June 2, 1953 C. M. HAMBLIN 2,640,500

CONSTRUCTION OF FLEXIBLE HOSE

Filed Dec. 21, 1948

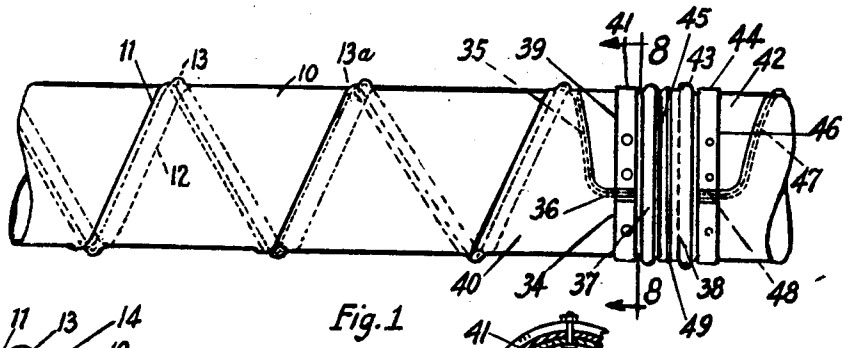

Fig. 1

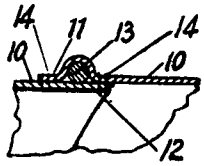

Fig. 2

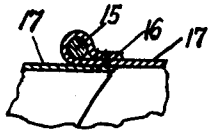

Fig. 3

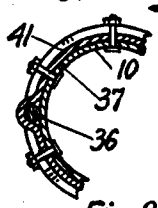

Fig. 8

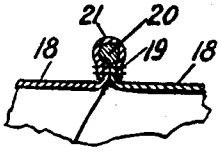

Fig. 4

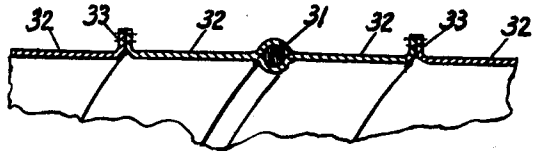

Fig. 5

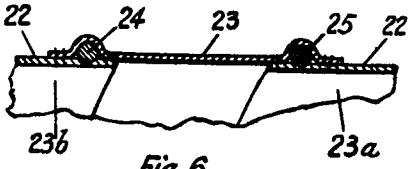

Fig. 6

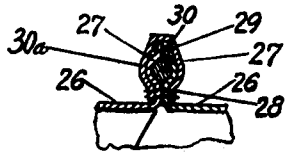

Fig. 7

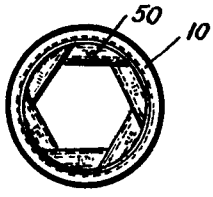

Fig. 9

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CONSTRUCTION OF FLEXIBLE HOSE

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6 Claims. (Cl. 138—53)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The present invention covers improvements in the means of construction of cloth and treated fabric hose used mostly as portable ventilating hose. It is of particular use on naval vessels where portable hose, resistant to transverse collapse, is used for temporary ventilation in various spaces and where space for stowage is restricted.

The purpose of this invention is to provide a type of construction of cloth ventilating hose which will reduce the number of operations necessary in the manufacture of hose, will reduce costs, and speed up production and will also provide a type of hose which will readily collapse longitudinally for stowage, but will remain in an extended position and tend to prevent longitudinal collapse of the hose when such is desired. Cloth hose may be made up by methods described herein, either with or without wire stiffening as will be further explained herein.

A number of means of specific construction are set out in the specification which provides variety in the type of construction used, all of which are useful in particular instances where hose of this character is used.

In the drawings forming part of this specification:

Fig. 1 is a side elevation of a continuous length of hose;

Fig. 2 is a longitudinal partial section of a type of construction where a helically wound strip of cloth is used;

Fig. 3 is a longitudinal partial section of a second type of joined construction;

Fig. 4 is a longitudinal partial section of a third type of joined construction;

Fig. 5 is a longitudinal partial section showing joined construction as well as a means of mounting a helical wire used in the construction of a hose;

Fig. 6 illustrates another partial longitudinal section showing a type of joined construction of two strips of cloth used in the construction of the hose;

Fig. 7 represents an additional longitudinal partial section of another type of joint used;

Fig. 8 is a partial vertical cross section of hose taken on line 8—8 of Fig. 1;

Fig. 9 is an end view of a hose in a collapsed condition.

The method of construction of the present invention on ventilating hose consists in the use of one or more strips of cloth of relatively narrow width with the edges sewed together so that the seam runs longitudinally and circumferentially forming a helical seam as clearly shown in

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Fig. 1 of the drawings. The pitch of the seam will depend on the width of strip selected for the cloth and the diameter of the hose. The seams may be sewed with any suitable type of stitching, or any other suitable means like riveting, etc., may be used.

In Fig. 1 is shown the hose made up with a single strip of cloth 10 wound helically, with the after edge 11 of each turn of the cloth lapped on and sewed to the forward edge 12 of the preceding "turn" of the cloth strip. It is to be understood that "forward edge" and "after edge" are meant to include the marginal border on each side of said strip extending throughout its length. Where wire stiffening is used with this type of construction to prevent transverse collapse of the hose, the wire 13 is sewed between the lap of the turns of the cloth, as shown in Fig. 2, with double stitching 14, 14.

However, this particular case is directed to an alternate type of lap seam construction as shown in Fig. 3, in which the wire stiffening 15 is secured by turning edge 16 of strip 17 back over wire 15. With some types of cloth or rubberized fabric, the "single strip" type of construction shown in Figs. 1, 2 and 3 may cause a slight difference in diameter at the opposite ends, if the hose is long, unless special precautions are taken in manufacture. This may generally be accomplished by a tension device (not shown) on the sewing machine used in the fabrication of the hose.

The tendency for a difference in diameter at opposite ends of the hose may be avoided by the use of a seam with edges of strip 18 turned up and stitched together at 19 as shown in Fig. 4. Where wire stiffening is used in this type of construction the wire 20 is secured by binding strip 21. This binding strip may be used whether or not the wire stiffening is provided.

Another type of construction (Fig. 6) which may be used to avoid a difference in diameter of the hose is to provide two strips of material 22, 23, with both the "forward" and "after" edges of one strip 23 always lapping over the edges of the other strip 22, as shown in Fig. 6, where the edges 23a and 23b of strip 23 lap over the edges of strip 22. The wire stiffening of this type of construction (Fig. 6) will consist of two continuous wires 24 and 25.

Fig. 7 covers another form of the seam somewhat similar to that shown in Fig. 4, in which the hose material 26 is provided with two upstanding ends 27, 27, which may be used stitched at 28, 29, over which is mounted a cover strip 30. The strip 30 may be secured by an addi-

tional stitching at 28 if desired or secured in any other suitable manner. In this type the wire 30a may be used or omitted as found more desirable.

Another type of construction is shown in Fig. 5, in which the stiffening wire 31 is woven into the cloth in the direction of the length of the strip 32. The wire may be located on the center line of the strip 32 as shown in Fig. 5 or in any other position where it will not interfere with stitching the seams. Any suitable type of seam 33, 33, may be used for securing the edges of the cloth strip 32, together.

Where stiffening is used as shown in the drawing to prevent transverse collapse of the hose, it should be made of spring wire or strip metal which should preferably be wound with the "turns" separated a greater distance than they will be in the finished hose, so that the stiffening wire will tend to hold the hose in the extended or open position, as shown in Fig. 1 of the drawings. The stiffening wire may also be formed with the "turns" 13, 13a, positioned closely together so that the wire will tend to hold the hose in longitudinally collapsed position in cases where this condition is found more desirable. The pitch of the "turns" of wire relative to the diameter of the hose fixes the minimum opening through the hose in the collapsed position as illustrated in Fig. 9 of the drawings, as is at once understood.

It is not the intention to limit the invention to the use of circular wire stiffening as shown in the drawings as any shape of spring which can be wound in helical form may be used.

The construction of wire stiffened hose in accordance with the various figures of the drawing facilitates the collapse of the hose in a longitudinal direction as the cloth tends to fold in the form of an iris diaphragm 50 as in Fig. 9 and permits stowing the hose in less space than is occupied by other types of wire or ring stiffened hose. This is, of course, a big advantage on shipboard or other places where stowage space for the hose is at a premium.

It will be noted from Fig. 1 of the drawings that where the ends 34, 42 of two sections of hose come together, same may be secured together by the arrangement shown in said figure. On this figure the end 34 of one section of hose is mounted over the end of male half connector ring 37 and secured by ring 41 mounted on the hose and riveted to ring 37 which extends to 38 within female half connector ring 43. The end 42 of another section of hose is mounted over the end of the female half connector ring 43 and secured by ring 44 riveted to ring 43. It will be noted that wires 13 and 47 of the two sections of hose have turned ends 36 and 48 which are clamped by rings 41 and 44 against rings 37 and 43, respectively, as shown for end 36 in Fig. 8.

It will be noted that the ring 43 can be fastened by means of a spring attachment at 49 and be detachably mounted on the ring 37. In this way, the ends of two sections of hose may be detachably secured to each other. Connector rings and clamping rings are preferably made of metal but other suitable material such as plastic may be used.

From which above description it is seen that I have provided a transversely non-collapsible hose in longitudinally normally extended and normally collapsed types in a number of very convenient forms adapted to be quickly mounted in various positions for use and also adapted to be stowed away in a small floor or ship space when desired.

While the subject matter of this case is disclosed in issued Patent No. 2,452,047, the claims hereof include claims which are subgeneric to forms such as that of Fig. 3, while the issued patent includes generic claims and claims directed to others of the species disclosed and not covered by claims herein.

The invention described herein may be manufactured and used by and for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A hose comprising a strip of flexible fabric material wound in a helix forming a cylindrical tube, said strip comprising a plurality of turns, a forward edge and an after edge on each turn of said material, said edges positioned in overlapping relation with one another and having lapped portions substantially paralleling the surface of said tube, a coil of wire, and means securing said coil of wire to said lapped portions so as to form an endless seam which surrounds said wire and travels the length of said tube.

2. A hose comprising a strip of flexible fabric material wound in a helix forming a cylindrical tube, said strip comprising a plurality of turns, a forward edge and an after edge on each turn of said material, said edges meeting at a helical junction along said tube, a coil of wire along said junction, a first one of said edges lying beneath said wire at said junction, the other of said edges positioned over and substantially encompassing the portion of the wire above the said first edge, and means for securing said edges together so as to form an endless seam which completely covers said wire and travels the length of said tube.

3. A hose comprising flexible fabric material forming a cylindrical tube comprising a plurality of helical turns, a forward edge and an after edge on each turn of said material, said edges meeting at a helical junction along said tube, a coil of wire along said junction, a first one of said edges lying beneath said wire at said junction, a second one of said edges overlapping said first one of said edges and said wire, and means positioned on each side of said wire for securing said edges together so as to form a helical envelope enclosing said wire and extending the length of said tube.

4. A hose comprising a strip of flexible fabric material wound in a helix forming a cylindrical tube, said strip comprising a plurality of turns, a forward edge and an after edge on each turn of said material, said edges positioned to lie in overlapping engagement with one another and having lapping portions substantially paralleling the surface of said tube, a coil of wire positioned between said overlapping edges, and means securing said wire and said edges in the aforesaid position.

5. A hose comprising a strip of flexible fabric material wound in a helix forming a cylindrical tube, said strip comprising a plurality of turns, a forward edge and an after edge on each turn of said material, said edges meeting at a helical junction along said tube, a coil of wire of preformed pitch different from that of said helix, said coil of wire being disposed along said junction, a first one of said edges lying beneath said wire, a second of said edges overlapping said first one of said edges and turned back on itself

to form a fold, said coil of wire positioned within said fold and means for securing said wire within said fold while simultaneously securing said edges to one another thereby forming an endless seam extending along the length of said tube.

6. A hose comprising a strip of flexible material wound in a helix forming a cylindrical tube, said strip comprising a plurality of turns, a forward edge and an after edge on each turn of said material, a first of said edges underlying the second of said edges, said second edge being turned back on itself to form a fold, a coil of wire, and means for securing said coil of wire within

said fold, said means further securing said edges to one another whereby an endless seam enclosing said wire is formed along the length of said tube.

CLYDE M. HAMBLIN.

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