Oct. 26, 1948. C. M. HAMBLIN 2,452,047

CONSTRUCTION OF FLEXIBLE HOSE

Filed May 1, 1943

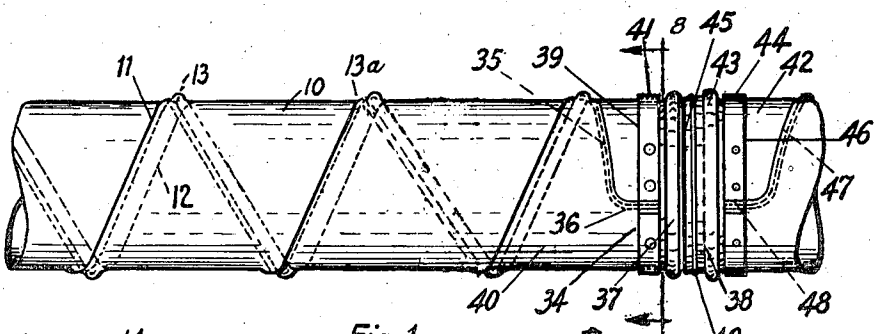


Fig. 1

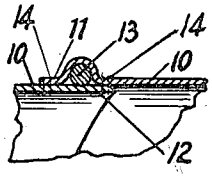


Fig. 2

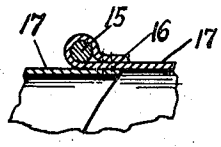


Fig. 3

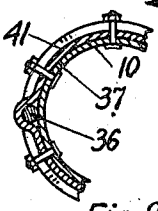


Fig. 8

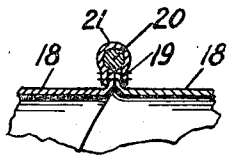


Fig. 4

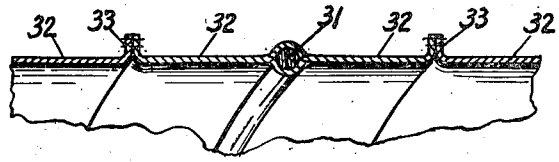


Fig. 5

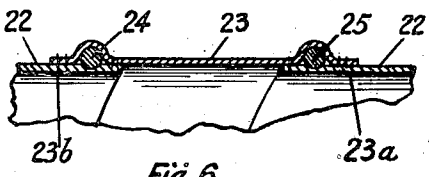


Fig. 6

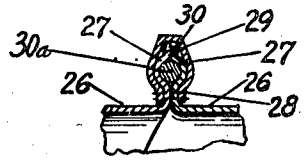


Fig. 7

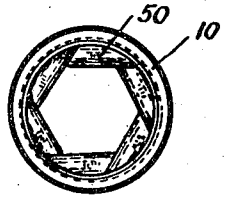


Fig. 9

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CONSTRUCTION OF FLEXIBLE HOSE

Clyde M. Hamblin, Washington, D. C.

Application May 1, 1943, Serial No. 485,324

22 Claims. (Cl. 138—49)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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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 provide 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 shown in Fig. 1 of the drawings clearly. 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.

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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. 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 cloth, as shown in Fig. 2, with double stitching 14, 14.

An alternate type of lap seam construction is 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 23*a* and 23*b* of strip 23 lap over the edges of strip 22. The wire stiffening for 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 divided 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 additional stitching at 28 if desired or secured in any other suitable manner. In this type the wire 30*a* 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" sep-

arated 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 accordence 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.

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 formed of a strip of flexible fabric wound helically to form a continuous tube, and a helically wound spring wire having when unstressed a pitch substantially different from the pitch of the fabric strip, attached to the adjacent edges of said strip to prevent transverse collapse of and exert longitudinal force on said tube.

2. A hose formed of a strip of flexible fabric wound helically to form a continuous tube, and a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of the fabric strip, attached to the adjacent edges of said strip to exert longitudinal tension on and prevent transverse collapse of said tube.

3. In a device of the class described a hose formed from a strip of fabric wound in a helical manner, to form a tube, a helically wound wire of preformed contracted pitch mounted in the edges of the strip, to hold the hose in contracted position for stowage and other purposes.

4. A hose formed from at least one strip of flexible fabric wound helically, a stiffening helical resilient wire of a pitch substantially different than the pitch of the finished hose woven lengthwise therein, and means for securing the adjacent edges of the successive turns of the fabric together.

5. In a hose of the kind described, a hose formed of a strip of fabric wound helically to form a tube, a helically preformed wire of preformed contracted pitch, mounted in the body of the hose, and adapted to cause the fabric of the hose to assume folds of the iris diaphragm type when the hose is longitudinally collapsed.

6. A hose formed of strip material wound helically, a helically disposed wire forming the contacting edges of the material, and a means for securing the end of said wire adjacent to the end of said hose, comprising an inner annular metal ring, adapted to be mounted on the end of the hose, a bent end on said wire placed in superimposed relation to the metal ring, a locking ring mounted on the outer circumferential face of the hose, and enclosing the bent end of said wire, and means for locking the locking ring, the end of the wire, the material of the hose and the inner metal ring together.

7. A flexible and longitudinally collapsible hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of the fabric strip to exert longitudinal tension on and prevent transverse collapse of said tube, means for joining adjacent edges of said strip together to form a continuous seam and means for attaching said spring wire to said tube with said spring wire contracted with respect to its length when unstressed.

8. A flexible and longitudinally collapsible hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire extending lengthwise in said strip and having when unstressed a pitch substantially greater than the pitch of said helically wound strip in the finished hose to exert longitudinal tension on and prevent transverse collapse of said tube, and means for joining adjacent edges of said strip together.

9. A flexible and longitudinally collapsible hose formed of a plurality of strips of flexible fabric wound helically and in parallel relation to each other, means for joining the forward and after edges of the successive turns of said strips together to form continuous seams, and resilient means in relation with said seams for exerting longitudinal tension on and preventing transverse collapse of said hose.

10. A hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire between adjacent edges of said strip and having when unstressed a pitch substantially greater than the pitch of the fabric strip for exerting longitudinal tension on and preventing transverse collapse of said tube, a strip of flexible fabric enclosing said wire and the ad-

jacent edges of said helically wound strip, and means for fastening all of said parts together.

11. In a flexible and longitudinally collapsible hose, a continuous tube formed of a strip of flexible fabric wound helically, a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of said fabric strip for exerting longitudinal tension on and preventing transverse collapse of said tube, and means for simultaneously joining the adjacent edges of successive turns of said strip and attaching said wire thereto with said spring wire contracted with respect to its length when unstressed.

12. A flexible and longitudinally collapsible hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire having when unstressed a contracted pitch substantially less than the pitch of the fabric strip to cause longitudinal contraction and prevent transverse collapse of said tube, means for joining adjacent edges of successive turns of said strip together to form a continuous seam and means for attaching said spring wire to said tube with said spring wire extended with respect to its length when unstressed.

13. A flexible and longitudinally collapsible hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire extending lengthwise in said strip and preformed to contracted pitch less than the pitch of said helically wound strip to resist longitudinal extension and prevent transverse collapse of said tube, and means for joining adjacent edges of successive turns of said strip together to form a continuous seam.

14. A flexible and longitudinally collapsible hose formed of a plurality of strips of flexible fabric wound helically and in a parallel relation to each other, means for securing the forward and after edges of the successive turns of said strips together to form continuous seams, and resilient helically wound spring wire means having when unstressed a pitch substantially less than the pitch of said seams to cause longitudinal contraction and prevent transverse collapse of said hose.

15. A hose formed of a strip of flexible fabric wound helically to form a continuous tube, with the adjacent edges of successive turns joined together by sewing to form a continuous seam, and a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of the fabric strip in joined relation with said seam to exert longitudinal tension on and prevent transverse collapse of said tube.

16. A hose formed of a plurality of strips of flexible fabric wound helically and in parallel relation to each other to form a continuous tube with the adjacent edges of successive turns joined together by sewing to form continuous seams and helically wound spring wire means having when unstressed a pitch substantially greater than the pitch of said seams, in joined relation with said seams.

17. A flexible and longitudinally collapsible hose formed of a strip of flexible fabric wound helically to form a continuous tube, a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of the fabric strip interposed between the adjacent edges of successive turns of said strip for extending longitudinally tension on and preventing transverse collapse of said tube, and sewing means for joining the edges of the strip together to form a continuous seam and fasten said wire in fixed relation to said tube.

18. In an extensible hose a continuous tube formed of a strip of flexible fabric wound helically, a helically wound spring wire having when unstressed a pitch substantially less than the pitch of the fabric strip for retracting said tube, and sewing means for simultaneously joining adjacent edges of said strip together and fastening said wire with said wire extended with respect to its length when unstressed.

19. A hose formed of a strip of flexible fabric wound helically to form a continuous tube, and a helically wound spring wire having when unstressed a pitch substantially greater than the pitch of the fabric strip to exert longitudinal tension on said tube and having a coil diameter sufficiently less than the diameter of the finished hose that when the spring wire is compressed to the length of the finished hose, the coil diameter will be the same as the diameter of the finished hose to prevent distortion of the hose in the extended condition.

20. A hose formed of a strip of flexible fabric wound helically to form a continuous tube, and a helically wound spring wire having when unstressed a pitch substantially less than the pitch of the fabric strip to resist longitudinal extension of said tube and having a coil diameter sufficiently larger than the diameter of the finished hose that when the spring wire is extended to the length of the finished hose, the coil diameter will be the same as the diameter of the finished hose, and when the spring wire is contracted, the larger diameter will assist the hose in assuming folds of the iris diaphragm type.

21. A hose formed of flexible fabric wound helically to form a continuous tube, a helically wound spring wire engaging said fabric, and sewing means for simultaneously joining adjacent edges of the helically wound fabric and fastening said wire to said fabric.

22. A hose formed of flexible fabric wound helically to form a continuous tube, a helically wound wire positioned between adjacent edges of said helically wound fabric, and means for simultaneously joining said adjacent fabric edges and fastening said wire to said fabric, said means extending no greater distance from the diameter of said hose than the outer periphery of the fabric edges which cover said wire.

CLYDE M. HAMBLIN.

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Certificate of Correction

Patent No. 2,452,047. October 26, 1948.

CLYDE M. HAMBLIN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 5, lines 72 and 73, claim 17, for the words "extending longitudinally" read *exerting longitudinal*;

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 18th day of January, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.