stops between said sheath and wedge for limiting the gripping pressure on the live end of the rope.

4. A rope socket, consisting of a sheath, a movable wedge mounted in said sheath and arranged to co-operate therewith to grip a rope, stops between the sheath and wedge at the live end of the rope arranged to abut to limit the gripping pressure on the live end of the rope, and gripping surfaces arranged to hold the dead end of the rope and support part of the load.

5. A rope socket, consisting of a sheath, a wedge movable therein, grooves in said sheath and wedge at opposite sides of the socket arranged to grip the live and dead ends of a rope, respectively, and stops on opposite sides of the grooves at one side of the socket for limiting the gripping pressure on the live end of the rope.

6. A rope socket, consisting of a sheath, a movable wedge mounted in said sheath and arranged to co-operate therewith to grip a rope at its live and dead ends, means for seating the rope on the wedge base between said gripped portions of the rope, and stops arranged between the wedge and sheath for limiting the gripping pressure on the live end of the rope.

7. A rope socket, consisting of a sheath having rope seating grooves therein, a wedge mounted in said sheath and having a groove arranged to co-operate with said sheath grooves for gripping a rope at its live and dead ends and for positioning such rope on the wedge base intermediate the gripped parts of the rope, and stops between the sheath and wedge arranged to abut and limit the gripping pressure on

the live end of the rope when a predetermined load on the rope is reached.

8. A rope socket, consisting of a sheath, a wedge mounted in said sheath, shouldered grooves in the sheath and wedge arranged to grip the live and dead ends of a rope, means for seating a rope on the wedge base intermediate said gripping surfaces, said shoulders being arranged to abut and limit the gripping pressure on the live end of the rope and thereby transfer part of the load to the base of the wedge and the dead end of the rope.

In testimony whereof, I have hereunto set my hand.

CHARLES C. SUNDERLAND.