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C. R. JOHNSON

2,286,136

EXPANSIBLE FABRIC COVER

Original Filed May 16, 1940

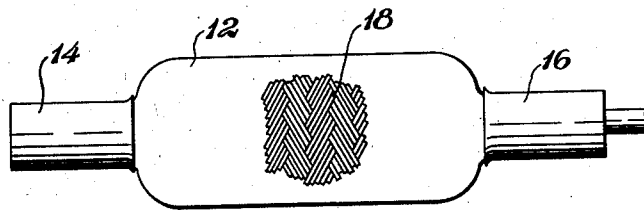


Fig. 2

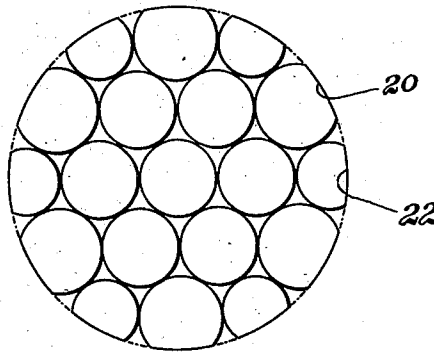


Fig. 3

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UNITED STATES PATENT OFFICE

2,286,136

EXPANSIBLE FABRIC COVER

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Continuation of application Serial No. 335,541,
May 16, 1940. This application December 3,
1940, Serial No. 368,310

3 Claims. (Cl. 96—25)

This invention relates to improvements in braided, stranded wire fabric covers or jackets for rubber tubes or cartridges suitable for expansion and contraction by means of oil or other fluid under pressure for use in mining operations, and particularly for breaking down coal from a seam in a mine, and for other similar purposes.

While braided fabric of stranded wires, particularly when the strands are arranged in sets, are essential for the successful operation of an expansible and contractible cartridge or tube of the character herein described, it has been found that such a fabric must form a substantially uniform surface over the entire expansible portion of the inner tube of rubber or similar flexible and expansible material so as to prevent the extrusion thereof thru openings between the strands.

It is the practice in constructing braided wire covers or jackets for mining tubes and the like to use wire strands, but the pressures used in actual operations, which are well in excess of 2,000 pounds per square inch, cause severe nicking of the wires which results in early failure of the wires and consequently the braided wire strand structure. This is especially true in high tensile wire when subjected to the high pressures required in mining and similar operations where the braided wire strand structure is subjected directly to the resistance offered by the material being acted upon.

I have found that when such braided wire covers are made of wire strands having their surfaces ground smooth, with the outer edge or surface of each outermost wire of each strand provided with a substantially flat surface which bears directly against a similar surface of the adjacent strands, nicking of the wires is substantially eliminated and the life of such braided wire structures is materially lengthened.

It will also be seen by reference to Figure 2 of the accompanying drawing that upon inflation or expansion of the cartridge or tube a curved surface or shoulder is formed in the areas marked B and C at each end of the cartridge or tube due to the restrictions of the ends of both the inner tube and the outer braided fabric cover by the securing collars 14 and 16. At these points marked B and C there is a greater tendency for the wires to spread apart, thus causing substantially diamond-shaped openings between the strands, and these openings become larger when the lateral movement of the strands on the outer surface across the strands on the

inner surface is impeded. Also, when extrusion has once taken place the stranded wires are prevented by the extruded rubber or similar material from moving laterally to close the openings.

While this lateral movement of the wire strands occurs at points designated B and C in the drawing, the crossed strands throughout the parallel areas or main body portion of the braided cover pivot about their points of contact as axes, and it is at these points that severe nicking occurs, resulting in early failure of the braided cover. While the free lateral movements of the strands are essential at the points marked B and C in order to facilitate closing of the openings which appear in these areas, such lateral movement is absent in the parallel sections or main body portion of the braided cover.

I have found therefore that when a braided wire fabric is made of stranded wire having the outer surfaces ground away or otherwise removed so as to present a substantially smooth flat surface, the lateral movement of the wires when the fabric is expanded or contracted is not only facilitated but the nicking of the wires is substantially eliminated and the life of the fabric materially increased.

For example, I have found that a mining tube or cartridge having a cover or jacket of braided wire fabric in which the outer surfaces of the strands are ground smooth will withstand expansion and contraction under pressures in excess of 2000 pounds per square inch of more than 500 times before breaking of any of the strands, as compared with a similar structure made of braided strands in which the outer surfaces have not been ground or removed to produce a smooth outer surface which withstood under similar conditions only approximately 50 to 75 expansions and contractions before breaking.

A principal object of my invention is to increase substantially the life and usefulness of braided wire covers or jackets made of stranded wires and adapted to be expanded and contracted.

Another object of my invention is to eliminate nicking of the outer wires in covers or jackets made of braided strands of wires.

A further object is to facilitate the unimpeded movement of the sets of stranded wires laterally across similar sets during expansion and contraction of the braided fabric.

These and other objects will be more apparent as the description proceeds and reference is

made to the accompanying drawing, in which:

Figure 1 is an elevational view of an unexpanded tube having a braided wire structure surrounding the tube;

Figure 2 is a view in elevation of the expanded tube; and

Figure 3 is an end elevation of one of the strands of wire showing the outer surfaces of the outermost wires removed and the surfaces made substantially flat or slightly curved;

Referring more particularly to the drawing to illustrate a particular embodiment of my invention, the numeral 10 designates the thick walled rubber inner tube or bag, and 12 designates the braided wire cover therefor. The numerals 14 and 16 show the end fittings or collars for securing the ends of the braided wire cover and tubes together according to established practice. As shown, the tubular braid 12 is made up of sets of three strands each carried alternately over and under three similar sets of wire strands. Figure 2 shows the tube and cover expanded.

In Figure 3 the outer strands of wires are shown with the metal removed at the points designated 20 and 22 to provide a substantially smooth outer surface. These wire strands may be made in the usual way either with wires of the same diameter, or wires of varying diameter, as shown in Figure 3, by having the outer surfaces of the outermost wires reduced to a substantially flat or slightly curved surface so as to eliminate nicking of the wires when the strands are forced under extreme pressure one against the other.

My improvement is especially applicable to any braided wire jacket or tubular cover where increased life of the braided wire fabric is desired, but is particularly applicable to covers or jackets made of wire strands arranged in sets carried over and under each other to form a tubular expansible and contractible braid. Such tubes or cartridges forming the inner element of each unit comprise a tube or bag of rubber or similar material as shown in Figure 1 so constructed as to permit expansion or contraction by means of the application or withdrawal of a fluid, and preferably by the use of hydraulic

pressure which may run preferably in excess of 2,000 pounds per square inch.

This is a continuation of my application Serial No. 335,541, filed May 16, 1940.

While I have shown and described one specific embodiment of my invention, it will be understood that various modifications may be made without departing from the scope of my invention and that I do not intend to be limited except as indicated in the following patent claims:

I claim:

1. An expansible and contractible braided metal tubular cover or jacket for reinforcing expansible and contractible hollow bodies of elastic material, comprising braided strands of wire having the outer surfaces of the strands reduced to substantial smoothness to eliminate nicking of the strands in line contact when subjected to high pressure from within the tubular cover.

2. An expansible contractible tubular metal cover for reinforcing expansible and contractible hollow bodies of elastic material, comprising braided sets of wire strands having the outer surfaces of the strands reduced to substantial smoothness to eliminate nicking of the strands in line contact when subjected to high pressure from within the tubular cover and to eliminate subsequent weakening of the strands resulting from rotation of the strands about their points of contact as an axis during subsequent expansions of the tubular cover.

3. An expansible tubular cover for reinforcing expansible bodies such as mining cartridges and the like, comprising sets of strands each of which sets consists of at least three strands and each of which sets is carried alternately over and under at least three of the other sets to form a tubular expansible braid, with end fittings to which the ends of the braid are secured, and having the outer surfaces of the strands ground to substantial smoothness to eliminate nicking of the wires at their points of contact when subjected to high pressures and to eliminate subsequent weakening of the strands as they are rotated about their points of contact as an axis during subsequent expansions of the tubular cover.

CHARLES R. JOHNSON.

CERTIFICATE OF CORRECTION.

Patent No. 2,286,136.

June 9, 1942.

CHARLES R. JOHNSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 34, after "their" insert --outer--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of August, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.