Aug. 30, 1938. D. B. GISH 2,128,814

HOSE

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Fig. 1.

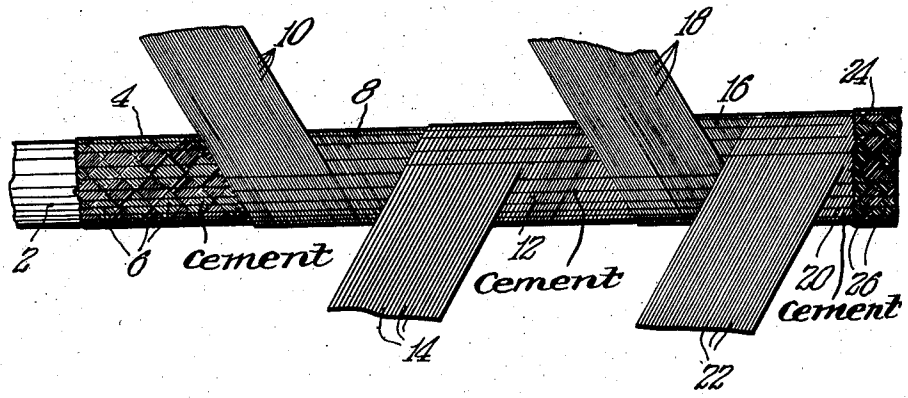
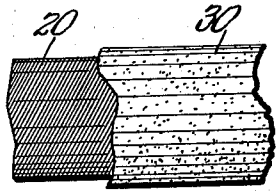


Fig. 2.



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HOSE

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2 Claims. (Cl. 138—56)

This invention relates to improvements in hose and is directed more particularly to the provision of a novel hose construction which is both suitably flexible and adapted for conducting fluids of all kinds at high pressures.

It is one of the principal objects of the invention to provide a process whereby a hose is constructed which is capable of withstanding extreme pressures and is at the same time sufficiently flexible so as to be adapted for many and various purposes.

According to the novel features of the invention the hose is constructed of a plurality of layers of different materials and, as will appear, these layers have different characteristics so as to be capable of performing certain functions and co-operating with the other layers to provide a hose which will withstand high pressures and at the same time have the desired degree of flexibility.

Also, according to the features of this invention, the method of making the hose is such as to facilitate the efficient and ecomonical production of the hose and a homogeneous and firmly bound product is obtained.

Various other novel features of the invention will be hereinafter more fully referred to in connection with the accompanying description of the preferred form thereof, reference being had to the drawing wherein:

Fig. 1 is a fragmentary side elevational view of a hose embodying the novel features of the invention; and

Fig. 2 is a similar view to show a modified form of the invention.

Referring now to the drawing more in detail the invention will be fully described.

At 2 is shown a hollow core or inner tube which is preferably formed of some more or less pliable material. The material of the core may vary, depending somewhat upon the use to which the hose is to be put. A bendable plastic composition such as vulcanizing cement has been found particularly suitable.

What may be called a reinforcing sheath 4 is disposed around a core 2 and this is formed of a plurality of interlaced elements 6. According to the preferred form of the invention, these elements 6 consist of wire or cord and they are braided or interlaced in some way so as to form the tubular sheath 4. It will be appreciated that such a sheath suitably protects the core and at the same time has the desired flexibility.

Preferably there is then placed over this much of the hose a layer of cement which can be vulcanized. This application may be brought about in various ways.

As a next step, what may be called a restraining sheath 8 is formed around the sheath 4. The sheath 8 preferably consists of a group of elements 10 which are led onto the sheath 4 under tension and in such a way that they are wound spirally about the sheath in one direction and in adjacency, as shown. A plurality of wires suitably perform this function and according to the preferred form of the invention, the elements 10 consist of wires.

In order to obtain a winding which will more or less prevent expansion and contraction, I have found that it is desirable to lead or wind under tension a number of elements 10 onto the sheath simultaneously.

A second restraining sheath 12 is formed about sheath 8 in a similar way. However, sheath 12 consists of adjacently-disposed elements 14 wound spirally about sheath 8 in a direction opposite to that in which the elements 10 extend. It may be stated that it is preferable that the windings of sheaths 8 and 12 have substantially the same pitch and the elements 14 should be of the same material as elements 10.

The winding operations of elements 10 and 14 may or may not be carried on simultaneously but I have found that where they are wound simultaneously under tension the torque set up by the winding in one direction is more or less counteracted by the torque of the opposite winding so that a balanced structure is obtained.

Again I preferably provide a layer of cement on this much of the hose so as to form a binder for another sheath 16. As will appear, I later vulcanize the hose so, it will be appreciated, the application of cement layers at these different stages of its manufacture later serves to render the assembly more homogeneous and bind the different layers together.

Over the restraining sheaths 8 and 12 a layer 16 of windings 18 of some fibrous material is applied under sufficient tension so that the elements 18 lay smoothly and evenly and, as will later appear, serve to hold the elements making up sheaths 8 and 12 from getting out of position. These elements 18, which may be of some material such as cotton, are preferably led onto the sheath 12 in much the same way as are the elements 10 and 14, that is spirally and in parallelism and in one direction. A second fibrous layer 20 is formed by winding adjacently-disposed elements 22 spirally about layer 16 in an opposite

direction. These layers function in one way to hold the windings of the restraining sheaths.

This whole assembly, that is core 2, reinforcing and restraining sheaths and fibrous layers, I call a carcass. As a final step, a cover member is provided around the carcass and according to the invention this may take various forms.

In Fig. 1, a cover 24 is formed of interlaced elements 26. These elements 26 preferably consist of cotton elements braided or woven together. When such a cover is used I have found it desirable to provide a layer of cement on sheath 20 and then the whole assembly is vulcanized.

In Fig. 2, there is shown the outside of the carcass, that is the sheath 20, and this has a cover 30 therearound formed of some rubber compound. Then the carcass and cover are vulcanized.

With either type of cover and with the vulcanizable cement the fabricated hose is vulcanized and this serves to provide a homogeneous structure with the different sheaths or layers combined in such a way that they may function for their particular purpose and co-operate with one another.

It will be observed that I have provided a hose structure wherein a central more or less pliable core is reinforced by a flexible sheath or sheaths of interlaced elements with the latter formed in such a way that the bore of the core is not undesirably constricted and without impairing the bendability or flexibility of the hose. Further, the restraining sheaths, with the windings of one sheath disposed in an opposite direction from the windings of the other, serve to hold the reinforcing sheath against expansion while the fibrous sheath or sheaths overlie, hold and protect the restraining sheaths.

The vulcanizable cement may be used at various stages of the fabrication so the whole may be vulcanized to provide the homogeneous flexible structure. The hose is so constructed that the core 2 is well reinforced while at the same time the restraining sheaths prevent undue expansion which would tend to impair the reinforcing effect of sheath 4.

It should be pointed out that, if desired, a cover of interlaced elements may be placed over the carcass and an auxiliary cover of some rubber compound, such as 30, may be placed over this cover of interlaced elements. That is, the particular way in which the outside of the hose is constructed is not so important as the construction of the carcass and the vulcanizing feature.

While I have described the invention in great detail and with respect to a preferred form thereof, it is not desired to be limited thereto since many changes and modifications may be made therein without departing from the spirit and scope of the invention. What it is desired to claim and secure by Letters Patent of the United States is:

1. A flexible hose of the class described comprising in combination, a core having a bore, a reinforcing sheath around said core formed of a plurality of interlaced metallic elements, a layer of cement over said sheath, a restraining sheath around the reinforcing sheath consisting of a group of closely adjacent separate wire elements wound spirally in one direction, a second restraining sheath consisting of a group of closely adjacent separate wire elements wound spirally in an opposite direction over the first-named restraining sheath, a layer of cement over said second restraining sheath, a layer of adjacently-disposed separate fibrous elements wound spirally around the second restraining sheath in one direction, a second layer of adjacently disposed separate fibrous elements wound spirally over the first fibrous layer in an opposite direction, the said core, sheaths and layers forming a carcass, and a cover around said carcass, the whole being vulcanized.

2. A flexible hose of the class described comprising in combination, a core having a bore, a reinforcing sheath around said core formed of a plurality of interlaced metallic elements, a layer of cement disposed over said sheath and in some of the interstices thereof, a restraining sheath around the reinforcing sheath consisting of a group of closely adjacent separate wire elements wound spirally in one direction, a second restraining sheath consisting of a group of closely adjacent separate wire elements wound spirally in an opposite direction over the first-named restraining sheath, a layer of cement disposed over said second restraining sheath and in some of the interstices thereof, a layer of adjacently-disposed separate fibrous elements wound spirally around the second restraining sheath in one direction, a second layer of adjacently disposed separate fibrous elements wound spirally over the first fibrous layer in an opposite direction, the said core, sheaths and layers forming a carcass, a layer of cement disposed over said carcass, and a cover around the whole and the whole being vulcanized.

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