

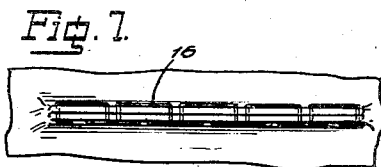
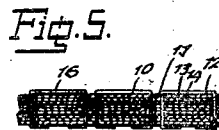
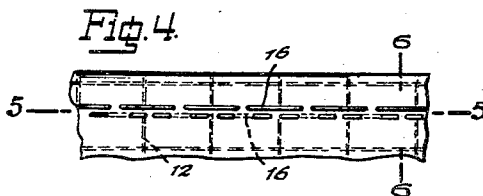
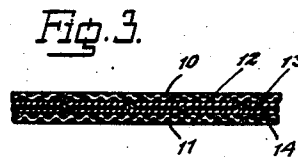
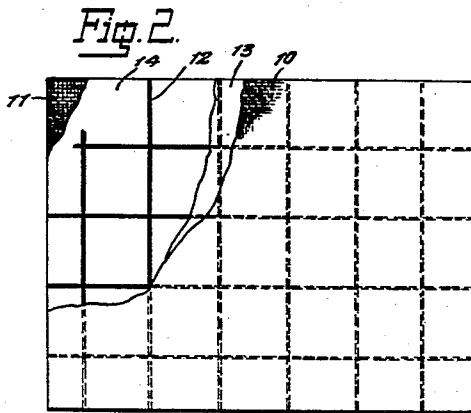
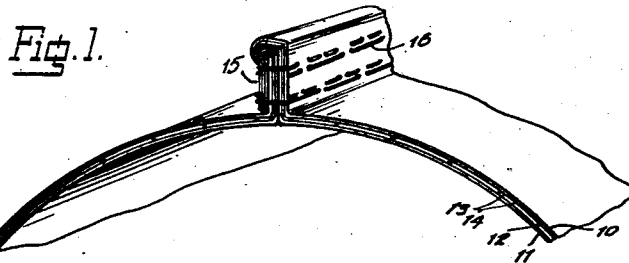
June 21, 1932.

W. H. EVANS

1,863,624

FLEXIBLE VENTILATING HOSE

Filed Jan. 27, 1928



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UNITED STATES PATENT OFFICE

WILLIAM HOOPER EVANS, OF BRIDGEPORT, CONNECTICUT

FLEXIBLE VENTILATING HOSE

Application filed January 27, 1928. Serial No. 249,976.

The present invention relates to flexible fabric ventilating hose, such as is in use in mines, and the like, for carrying air into the various working portions of the mine. The conditions under which such tubing is used are very severe, and the fabric is treated to render it resistant to the destructive effects of water, fungus growths, acid, gases, etc., this treatment usually consisting in coating or impregnating the canvas or duck fabric with various substances, as fungicides, rubber, paraffin, etc. The treated fabric was thereupon sewed into tube form, and for this purpose a fabric thread was machine stitched through the fabric to form the seam.

Considerable difficulty has been experienced in meeting the requirements of strength, flexibility and non-porosity, particularly due to the fact that it has been necessary to sacrifice one or the other of these requisites to increase the other, the heavier fabrics employed for strength being coarse, knotty, stiff and porous, while close weaves designed for non-porosity were relatively weak. Also the material heretofore employed has been subject to tears, shearing, uneven stretching and other objectionable features. It is proposed in the present invention to provide an improved material having the requisites of strength, non-porosity and flexibility, and in which any of these qualities may be increased or diminished to meet various conditions, without sacrificing or compromising the others, and in which fabrics may be employed having the most desirable weave, irrespective of inherent strength, the necessary strength being obtained in the combination structure making up the present material. The material therefore will permit of a wide range of fabrics, selected for the properties of close weave, penetration by fungicides, etc. To this end it is particularly proposed to provide a laminated structure having outer layers of fabric, an intermediate layer of woven wire for the requisite strength, and a combining layer of cementitious material in between the fabric layers combining them and imbedding the wire layer, the cementitious layer also having the properties of water

proofing and rendering the structure airtight.

I have found that the threads of such a seam are particularly subject to the destructive effects of the above mentioned mine conditions, due to the breaking of the protective coating or impregnation during the sewing operation, and also that the perforation of the needle in the fabric exposes the unprotected fibre centers to these conditions, inasmuch as the holes produced by the needle are larger than the thread, and deterioration of the tubing therefore, most frequently starts in the seam. Air leakage also results. It is proposed in the present invention to provide a tubing in which the seam will be wholly resistant to these destructive conditions, and to this end I provide an improved fastening for the seam, which is inherently resistant, will prevent air leakage, and will not expose the fibre centers of the fabric, and further which will combine with the wire layer of the material to produce a structure inherently resistant to tears and strains in all of its parts including the seam.

With the above and other objects in view an embodiment of my invention is shown in the accompanying drawing and this embodiment will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawing:

Fig. 1 is a perspective view of a flexible fabric hose, according to one embodiment of the invention;

Fig. 2 is a plan view of the improved material employed;

Fig. 3 is a sectional view thereof;

Fig. 4 is a plan view of a portion of the seam section;

Fig. 5 is a longitudinal sectional view, taken along the line 5—5 of Fig. 4;

Fig. 6 is a transverse sectional view, taken along the line 6—6 of Fig. 4;

Fig. 7 is a plan view showing a tear in the fabric closed by my improved seam;

Fig. 8 is a sectional view thereof.

Similar reference characters indicate corresponding parts throughout the several figures of the drawing.

Referring to the drawing, and more particularly to Figs. 2 and 3 thereof, the flexible ventilating tube material, according to the present embodiment of the invention, comprises outer layers of woven fabric 10 and 11, this material being of any suitable type and weave, as duck, drill, canvas and the like, to secure the desired closeness of weave, flexibility and affinity for the fungicidal, water-proofing and other treatments to which the same may be subjected. An intermediate layer of flexible woven wire 12 of large mesh, is interposed between the fabric layers and the structure combined by cementitious layers 13 and 14 of rubber, pyroxylin, or other suitable binder, the combined structure being preferably rolled in a heated state to compress the same, so that the cementitious material is pressed into the mesh of the fabric, this treatment also vulcanizing the binding layer when it consists of rubber compound. The fabric layers may be laid so that the line of their weaves is disposed in different directions, thereby providing equal resistance to tears and shearing in all directions, and if desired, the wire may be laid in bias relation to the weaves of the fabric layers. With this improved material great strength and flexibility are obtained, and close weave fabrics may be used which have heretofore been unsuitable because of their lack of strength. While the cementitious layer pressed into the fabric layers renders the structure resistant to fungus growths, moisture-proof, and air-tight, it will be understood that the fabric may be additionally treated by known methods to meet these conditions, the wide range of fabrics permitted by the present construction permitting of a selection of material, as to weave and fibre, that will most advantageously and effectively respond to such treatments. By increasing the strength of the wire layer, any desired strength may be obtained, irrespective of the strength or weave of the fabric layers. Surface tears and abrasions will not prevent functioning of the tubing as has been the case with materials heretofore in use.

The flexible fabric has its longitudinal edges folded and butted as at 15 to form a seam, and thereupon the same is secured by a series of spaced wire staples 16, these staples, according to the present embodiment, being of U-shape before insertion, and having their ends clinched over upon the under side of the fabric. The staples are preferably arranged in two rows in staggered relation, the staples of one row being inserted in the opposed direction from those of the other row, so that there is an equal resistance to strain in any direction that a pull is exerted on the seam. The staggering of the staples of one row with respect to the other spans the spaces between the staples, so that a

substantially continuous fastening is provided. The clamping of the staples in relation to the yielding binding layer effects a water and air-tight closure at the seam.

The transverse arrangement of the staples with respect to the woven wire layer provides an interlocking seam structure inherently resistant to strains and tears in all directions.

Inasmuch as the holes made by the staples are sealed by the cementitious layer, and tightly close about the staples, there is no chance for leakage at these points or for the attacks of fungus growth upon the fibre centers of the fabric. The staples are formed of copper, or other suitable material, resistant to the destructive conditions encountered in the use of the tubing.

In Figs. 7 and 8, I have shown a tear or rip in the material closed by the staple fastening. While I have illustrated a particular form of staple, it will be understood that other types of staples or metallic fastening means may be employed.

I have illustrated and described a preferred and satisfactory embodiment of my invention, but it will be understood that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. As a new article of manufacture, multi-layer reinforced fungus resisting material for mine ventilating tubing and the like, comprising a laminated structure including a woven fabric layer of given ventilating tubing characteristics irrespective of required ventilating tubing strength, and means adapted to provide said required strength comprising a reinforcing woven wire layer having wires adapted to extend both circumferentially and longitudinally of the tubing, said longitudinal wires adapted to resist longitudinal pull and said circumferential wires adapted to impart stability to the circumferential shape of the tubing and a cementitious fungus resisting layer embedding said wire and pressed into the mesh of said woven fabric to render it resistant to fungus growth.

2. In combination, material for mine ventilating tubing, and the like, comprising woven fabric having a cementitious fungus resisting material pressed therein, and wire fastening means punched through and securing overlapped edges of said material, the holes punched by said wire fastening means being sealed around said fastening means by said cementitious material.

3. In combination, material for mine ventilating tubing and the like, comprising woven fabric having a cementitious fungus resisting material pressed therein, and a se-

ries of wire staples punched through and securing overlapped edges of said material, the holes punched by said staples being sealed around the same by said cementitious material.

5 Signed at Bridgeport, county of Fairfield and State of Connecticut, this 8th day of January, 1928.

WILLIAM HOOPER EVANS.

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