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HOSE PIPE AND METHOD OF MAKING SAME

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8 Claims. (Cl. 154—8)

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This invention relates to improved hose pipes.

According to the present invention new and improved hose pipe of high strength and durability may be obtained by a process which comprises braiding or winding yarn, filaments or fabric, composed essentially of highly polymeric linear esters which have been obtained by heating one or more glycols of the series $HO(CH_2)_nOH$, where n is greater than 1 but not exceeding 10, with terephthalic acid or an ester-forming derivative thereof, on to a pipe of rubber, synthetic rubber or polyvinyl chloride and then, if desired, coating the exterior of said pipe with rubber, synthetic rubber or polyvinyl chloride and, if desired, curing or vulcanising the coating formed. Further layers of rubber and braiding or other sheathing may be added if desired. Such hose pipes are resistant to ultra violet light and abrasion and are scarcely influenced by most organic liquids and most acids and acid fumes.

By highly polymeric linear esters we mean polyesters, filaments or sheets of which are capable of molecular orientation, as shown by characteristic X-ray patterns, by drawing or rolling. Examples of ester-forming derivatives of terephthalic acid are its aliphatic (including cycloaliphatic) and aryl esters and half-esters, its acid halides and its ammonium and amine salts. Examples of the said glycols are ethylene, trimethylene, tetramethylene, hexamethylene and decamethylene glycols. Of the said polymeric esters, polyethylene terephthalate, or more technically correct, polymeric ethylene terephthalate is preferred because of the ready availability of the materials from which it is synthesised and because of its high melting point, which is 240° C.

Filaments of the said polymeric esters are prepared most easily by any of the methods of melt spinning known to the art, e. g. melting the polymeric ester on a heated grid, passing it through a filter bed composed of fine particles, e. g. sand, to filter the melt, forcing the melt through a spinneret and rapidly cooling the filaments so formed. It is preferred that these filaments are drawn in the solid state in order that they may have high tensile strengths, moduli of elasticity and resistance to water, and low extensibility factors. It is further preferred that the filaments or yarns produced therefrom, for use in the process of this invention should be subjected after drawing to a heat setting treatment at temperatures greater than 60° C. but less than, preferably at least 30° C. less than, their melting points while they are under tension. By this means filaments and yarns having high tenacity and low elongation, e. g. less than 10% of the drawn length, may be obtained. Such filaments or yarns when fully drawn may be woven or braided into fabrics which as well as being strong do not stretch to any degree when subjected to a stretching force e. g. when the hose pipe is carrying liquid under pressure. Details of the drawing and heat setting treatments are given in our copending U. S. application Serial No. 748,650, filed May 16, 1947.

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Yarns may be produced from the filaments of this invention by twisting a bundle of continuous filaments together or by spinning staple fibres of the polymeric esters. The staple fibres may be prepared by cutting or breaking continuous filaments of the esters; preferably after crimping them. Yarns produced from continuous filaments are preferred for use in the process of this invention because of their greater tensile strength.

Fabrics for use in the process of this invention may be produced from the yarns, hereinbefore described or from continuous filaments by any of the processes known in the art. It is preferred that the yarns or filaments should be braided, using a circular braiding machine, directly onto the rubber tube, but braids or woven ribbons may be wrapped round the tube if desired.

The yarns may be wound or braided on to the rubber, synthetic rubber or polyvinyl chloride utilising any apparatus or method known to the art. If desired the threads or fabrics of this invention may be fastened to the rubber by means of an adhesive composition. Suitable compositions include organic polyisocyanate and resorcinol formaldehyde compositions.

In addition to rubber, other suitable materials for use in the process of this invention include the various synthetic rubbers, such as butyl rubber, polychloroprene, commonly called "Neoprene," and the butadiene-styrene interpolymer known as "G. R. S." and plasticised polyvinyl chloride. Plasticised polyvinyl chloride, of course, does not require vulcanisation, although if applied in the form of finely powdered polyvinyl chloride dispersed in plasticiser, the dispersions require to be cured or gelatinised.

For most hose pipes a laminated tube made up of alternate layers of fabric or rubber, synthetic rubber or polyvinyl chloride is required. Other fabrics, such as linen may be used in plies, but it is preferred that fabrics or yarns composed of the linear polymeric esters of this invention should be used as the outer case, as by this means hose pipes of increased durability are obtained because of the good resistance of the polymeric

esters of this invention to ultraviolet light and to abrasion. The high resistance of the polymeric esters of this invention to acids, organic compounds and soil bacteria also enables the hose pipes of this invention to be used without deterioration under a wide range of conditions.

I claim:

1. The production of hosepipes by a process which comprises braiding or winding a drawn, heat set filamentous material composed of highly polymeric linear esters which have been obtained by heating at least one glycol of the series $HO(CH_2)_nOH$, where n is greater than 1 and not exceeding 10, with a substance of the group consisting of terephthalic acid and ester forming derivatives of terephthalic acid onto a pipe composed of a material of the group consisting of rubber, synthetic rubber and plasticized polyvinyl chloride.

2. A process as claimed in claim 1 wherein the polymeric linear ester is polymeric ethylene terephthalate.

3. A process as claimed in claim 1 wherein the exterior of the hosepipe is coated with a material of the group consisting of rubber, synthetic rubber and polyvinyl chloride.

4. A process according to claim 3 wherein the coating is cured.

5. A hosepipe comprised of drawn, heat set filamentous material composed of highly polymeric linear esters which have been obtained by heating at least one glycol of the series $HO(CH_2)_nOH$, where n is greater than 1 and not exceeding 10, with a substance of the group consisting of terephthalic acid and ester forming derivatives of terephthalic acid, braided or wound onto a pipe composed of a material of the group consisting of rubber, synthetic rubber and plasticized polyvinyl chloride.

6. A hosepipe as claimed in claim 5 wherein the polymeric linear ester is polymeric ethylene terephthalate.

7. A hosepipe as claimed in claim 5 wherein the exterior of the pipe is coated with a material of the group consisting of rubber, synthetic rubber and polyvinyl chloride.

8. A hosepipe as claimed in claim 7 wherein the exterior coating has been cured.

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