

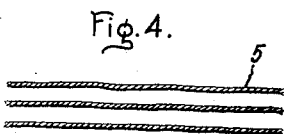
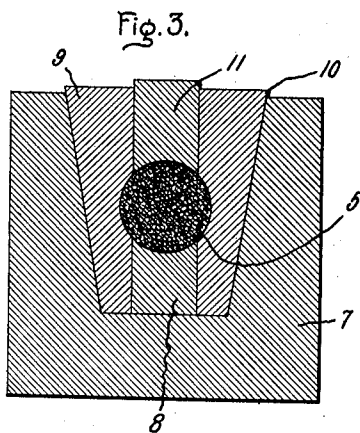
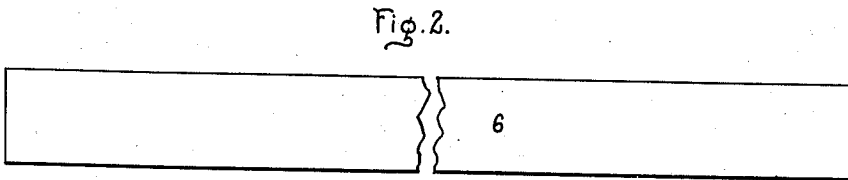
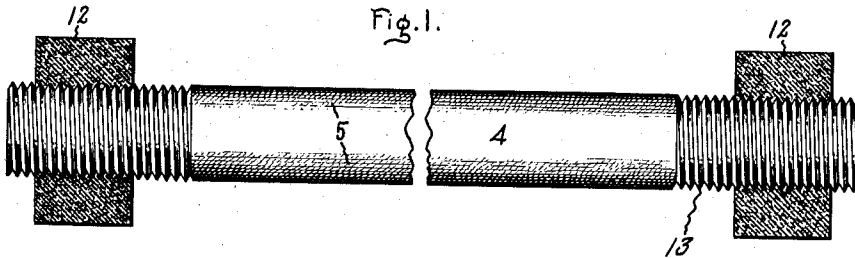
Aug. 30, 1927.

1,640,433

J. J. WELDON

INSULATING ELEMENT

Filed July 20, 1926



Inventor:
John J. Weldon,
by *Alfred S. Hunt*
His Attorney

UNITED STATES PATENT OFFICE.

JOHN J. WELDON, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

INSULATING ELEMENT.

Application filed July 20, 1926. Serial No. 123,774.

In certain classes of electrical apparatus, as high tension transformers for example, it is necessary for electrical considerations, to fasten two or more parts or pieces together with screw-threaded studs made of insulating material having high tensile strength. For this purpose they have commonly been made of vulcanized fiber but instances of failure are becoming more and more frequent as they are called upon to withstand greater stresses. Due to the limits made necessary by the size of the parts or pieces to be united it is in most cases impractical to make the studs of larger diameter and hence obtain increased strength in this manner.

For other classes of electrical apparatus as high tension switches for example, it is customary to connect certain of the operating parts with rods made of insulating material, the requirements of which are that the material shall be strong for a given cross-section in the direction of its length, stiff against a bending stress, and of high insulating properties.

After much experimental work with various fibers and a binder, I have invented or discovered that studs, rods or equivalent devices of great mechanical strength and high insulating properties can be made from spinnable textile fibers, as cotton for example, where the fibers are arranged in the form of longitudinally-extending hard twisted cord and a binder such for example as a phenolic condensation product. Also, that strong screw thread may be formed where necessary at the same time as the article is formed.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a view in elevation of a threaded stud; Fig. 2 is a view in elevation of a rod; Fig. 3 is a view in cross-section of a mould in which the stud or rod may be formed, and Fig. 4 illustrates pieces of twisted cotton cord.

For the insulating base material I used cotton fibers in the form of hard twisted cord. In such cord the fibers extend longitudinally and are also twisted, which arrangement gives great strength. By using hard twisted cord the fibers are under initial compression which prevents the binder from

working into the heart of the fibers when treated and thus render them brittle. Furthermore, such a cord occupies the minimum space for the amount of material employed. Various binders may be employed of which a phenolic condensation product is one good example.

The cords are first treated with a binder generally in liquid form and afterwards dried to facilitate handling. The cord may be treated as such or may take the form of the material used in making automobile cord tires which as is well known comprises a plurality of cords arranged side by side with a relatively few weak cross threads which serve as a carrier only. Using this tire material somewhat simplifies the binder coating operation and in some cases makes the subsequent operations somewhat simpler. After the cords are properly binder-coated they are placed side by side in a suitably constructed mould and all extend longitudinally thereof, from end to end of the article, after which the mould is closed and the cords subjected to heat and heavy pressure. The heat first causes the binder to soften which permits the cords to adjust themselves one to the other so that the density of the final product is uniform throughout, and later to harden and hold the cords and of course the fibers thereof in a compressed state upon the application of heavy pressure. The mould is preferably closed at its ends to form the end surfaces of the article, and if the article requires one or both ends to be threaded the threads are formed at the same time by having threads on the interior of the mould. The pressure to which the cords are subjected will force a limited amount of the fibers into the threads of the mould and the balance of the thread will be formed by the binder. The rods may be made round, square, oval, etc., this being determined by the shape of the mould.

Referring to the drawing, 4 represents a stud composed of a large number of axially-extending hard twisted cotton cords 5 which are held under compression by a binder of Bakelite or equivalent material.

Fig. 2 shows a rod 6 which may be of any desired shape in cross-section and is composed of material similar to that described above.

Fig. 3 shows a mould of a type suitable

for forming studs, rods and the like. It comprises an outer fixed member 7 with closed ends, a central member 8, two side members 9 and 10 and a top member 11 through which transverse pressure is applied to the cords 5 contained in the chamber formed by the several parts of the mould. The heat is applied in any suitable manner, as through the platens of the press. Where the element, rod, or article is to have screw threads either at one or both ends, or at some intermediate point or points, the portions of the metal mould corresponding in position to the threads will likewise have threads suitably cut therein. These threads may be shaped as indicated at 13 or otherwise, as desired. For quantity production it is preferable to use multiple impression moulds, each having the characteristics mentioned above.

In the case of screw threaded studs, the nuts 12 are also made of insulating material. These may advantageously be formed of cotton fibers and a binder such as Bakelite. These are also formed in a mould together with the threads.

Each individual cord possesses much tensile strength and this strength is multiplied by the number of cords which are incorporated in the bundle forming the body of the element. By preference the cords are cut to lengths which correspond to the inside longitudinal dimension of the mould. Since the mould is a closed one, the amount of binder treated cord introduced therein for each charge should be rather carefully determined as by weight or other measurement. For many purposes however, a small amount of cord material or binder over or under the predetermined requirements will not make any serious difference in the finished product.

The use of cords as distinguished from closely woven fabric, such as canvas, not only permits of the production of articles of great tensile strength, but also results in articles of very uniform density. The fact that the cords are round and not tightly fastened to each other, as by being closely woven into a fabric, permits them to adjust themselves

while in the mould thereby avoiding excess pressure in one region and less than the desired pressure in another region. The use of cords also minimizes the danger of pockets being formed in the finished article which contain only binder.

A stud constructed in accordance with my invention having a diameter of three-quarters of an inch and nuts three-quarters of an inch in thickness has been tested with the result that it withstood 4000 pounds when one of the nuts split and at the same time partially sheared some of the threads. Such studs are from 40 to 50% stronger than fiber studs and are also more resilient so that there is less danger of their breaking due to shocks or undue stresses from any cause.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An element comprising a bundle of hard twisted textile material cords which extend side by side from end to end of the element and are in mutual contact, and a phenolic condensation product which holds the cords under compression.

2. An element comprising a bundle of hard twisted textile material cords which extend from end to end thereof, a binder which holds the cords in a highly compressed state, and screw threads thereon which are formed partly by the cord and partly by the binder.

3. A rod-like element which is relatively long and thin, comprising a bundle of textile material cords which cords extend longitudinally thereof from end to end, said cords being in contact with each other and being held under compression by a binder to form a rigid structure.

4. A relatively long, thin element comprising a bundle of hard-twisted textile material cords which cords extend parallel to each other from end to end and form tension members, and a binder which unites the cords in a manner to form a rigid structure and holds the cords in a compressed state.

In witness whereof, I have hereunto set my hand this 16th day of July 1926.

JOHN J. WELDON.