

Aug. 31, 1948.

A. E. CHERNACK

2,448,485

HOSE

Filed Dec. 11, 1943

Fig. 1.

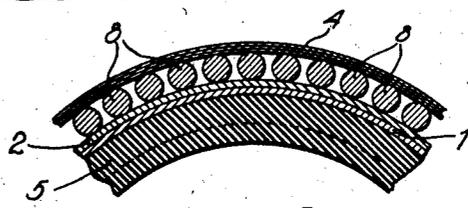
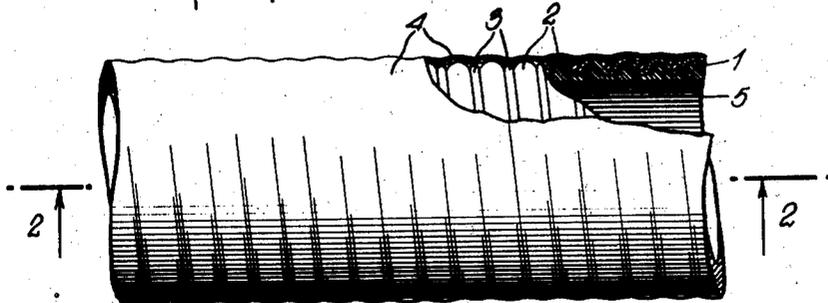


Fig. 4.

Fig. 5.

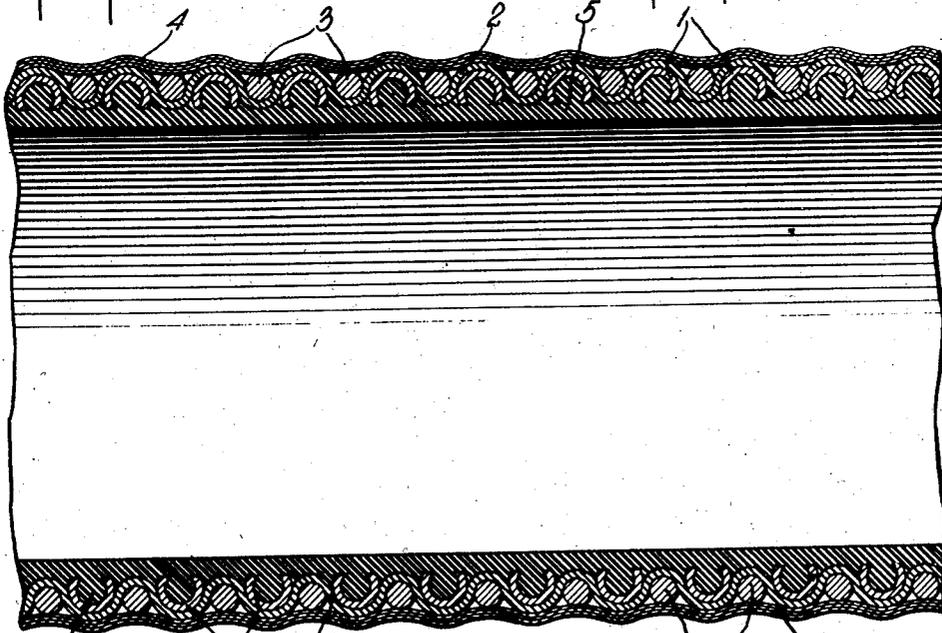


Fig. 3.



Fig. 2.

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UNITED STATES PATENT OFFICE

2,448,485

HOSE

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Application December 11, 1943, Serial No. 513,969

9 Claims. (Cl. 138—56)

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This invention relates to high pressure hose of large diameter and more particularly to high pressure hose of large diameter having metallic reinforcing and it is an object of this invention to provide hose of the type described of an improved construction, of great strength, and which can be readily and economically manufactured in units of any desired length. It is a further object of this invention to provide hose of the type described having a rubber or other suitable water or gas tight lining secured to the metallic reinforcing of the hose without the use of adhesives and in a manner insuring the lining being retained in position.

It is also an object of this invention to provide an improved method of manufacturing hose of the type described.

In the drawings—

Fig. 1 is a view partly in elevation and partly in section of a portion of hose constructed in accordance with this invention;

Fig. 2 is a longitudinal sectional view taken as on line 2—2 of Fig. 1 and drawn to a larger scale, of the hose shown in Fig. 1;

Fig. 3 is a sectional view of a binder of composite construction suitable for use in the hose of Figs. 1 and 2.

Fig. 4 is a fragmentary longitudinal sectional view of hose of a modified construction; and

Fig. 5 is a fragmentary transverse sectional view taken as on line 5—5 of Fig. 4.

As shown in Figs. 1 and 2 of the drawings, hose constructed in accordance with this invention comprises a continuous spiral 1 formed of a metal strip bent to a substantially tubular shape and wound with its opening directed inwardly towards the longitudinal axis of the spiral. The bending of the strip is carried to a point such that the distance between the edges of the strip is appreciably less than the diameter about which the strip is bent.

Wound about the metallic spiral 1 is a cloth or fabric wrapping 2 formed of a plurality of overlapping layers of a textile or other suitable material which has been treated, on the outer face only, with an adhesive, preferably a suitable rubber compound. The wrapping 2 is wound about the spiral 1 under considerable tension to insure bonding of the layers together and to press the wrapping between the turns of the spiral 1.

There is then placed about the wrapping 2 between the coils of the spiral 1 a binding wire or cord 3 which serves to further press the wrapping 2 between the turns of the spiral 1. The binder 3 may be a solid steel wire, a cord of any

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suitable material or, as shown in Fig. 3, of a composite construction comprising a metallic strip bent to a tube 6 about a paper cord 7 as a core where lightness coupled with considerable strength is desired. An outer covering 4 of any desired number of overlapping layers of a suitable textile fabric, preferably treated with a suitable rubber compound, is then wrapped about the binder 3 and the inner covering 2, the outer covering 4 preferably being wrapped in a direction opposite to the direction of wrapping of the inner wrapping 2.

Secured to the spiral 1 by interlocking engagement in the trough of the spiral 1 is an inner lining 5 formed of a material which can be forced into engagement with the spiral 1 by pressure while in a plastic or semi-fluid condition. The lining 5 is preferably of a suitable rubber compound which can be vulcanized by treating with steam or in other convenient manner and which is water tight and flexible when vulcanized but other suitable material can be used. The thickness of the lining 5 can be varied by varying the size of the area into which the material is forced to form the lining.

The spiral 1 can be formed about a mandrel and the wrapping 2, binder 3 and covering 4 added while the spiral 1 is moved along the mandrel to a mandrel of less diameter. While the spiral 1 and its wrappings are being moved along the spiral of lesser diameter, the material forming the lining 5 can be forced into the spiral and between it and the smaller mandrel thus forming the lining. The hose is then cut in desired lengths and, where necessary, vulcanized by treating with steam or in other suitable manner.

Hose in accordance with this invention provides a smooth fluid-tight inner lining which is interlocked during manufacture to the steel reinforcing spiral in a manner preventing release therefrom except upon destruction of hose. The hose is more flexible than high pressure hose of other constructions and it may be given the desired strength by variations in the width and thickness of the metal strip forming the spiral and in the width and extent of overlap of the materials of the inner and outer coverings.

In the modified construction of hose shown in Figs. 4 and 5, the hose comprises the inner lining 5 interlocked with the metallic spiral 1, the inner wrapping 2 placed about the spiral 1 and the binder 3 wrapped about the inner wrapping 2 between the coils of the spiral 1. Before the outer wrapping 4 is put on, a number of parallel longitudinally extending wires or cords

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§ are placed about the wrapping 2 and binder 3 and the layers of the outer wrapping 4 are then applied, the wires or cords § being secured in position by the wrapping 4. The wires or cords § provide additional strength where the hose is subjected to strain longitudinally, as by being used in a substantially vertical position. The wires or cords § may be spaced apart and be of a desired size so as to provide a hose of a relatively light weight with a desired longitudinal strength or the wires § may be placed close together so as to provide substantially an armor for the hose.

While the spiral 1 has been shown and described as being formed of substantially cylindrical tubing it is to be understood the material of which the spiral is formed may have other cross-sections than the substantially circular cross section shown so long as the spiral permits of the rubber lining interlocking therewith.

What is claimed is:

1. A hose comprising a metallic spiral formed of a strip of trough-shaped section opening towards the hose axis, a covering on said spiral, binding means engaging said covering and a lining forming a smooth inner surface for the hose secured to said spiral.

2. A hose comprising a metallic spiral formed of a strip of trough-shaped section opening towards the hose axis, a covering on said spiral, binding means engaging said covering and a unitary lining forming a smooth inner surface for the hose engaging said spiral.

3. A hose comprising a metallic spiral formed of a strip of trough-shaped section opening towards the hose axis, a covering on said spiral, binding means forcing said covering between the convolutions of said spiral and a lining forming a smooth inner surface for the hose interlocked with said spiral.

4. A hose comprising a metallic spiral formed of a strip having a trough-shaped section opening inwardly of the spiral, a covering on said spiral and a lining forming a smooth inner surface for the hose engaging in the trough of said strip.

5. A hose comprising a metallic spiral formed of a strip having a trough-shaped section opening inwardly of the spiral, a covering on said spiral and a unitary lining forming a smooth

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inner surface for the hose interlocked with the trough of said strip.

6. A hose comprising a metallic spiral having an inwardly-opening substantially circular-shaped section, a covering on said spiral, a binder on said covering, an outer covering on said binder and said first covering and a unitary inner lining interlocked with said spiral.

7. A hose comprising a metallic spiral having a substantially circular-shaped section opening inwardly of the spiral, a covering on said spiral and a unitary rubber lining forming a smooth inner surface for the hose interlocked with said spiral.

8. A hose comprising a metallic spiral consisting of a substantially tubular member opening inwardly of the spiral, a covering on said spiral, a binder on said covering, longitudinally extending strain members on said covering and binder, an outer wrapping securing said strain members in position and a unitary lining forming a smooth inner surface for the hose interlocked with said spiral.

9. A hose comprising a metallic spiral consisting of a substantially tubular member opening inwardly of the spiral, a covering on the spiral, a binder on said covering, parallel longitudinally extending strain members on said covering and binder, an outer wrapping securing said strain members in position and a unitary lining forming a smooth inner surface for the hose interlocked in said spiral.

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