

Jan. 29, 1963

J. M. FENNER ET AL

3,075,344

DOUBLE TWISTED STRAND AND METHOD OF MAKING THE SAME

Filed June 24, 1960

FIG. 1



FIG. 2

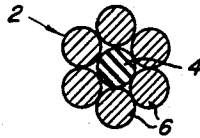


FIG. 3

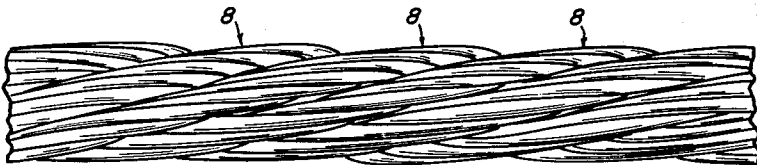
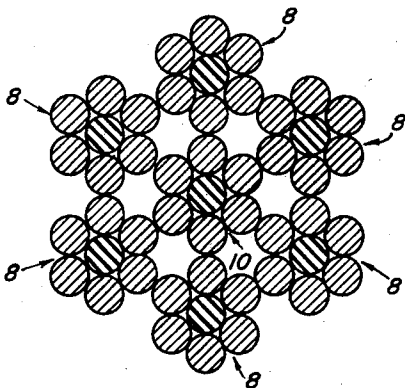


FIG. 4



INVENTORS
JAMES M. FENNER and
WILLIAM A. GURECKI
By *Donald G. Dalton*
Attorney

1

3,075,344

DOUBLE TWISTED STRAND AND METHOD OF MAKING THE SAME

James M. Fenner, Lake Lucerne (Club), and William A. Gurecki, Cleveland, Ohio, assignors to United States Steel Corporation, a corporation of New Jersey
 Filed June 24, 1960, Ser. No. 38,468
 7 Claims. (Cl. 57-147)

This invention relates to a double twisted strand and to a method of making the same and more particularly to a strand made of metallic wires surrounding an elastic core. The double twist method of stranding is more economical than the ordinary method of stranding because the stranding operation is faster and the equipment involved is less expensive. The equipment also takes up less floor space. However, one objectionable feature in the double twist method of stranding wire filaments is the impossibility of retaining a wire in the center of a strand to serve as a single continuous core member. Because of this the strand produced is not a symmetrical or balanced structure so that its fatigue resistance is not as good as that of a balanced strand. The reason why the same wire cannot serve as a single continuous core member is that the double twist stranding method is such that if a wire is retained in the center of the strand it will be longer than the strand produced so that kinks or loops will form in the center core. For example; if the double twist stranding method is used to produce a seven wire strand made up of .012" diameter wires with a 0.40" length of lay, the first twist will require a length of 12.0531" for each of the outer wires. At the completion of the first twist the lay of the strand will be 0.80". The second twist would theoretically require 12.2109" of length for each of the outer strand wires for every 12" of core wire length. However, the lengths of the outer wires and the core wire are determined by the first twist so that the additional length required of the outer wires by the second twist is not available. This results in a tighter twisting of the outer wires and shortening of the lay to 0.40". From the foregoing it is apparent that upon completion of the second twist the length of the core wire, as set by the first twist, will be excessive and must be gathered up or accounted for either as a kink or a loop at intervals in the strand length. The excess core wire length is equal to the difference between the theoretical length required for the outer wire after the second twist and the actual length of these wires after the first twist. In the example set forth, the excess core wire length would be equal to 0.1578" for every 12" of core wire length or the difference between 12.2109" (theoretical length required in the outer core wires after second twist) and 12.0531" (the actual length of the outer wires after the first twist). From the above, it is also seen that for every 12" of core length delivered to the double twist strander, it is necessary to deliver 12.2109" of outer wire length and that after double twisting the actual length of strand produced is equal to 11.8422" (the difference between 12" and the 0.1578" of excess core length).

It is therefore an object of our invention to provide a balanced double twisted strand having a continuous core member.

Another object is to provide a rope structure utilizing such strands.

A still further object is to provide a method of making such a strand.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is a longitudinal view of the strand of our invention;

2

FIGURE 2 is a transverse sectional view of the strand of FIGURE 1;

FIGURE 3 is a longitudinal view of the cord or rope of our invention; and

FIGURE 4 is a transverse sectional view of the cord of FIGURE 3.

Referring more particularly to the drawings reference numeral 2 indicates the strand of our invention. As shown in FIGURE 2 the strand consists of a center core 4 and six steel wires 6 stranded around the center core 4. The center core 4 may be a single filament or a stranded structure. However, it must be made of elastic material which can be stretched and which when released will contract. Material found suitable for this purpose includes nylon, polypropylene and polyethylene. The wires 6 may be made of materials other than steel which do not meet the description of "elastic" as defined above. The core 4 may or may not be under tension as explained hereinafter. While the invention is particularly suited for strands such as described above and shown in the drawings in which all the wires are of substantially the same diameter the invention is applicable to other strands in which at least five wires are twisted around a center core. This construction also enables longer lays to be used and yet hold the strand intact.

According to our invention we also contemplate making a wire rope or cord utilizing the strands described above. As shown in FIGURES 3 and 4, six strands 8 are twisted around a center core 10 with the strands 8 and 10 being constructed according to our invention and with the strands 8 and 10 being substantially of the same diameter. The center core may be otherwise constructed, but it is necessary that the outer strands be constructed as described above. Such cords are cheaper to manufacture and are more flexible than other cords of which we have knowledge.

Machines suitable for carrying out our invention are shown in Berggren Patent No. 2,331,648 dated October 12, 1943 and Winslow Patent No. 2,400,323 dated May 14, 1946. In making up the strand sufficient tension is applied to the core 4 to stretch it at least an amount equal to the difference between the stretched length of core delivered to the strander and the length of strand produced. The core member is held in this elongated condition while the metallic wires are twisted therearound at a lay of, say for example, .80". The wires 6 are then further twisted so as to make the wire tighter and of shorter lay, say for example, .40". During this second twisting operation the tension is reduced so as to permit the core member to contract to the length of strand produced after the second twisting operation. The assembled strand is then subjected to a false twisting operation which may further reduce the length of the strand and with it the length of the core member. Thus it will be seen that a strand is produced in which the elastic core member has been first stretched and then contracted, either to its original length prior to stretching, or to a length intermediate its original length and its tensioned length as supplied to the first twisting operation. In the latter case the strand will have a pretensioned core.

While one embodiment of our invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

We claim:

1. A double twisted strand comprising a core member of stretchable elastic material of the class consisting of nylon, polypropylene and polyethylene which is first elongated and then contracted during formation of the strand, and at least five individual wires stranded around said core member.

2. A double twisted strand comprising a core member

3

of stretchable elastic material of the class consisting of nylon, polypropylene and polyethylene which is elongated and then contracted during formation of the strand, and six individual metallic wires of essentially the same diameter as said core member stranded around said core member.

3. A cord comprising a center strand, and a plurality of double twisted strands surrounding said center strand, each of said last named strands including a core member of stretched elastic material which is elongated and then contracted during formation of the strand, and at least five individual metallic wires stranded around said core member, said core member having a normal unstretched length less than the length of the associated strand.

4. A cord comprising a center strand, and six double twisted strands surrounding said center strand, each of said strands including a core member of stretched elastic material which is elongated and then contracted during formation of the strand, and six individual metallic wires of essentially the same diameter as said core member stranded around said core member, said core member having a normal unstretched length less than the length of the associated strand.

5. The method of making a strand having a core member of elastic material, and at least five metallic wires surrounding said core member, which method comprises twisting the metallic wires around said core member while the core member is in elongated condition, and then further twisting the metallic wires around said core

4

member to a shorter lay while permitting the core member to contract.

6. The method of making a strand having a core member of elastic material, which method comprises twisting a plurality of metallic wires around said core member while the core member is in elongated condition, then further twisting the metallic wires around said core member to a shorter lay while permitting the core member to contract, and then subjecting the assembled strand to a false twisting operation.

7. A double twisted strand comprising a core member of stretched elastic material which is elongated and then contracted during formation of the strand, and a plurality of metallic wires stranded around said core member, said core member having a normal unstretched length less than the length of said strand.

References Cited in the file of this patent

UNITED STATES PATENTS

761,129	Ashworth	May 31, 1904
1,531,862	Larned	Mar. 31, 1925
1,759,410	Marston	May 20, 1930
2,480,005	Ewell	Aug. 23, 1949
2,792,868	Benson	May 21, 1957

FOREIGN PATENTS

813,519	Germany	Sept. 13, 1951
518,860	Italy	Mar. 9, 1955