

RESERVE COPY PATENT SPECIFICATION

1,176,765

DRAWINGS ATTACHED.

1,176,765



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Index at acceptance:—F2 P(1A12, 1A22, 1A23A, 1A25, 1B7).

International Classification:—F 16 I 11/12.

COMPLETE SPECIFICATION.

Hoses.

I, ARISTOVOULOS GEORGE PETZETAKIS, a Greek Subject, of Thessalonikis and Chandri Streets, Moschaton/Piraeus, Greece, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to hoses, and more particularly to hoses incorporating electrical conductors to avoid or lessen the risk of excessive static electrical charges in the hoses.

It is known that there is a tendency for the conveyance of certain substances, such as inflammable fuels, grain or pulverised material, through flexible hoses of electrically insulating material to induce static electrical charges in the hoses.

It is also known for flexible hoses of rubber material which are to convey such materials each to incorporate a metallic conductor wire extending helically along the wall of the hose, the conductor wire lying on the inner or outer surface of the hose wall or in the hose wall. The conductor wire is able to conform to bending and/or elongation of the hose by reason of the helical configuration of the conductor wire.

Such a hose is usually made by superimposing layers of rubber, textile material and the helical wire. It is relatively difficult and/or expensive to incorporate a helical conductor wire in a hose produced by extrusion.

It is an object of the invention to provide a hose incorporating an alternative form of conductive element.

It is envisaged that an important application of the invention will be to hoses of which the hose walls are produced by extrusion, but the invention may have other applications.

According to the invention there is provided a flexible hose having an electrical element extending along the hose wall, the conductor element being in the form of an elastic electrically conductive strip or tape, the strip or tape being generally of flat configuration and formed of elastic yarns or threads extending along the length of the strip or tape and flexible metal wires or threads of metal braided, plaited or interwoven with the elastic yarns or threads. The invention will be described by way of examples with reference to the accompanying drawings, wherein:—

Figures 1A and 1B are a side view and an end view respectively of an electrical conductor element in the form of an elastic electrically conductive tape, to extend along a hose wall in accordance with the invention;

Figure 2 is a side elevation of a small length of hose incorporating the tape of Figure 1 in accordance with the invention;

Figure 3 is a cross-section through another hose in accordance with the invention;

Figure 4 is a cross-section through another hose in accordance with the invention;

Figure 5 is a cross-section through another hose in accordance with the invention; and

Figure 6 is a cross-section through a fifth hose in accordance with the invention.

The tape 10 and its incorporation thus in Referring to Figures 1A and 1B, there is shown an elastic tape 10 consisting of parallel extremely fine elastic yarns 11, preferably but not necessarily of thermoplastic polyurethane, on which very fine metallic wires 12, of copper, have been braided at such an angle, determined empirically, as to permit elastic elongation of the tape 10 and eventual restoration of the tape 10 to its original length.

[Price 5s. 0d.]

SEE ERRATA SLIP ATTACHED

The tape and its incorporation thus in an ordinary braiding machine as is commonly used for making elastic fabric belts, with the exception that copper wires are used instead of fibre yarns, so that the tape 10 shall be electrically conductive.

The hose 20 shown in Figure 2 comprises a hose wall 21 preferably, but not necessarily, made by extrusion, and the tape 10 extending along the hose wall 21 parallel to the axis of the hose 20, at the external surface 22 of the hose wall 21. The materials of the hose wall 21 and the elastic yarns 11 are, for this purpose, preferably compatible with each other.

The tape 10 and its incorporation thus in the hose 20 provides three characteristics. Firstly, the tape 10, being elastic, is able to conform to any bending and elongation of the hose 20. Secondly, being generally flat, it does not damage the hose wall 21 or reduce the strain-resistance of the hose wall 21. Thirdly, it takes up little space.

The tape 10 can be incorporated in the hose 20 during extrusion of the hose wall 21, without much difficulty.

Figure 3 shows a modified hose 23 similar to the hose 20 except that the tape 10 is coated with a protective covering 24 of a plastics material which is compatible with the hose wall 25 and which is welded to the hose wall 25.

The hose 23 may be made in a similar manner to the hose 20. Alternatively, by reason of the provision of the plastics covering 24 the tape 10 and the covering 24 may be applied to the hose wall 25 after the hose wall 25 has already been formed.

As will be seen from Figure 3, the covering 24 completely envelopes the tape 10, and it is envisaged that the covering 24 will be already on the tape 10 when the tape is applied to the hose wall 25.

Figure 4 shows a modified hose 26 with tape 10 lying along the external surface 27 of the hose wall 28 and with a covering 29, of plastics material compatible with the material of the hose wall 28, welded to the hose wall 28. In this case, the covering 29 is over only the outside of tape 10.

Figure 5 shows a modified hose 30 in which tape 10 is embedded within the hose wall 31. In this case in particular, it is highly desirable that the elastic yarns 11 (Figures 1A and 1B) and the hose wall 31 should be of mutually compatible materials.

Figure 6 shows a further modified hose 32 in the tape 10 which is incorporated in the inner surface 33 of the hose wall 34. In this case also, the yarns 11 (Figures 1A and 1B) and the hose wall 34 should be of mutually compatible materials.

Tape 10 may have a wider or looser braiding, that is to say, so that there are distinct gaps between the braided wires.

By incorporating the tape 10 in the hoses 20, 26, 30 and 32 during production of the hose walls 21, 28, 31 and 34 by extrusion, while the hose walls are still not set, the materials of the hose may be made to fill up the interstices of the tape 10, particularly if the yarns 11 are of compatible materials.

In use, the tape 10 is earthed so as to conduct electrostatic charges away to prevent or reduce the risk of fire or by explosion, and generally to increase the safety of the environment in which the hose is used.

The term "threads of metal" is defined to include metalised threads.

WHAT I CLAIM IS:—

1. A flexible hose having an electrical conductor element extending along the hose wall, the conductor element being in the form of an elastic electrically conductive strip or tape, the strip or tape being generally of flat configuration and formed of elastic yarns or threads extending along the length of the strip or tape and flexible metal wires or threads of metal braided, plaited or interwoven with the elastic yarns or threads.

2. A hose according to claim 1, wherein the strip or tape extending along the hose wall at or near the external surface thereof.

3. A hose according to claim 2, wherein the strip or tape is at said surface and is coated with a protective covering.

4. A hose according to claim 1, wherein the strip or tape extends along the hose wall at or near the inner surface thereof.

5. A hose according to claim 1, wherein the strip or tape is in the hose wall.

6. A hose according to any preceding claim, wherein the elastic yarns or threads are of thermoplastic polyurethane.

7. A hose according to any preceding claim, wherein the strip or tape or a covering over the strip or tape is welded to the hose wall.

8. A hose according to any preceding claim, wherein the hose wall is formed by extrusion.

9. A hose according to claim 7 read as appended to claim 3, made by laying the strip or tape with the covering along the outer surface of the hose wall after the hose wall has been formed, and welding the covering to the hose wall.

10. A hose according to any preceding claim, wherein the metal of the metal wires or threads of metal is copper.

11. A flexible hose having extending along the hose wall a conductor element substantially as herein described with reference to and as illustrated in Figures 1A and 1B of the accompanying drawings.

12. A flexible hose substantially as



The tape and its incorporation thus in an ordinary braiding machine as is commonly used for making elastic fabric belts, with the exception that copper wires are used instead of fibre yarns, so that the tape 10 shall be electrically conductive.

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The tape 10 can be incorporated in the hose 20 during extrusion of the hose wall 21, without much difficulty.

Figure 3 shows a modified hose 23 similar to the hose 20 except that the tape 10 is coated with a protective covering 24 of a plastics material which is compatible with the hose wall 25 and which is welded to the hose wall 25.

The hose 23 may be made in a similar manner to the hose 20. Alternatively, by reason of the provision of the plastics covering 24 the tape 10 and the covering 24 may be applied to the hose wall 25 after the hose wall 25 has already been formed.

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Figure 6 shows a further modified hose 32 in the tape 10 which is incorporated in the inner surface 33 of the hose wall 34. In this case also, the yarns 11 (Figures 1A and 1B) and the hose wall 34 should be of mutually compatible materials.

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By incorporating the tape 10 in the hoses 20, 26, 30 and 32 during production of the hose walls 21, 28, 31 and 34 by extrusion, while the hose walls are still not set, the materials of the hose may be made to fill up the interstices of the tape 10, particularly if the yarns 11 are of compatible materials.

In use, the tape 10 is earthed so as to conduct electrostatic charges away to prevent or reduce the risk of fire or by explosion, and generally to increase the safety of the environment in which the hose is used.

The term "threads of metal" is defined to include metalised threads.

WHAT I CLAIM IS:—

1. A flexible hose having an electrical conductor element extending along the hose wall, the conductor element being in the form of an elastic electrically conductive strip or tape, the strip or tape being generally of flat configuration and formed of elastic yarns or threads extending along the length of the strip or tape and flexible metal wires or threads of metal braided, plaited or interwoven with the elastic yarns or threads.

2. A hose according to claim 1, wherein the strip or tape extending along the hose wall at or near the external surface thereof.

3. A hose according to claim 2, wherein the strip or tape is at said surface and is coated with a protective covering.

4. A hose according to claim 1, wherein the strip or tape extends along the hose wall at or near the inner surface thereof.

5. A hose according to claim 1, wherein the strip or tape is in the hose wall.

6. A hose according to any preceding claim, wherein the elastic yarns or threads are of thermoplastic polyurethane.

7. A hose according to any preceding claim, wherein the strip or tape or a covering over the strip or tape is welded to the hose wall.

8. A hose according to any preceding claim, wherein the hose wall is formed by extrusion.

9. A hose according to claim 7 read as appended to claim 3, made by laying the strip or tape with the covering along the outer surface of the hose wall after the hose wall has been formed, and welding the covering to the hose wall.

10. A hose according to any preceding claim, wherein the metal of the metal wires or threads of metal is copper.

11. A flexible hose having extending along the hose wall a conductor element substantially as herein described with reference to and as illustrated in Figures 1A and 1B of the accompanying drawings.

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herein described with reference to and as illustrated in Figure 2 of the accompanying drawings.

13. A flexible hose substantially as herein described with reference to and as illustrated in Figure 3 of the accompanying drawings.

14. A flexible hose substantially as herein described with reference to and as illustrated in Figure 4 of the accompanying drawings.

15. A flexible hose substantially as herein described with reference to and as

illustrated in Figure 5 of the accompanying drawings.

16. A flexible hose substantially as herein described with reference to and as illustrated in Figure 6 of the accompanying drawings.

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ERRATA

SPECIFICATION NO. 1,176,765

Page 1, line 45, *after* "electrical" insert "conductor"

Page 1, line 76, *delete* "whole line" substitute "hose in accordance with the invention"

Page 2, line 1, *delete* "and its incorporation thus in" substitute "10 may be made by means of"

Page 2, line 37, *after* "may" insert "both"

THE PATENT OFFICE,
20th February 1970

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