

Nov. 29, 1966

T. F. MOSS
PNEUMATIC HOSE

3,288,169

Filed April 26, 1963

2 Sheets-Sheet 1

FIG.1.

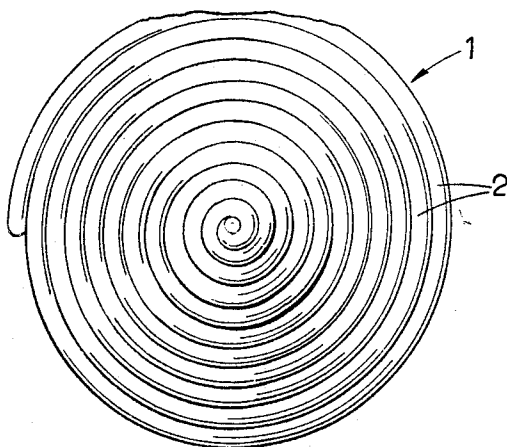


FIG.2.

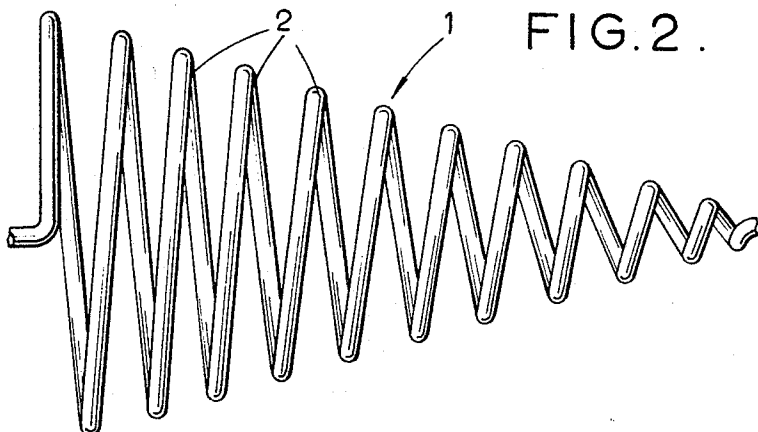
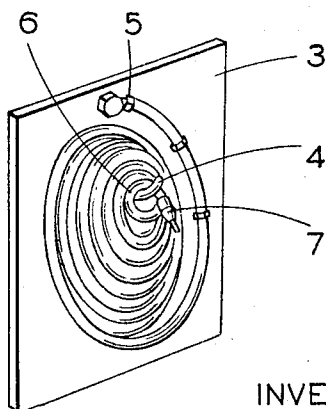


FIG.3.



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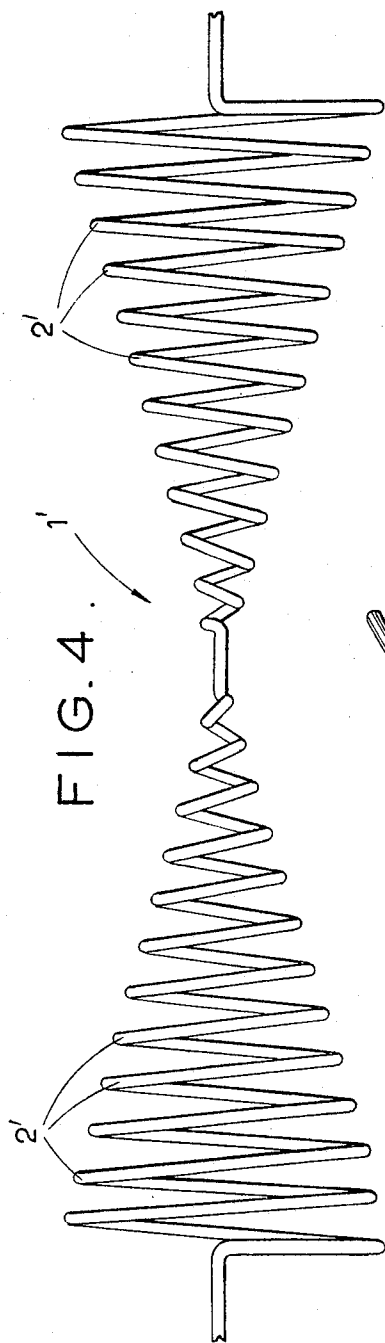


FIG. 4.

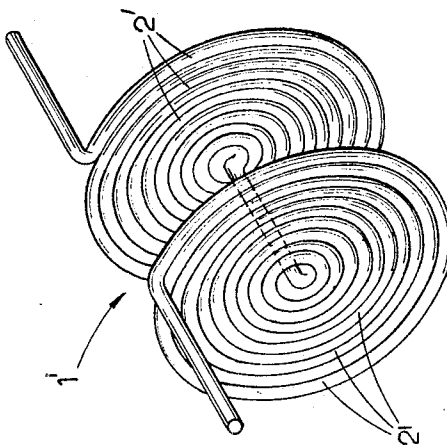


FIG. 5.

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PNEUMATIC HOSE

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16,808/62

3 Claims. (Cl. 138—118)

This invention relates to pneumatic hose, particularly flexible hose intended to carry considerable pressures and intended to be self coiling when not extended.

It is known to produce nylon hose incorporating a "memory" so that it will be self coiling when released to form a cylinder. For this purpose coils are known formed of flexible hollow coiled tubes of seamless resilient nylon or similar material. A disadvantage, however, of this type of tube lies in the comparatively large size of the cylinder even when compressed and in the fact that the ends have to be specially reinforced, usually by an ornamental external metal coil, so as to prevent kinking of the tube at the ends.

I have discovered that this kinking can be obviated without the use of an external coil by selectively varying the diameter of each convolution of the coil over its length. An incidental advantage of such improved coil lies in its smaller over-all size when coiled up.

My invention is applicable to coils made of any thermoplastic or similar material.

According to the invention there is provided a hollow tube of synthetic plastic in which at least a part of the tube is self coiling and formed so as to normally take the shape of a coil in which the diameter of each convolution differs from that of each adjacent convolution. The remainder of the coil may be of a constant diameter or can be constantly increased or reduced so as to form a flat spiral. In the latter event a "lay-flat" type is produced that will produce a flat disc when completely coiled. In order to decrease the liability to kink, there may be provided a double layer of coil so that there are two spirals, one lying upon the other when coiled.

The decrease in the diameter of the coils has the effect of increasing the rate of the spring formed by the coil and the stiffness at this point and prevents or diminishes the likelihood of undue bending moments from breaking or kinking the spring at this point. This phenomenon is well known in the case of close coiled metal springs but has not apparently been appreciated by manufacturers of coiled pneumatic tubes, and the introduction of this phenomenon into the art is believed to be novel and beneficial. The use of this invention will obviate the necessity of the conventional external metal chromium plated spring which is usually associated with the known form of coiled pneumatic tube. It will probably be possible to provide a coiled tube in accordance with my invention without strengthening at the ends at all, but if any strengthening is required, the provision of a cheap external plastic sleeve will be all that is required.

Kinking can of course be avoided by making the coiled tube with walls sufficiently thick, but the product is then non-competitive on price and portability and it is believed that the incorporation of this invention will enable a competitive article to be manufactured and that the article will be equally satisfactory in use. If an external sleeve is used it can be assembled very cheaply and the anchoring of the external spring to the tube or fixed supply line is again obviated.

Tubing made in accordance with this invention can be heat or otherwise set. One particular method of manufacture will be to extrude tubing of suitable thermo-plastic material. This is then wrapped as a coil on a mandrel

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having a fixed diameter over the larger part of its length but having diameters which diminish towards each end. Internal mandrels are inserted as required to prevent collapse during winding and setting, and after coiling the whole is immersed in liquid preferably at a temperature of between 218° and 220° F. in the case of nylon (and with varying temperatures to suit other thermo-plastics) for a short period such as 20 minutes. Thereafter the whole is immersed in cold water and thereby set. The internal mandrels are then withdrawn and the article is ready for use having a heat set "memory" which will cause it to return to its coiled position after use.

The internal cross section of the convolutions of the coil will preferably remain constant but may be varied if required. A further advantage lies in that the increase in the rate and stiffness of the spring automatically prevents the decrease in actual stiffness of the assembly at the end but allows more axial flexibility at this point.

A further advantage lies in that the improved coil prevents the convolutions from over-riding one over the other at the end of the coil on a fast retraction such as sometimes happens when an operator lets go of the assembly quickly when the line is well extended.

The appearance is enhanced and a more developed product with greater sales appeal is thus produced.

The coil according to the invention may also be provided with a back plate with one end of the coil affixed thereto. The other end of the coil may be provided with a nozzle adapted to take a plurality of pneumatic attachments depending upon the job required. The tube may be used for the passage of any fluid but is regarded as being particularly suitable for pneumatic systems.

To this effect an "air station" i.e. a position in a pneumatic system for the supply of air, may be provided, and it is envisaged that a plurality of these stations may be provided for instance along an assembly line, or at a garage.

The invention is illustrated in the accompanying drawings in which:

FIGURE 1 shows one form of coil in a retracted position,

FIGURE 2 shows a second form of coil also in a retracted position,

FIGURE 3 shows a perspective view of the apparatus of an air station incorporating a coil in retracted position,

FIGURE 4 is a side elevation showing the further modified hose coil, and

FIGURE 5 is a perspective view of the form of invention shown in FIGURE 4 with the coils in different positions.

It will be seen from FIGURE 1 that a coil 1 comprises a plurality of convolutions 2 of varying diameter which, in the retracted position, form a flat disc. The tube of the coil is of a standard size diameter and of circular cross section. FIGURE 2 shows a part of a similar coil when retracted. This part may be extended at will by an operator and the remainder of this coil may be in the form of a cylinder when in a retracted position.

The apparatus of an air station as shown in FIGURE 3 incorporates a back plate 3 for fixing into a pneumatic feed line (not shown). The back plate 3 may be of any specific size or shape and includes a hook member 4 for supporting the coil in the retracted position. One end 5 of the coil is attached through the back plate 3 to the feed supply, and the other end 6 is provided with a nozzle 7 for controlling the exit of air from the tube.

It is intended that the air station may be hung at any convenient point at an outlet from a pneumatic feed line and may further be provided with a quick release clip for quick attachment of the air station thereto.

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The nozzle 7 may also be adapted to co-operate with a number of attachments such as are well known and frequently used in pneumatic systems.

The tube may be made from any convenient plastic of which examples are nylon or polypropylene. The latter has been found to be quite suitable for use with this tubing with the exception that it is rather rigid in its present form.

The embodiment stated above may also incorporate a cylinder of coiled tube which in turn may be connected to a pneumatic device for controlling air.

FIGURES 4 and 5 illustrate a coil 1' of hose in which there are two sets of connected convolutions 2' where in FIGURE 4 the convolutions are expanded and in FIGURE 5 the convolutions are retracted.

What I claim is:

1. A hose assembly including a hose formed of resilient thermoplastic material comprising at least a part of said hose being self-coiling, said self-coiling part being preformed into a plurality of self-supporting convolutions, in which each succeeding coil is of smaller diameter than the coil that precedes it, said coil taking the form of a flat disc in the retracted state and of a spiral configuration in the extended state, a back plate positioned on one

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side of the hose, and means on the back plate for supporting the hose in a substantially vertical plane.

2. A hose assembly according to claim 1 in which the hose is formed as a seamless hollow tube and provided with a nozzle for controlling the exit of fluid from the hose.

3. A hose assembly according to claim 1, in which a double layer of coil is provided so as to form two spirals, one lying upon the other when coiled.

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