Aug. 13, 1940. R. C. PIERCE 2,211,478

EXPANSIBLE COVER

Filed April 13, 1939 2 Sheets-Sheet 1

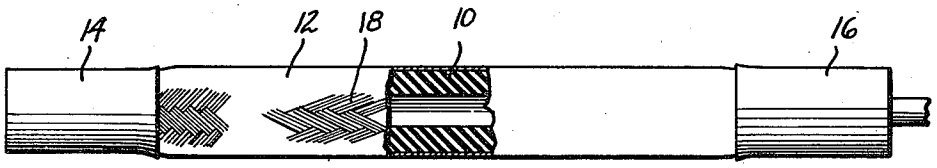


Fig. 1

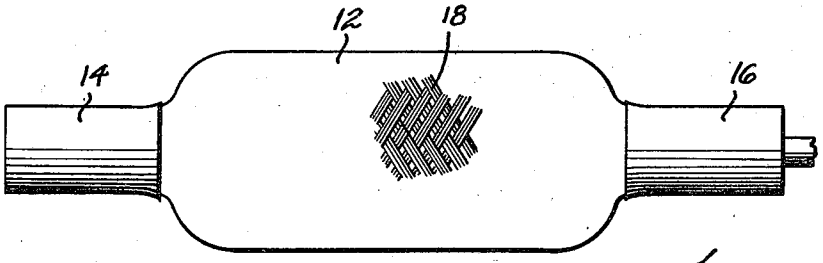


Fig. 2

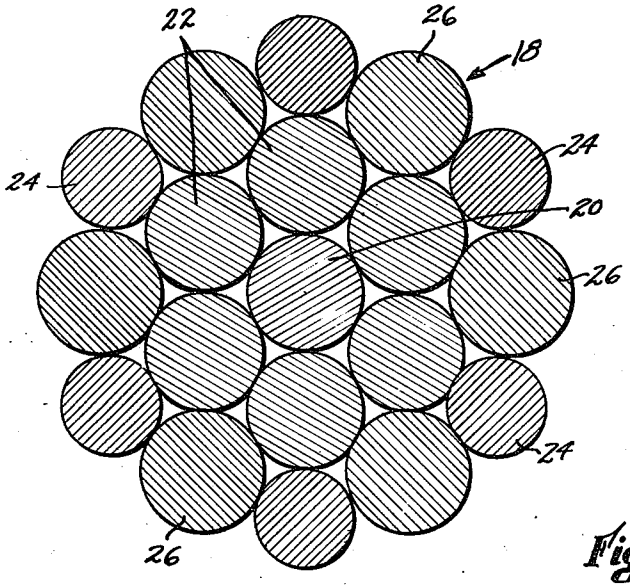


Fig. 3.

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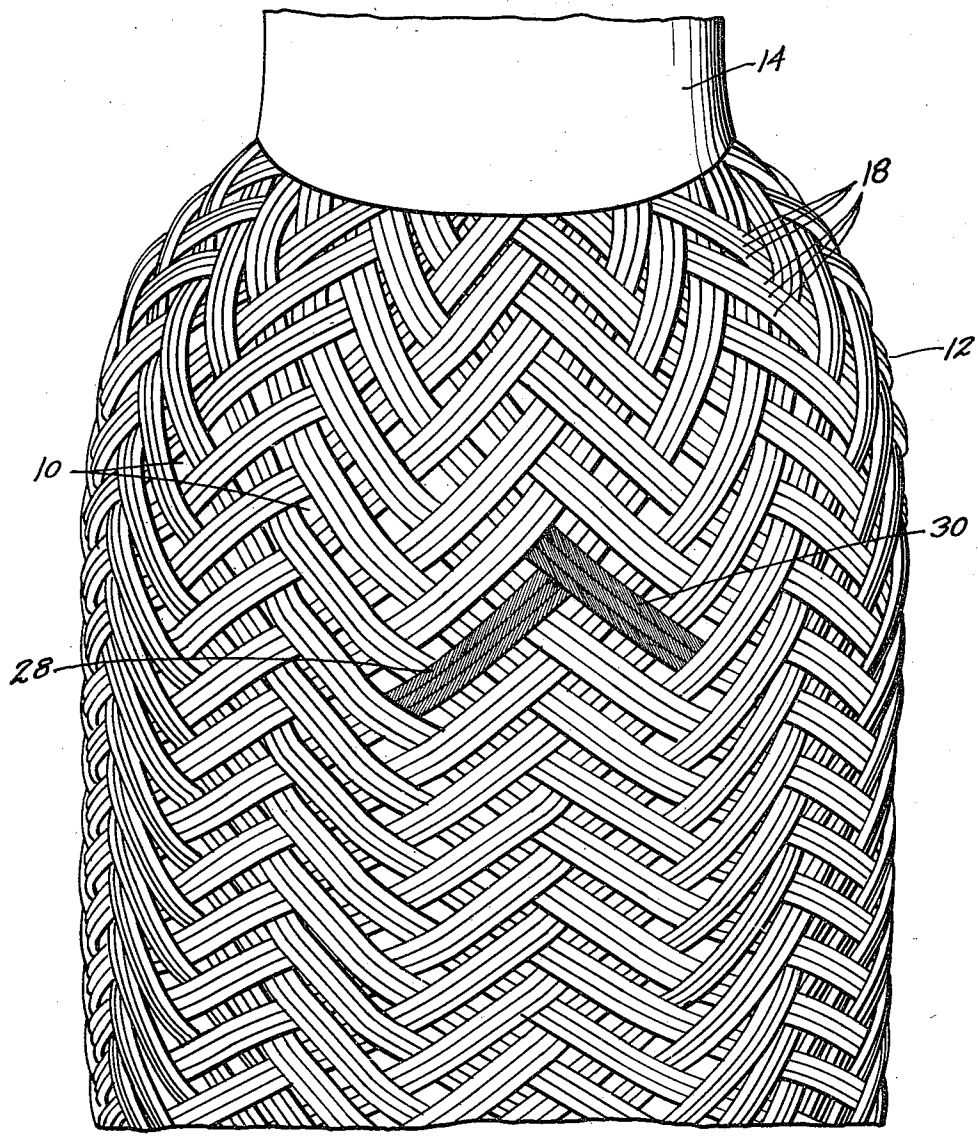


Fig. 4

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Patented Aug. 13, 1940 2,211,478

UNITED STATES PATENT OFFICE

2,211,478

EXPANSIBLE COVER

Robert C. Pierce, Niles, Mich., assignor to National Standard Company, Niles, Mich., a corporation of Michigan

Application April 13, 1939, Serial No. 267,636

2 Claims. (Cl. 96—26)

This invention relates to expansible wire covers, and is illustrated as embodied in a cover for a rubber tube or bag adapted to be expanded by oil under pressure to break down coal from a seam in a mine, the whole assembly being usually referred to as a mining cartridge.

An object of the invention is to increase the strength and durability of such covers by making them of special wire strands arranged in sets carried over and under each other to form a tubular expansible braid.

Various features of novelty relate to the structure and arrangement of the strands to give the necessary strength to the tubular braid, and still to shift readily on each other to facilitate the expansion and accompanying shortening of the cartridge, and its contraction and accompanying elongation.

The above and other objects and features of the invention will be apparent from the following description of the illustrative embodiment shown in the accompanying drawings, in which:

Figure 1 is an elevational view of one of my novel cartridges with a portion cut away to show the inner tube;

Figure 2 is an elevational view of the cartridge of Figure 1 expanded by oil pressure;

Figure 3 is a sectional view, greatly enlarged of the special wire strand used to make my novel cartridge; and

Figure 4 is a substantially full size view of one end of the cartridge in the expanded condition showing in detail the inter-relationship of the strands.

The invention is illustrated in the drawings and described below, as embodied in a coal-mining expansible and contractible "cartridge" of the type described in my Patent No. 2,041,950, granted May 26, 1936; it relates more particularly to the cover of such a cartridge.

In the form shown, the cartridge includes an inner tube or bag 10 of rubber, adapted to be expanded by hydraulic pressure which may run up to 2500 lbs. per square inch and which is protected by an expansible and contractible metallic cover comprising a novel tubular wire braid structure 12 having end fittings 14 and 16 secured thereto.

The tubular braid 12 is made up by carrying alternately over and under each other diagonally around the braid sets of wire strands 18, there being preferably three strands in each set, and each of the sets preferably extending alternately over and under three of the other sets.

Each of the strands 18, in order to secure maximum strength, is made up of wires of three sizes arranged as shown in Figure 3. The central wire 20 is of an intermediate size (e. g. .023 inch) and is surrounded in an intermediate layer by six other wires 22 of substantially the same size. Then there is an outer layer of 12 wires, half of which, designated by the numeral 24, are smaller (e. g. .018 inch) and half of which, designated by the numeral 26, are larger (e. g. .024 inch) than the inner wires. The smaller wires are on top of the intermediate wires and the larger ones nest in the depressions between them.

The wires of the strands 18 are all wound in the same direction and at the same pitch. It is important that the wires of the strands extending around the braid to the right should be wound to the left in their strands (see Figure 4 at numeral 28) and the wires of the strands extending around the braid to the left should be wound to the right (see Figure 4 at numeral 30) so that the strands all tighten as the pressure is applied inside the cartridge.

It will be seen that in the completed cartridge, when the pressure is applied internally, all of the strands 18 tend to tighten rather than to loosen.

While one illustrative embodiment has been described in detail, it is not my intention to limit the scope of the invention to that particular embodiment, or otherwise than by the terms of the appended claims.

I claim:

1. An expansible cover, suitable for reinforcing articles such as mining cartridges and the like, comprising sets of strands carried over and under each other to form a tubular expansible braid and having end fittiings to which the ends of the braid are secured, the sets of strands extending alternately to the right and to the left about the braid, the strands of each set which extends to the right being made up of wires wound with a left-hand pitch and the strands of each set which extends to the left being made up of wires wound with a right-hand pitch so that all of the strands tend to tighten as the cover is expanded.

2. An expansible cover, suitable for reinforcing articles 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 and having end fittings to which the ends of the braid are secured, the sets of strands extending alternately to the right and to the left about the braid, the strands of each set which extends to the right being made up of wires wound with a left-hand pitch and the strands of each set which extends to the left being made up of wires wound with a right-hand pitch so that all of the strands tend to tighten as the cover is expanded.

ROBERT C. PIERCE.