PATENT SPECIFICATION (11) 1 432 773

1 432 773

(21) Application No. 32024/72 (22) Filed 7 July 1972

(23) Complete Specification filed 25 June 1973

(44) Complete Specification published 22 April 1976

(51) INT CL² B29D 31/00

(52) Index at acceptance
B5A 1R100 1R14C1C 1R14D
D1R 3A2F2 3A2Q5 3A2QY 3B1 3C2G 3C2Y 3D1A2B 3D1A3A 3D1AY 3D3E 3D3X 3D4A

(72) Inventors: ANTHONY BRAMLEY
ROBIN JAMES THOMAS CLABBURN

(54) IMPROVED NETTING

(71) I, ANTHONY BRAMLEY, a British Subject, of Gosford House, Gosford, Kidlington, Oxfordshire, 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:—

This invention relates to the production of netting from threads comprising synthetic plastics material.

The specification of my British Patent No. 1,110,793 describes and claims netting suitable for making up into nets for conventional purposes, composed of regularly arranged flexible threads which consist of or contain thermoplastic filaments, the threads being joined to one another to form netting by masses of plastics material individually moulded and bonded to each thread at each threed junction. It also describes and claims a process for making netting in which an array of flexible transverse threads consisting of or containing thermoplastic filaments are laid across a plurality of flexible longitudinal threads consisting of or containing thermoplastic filaments, discrete masses of plastics material, in a heated condition are individually moulded about the threads at crossing points to secure the longitudinal to the transverse threads and the plastics mass is caused to harden and bond to the threads.

It is known for example from British Patent No. 990,325 to cross-link polymeric materials by irradiating them with high energy electrons or ionising radiation and that such cross-linked polymers have modified physical properties, such as increased heat resistance or a degree of dimensional stability and a potential of acquiring plastic memory.

It has now been found in accordance with this invention that the use of threads comprising fibres or filaments of synthetic thermoplastic polymers which have been cross-linked by irradiation enables an improved quality of netting to be obtained. In particular, a bond of increased strength can be attained between crossing threads by the moulding technique described in the said specification.

Although the improvements which can be obtained by the use of the present invention in no way depend on any particular theory of operation, it is believed that during injection of the heated thermoplastic in moulding the bonding masses the plies of the twine employed tend to open or part, and thus allow the plastic material to penetrate more deeply among the constituent filaments of the threads. Moreover, the irradiated twine, with its enhanced heat resistance, can be bonded at a significantly higher temperature than untreated twine, without incurring heat damage or softening of the filaments, and the use of a higher moulding temperature gives a stronger bond. For example, for typical twine materials such as polyethylene, a moulding temperature of 235-245°C with untreated twine can be safely increased to 255-260°C for irradiated twine and in some cases even to 320°C.

The twine is preferably subjected to irradiation as a separate preliminary process before it is used for net making. Alternatively, twine can be made from filaments extruded from thermoplastic material and irradiated immediately after extrusion during filament manufacture. The irradiation dosage will usually exceed 2 Mrads and is typically in the range 5 to 50 Mrads.

The invention will be further described, by way of example, with reference to the accompanying drawing, the single Figure of which shows netting produced in accordance with this invention.

The netting 10 shown in the drawing comprises longitudinal threads 11 in the form of twine of thermoplastic filaments, which in manufacture are drawn intermittently through respective moulding dies arranged in at least one transverse row, and transverse threads 12,

also in the form of twine of thermoplastic filaments, which are drawn, singly or in groups corresponding to the rows of dies, across the longitudinal threads and through the moulding dies during each cycle of operation in manufacture. The threads are joined together at the crossings by individually moulded masses or buttons 13 of thermoplastic material, which may be chemically similar to the material of the threads, applied by injection moulding in the dies referred to. After the buttons 13 have been formed, the dies open and the longitudinal threads advanced until they reach the position where the next row or rows of thread junctions is or are to be formed.

This technique of manufacturing netting is described in greater detail in the aforementioned British Patent No. 1,110,793 and in the specification of our co-pending British Application No. 1,321,229.

In accordance with this invention, the longitudinal or transverse threads 11 or 12, and preferably both, which may for example be of polyethylene, are irradiated to cause cross-linking of their constituent material, for example by exposure to high energy electrons at a dose within the range 15 to 25 Mrads. The irradiation may be performed immediately after extrusion of the thermoplastic filaments or after their twisting into twine, or at any time before they are subjected to the operation of moulding the buttons 13.

The preferred practice of this invention and some of the advantages thereof will be illustrated by the following example.

EXAMPLE

Netting as shown in the drawing was produced in the manner described from high density polyethylene twine, irradiated to a dose of 20 Mrad. The bonding buttons were moulded also from high density polyethylene. Several samples of netting were made at different moulding temperatures.

The resulting netting was tested, in comparison with similar netting made from unirradiated twine, in a tensile testing machine to determine the force required to pull one single twine through a single button. The results are given in the following Table, where the force is indicated in comparative arbitrary units.

TABLE

	Moulding temperature, °C.			
	240	245	250	255
Longitudinal threads:				
Unirradiated	30	29	32	32
Irradiated	56	63	65	69
Transverse threads:				
Unirradiated	37	37	34	31
Irradiated	57	58	60	60

The results show that the bond strength of the samples made from irradiated twine is greater than those from unirradiated materials, and that increasing the moulding temperature increases the bond strength at the thread intersections.

The use of irradiated plastics materials for the filaments of the constituent threads or for the moulded bonding masses in the production of netting in accordance with Specification No. 1,110,793 does not materially alter the observed contraction of the netting in the transverse or "weft" direction during manufacture, which is attributable to mechanical rather than physical causes. It does not therefore introduce additional problems, but the modified method and apparatus described in the specification of my Application No. 1,321,229, which is intended to counteract the effects of such contraction and to facilitate the production of wider netting or the application of a plurality of rows of moulding masses in a single operation, can be used with equal advantage when irradiated polymers are employed in accordance with the present invention.

WHAT WE CLAIM IS:—

1. Netting composed of longitudinal threads of thermoplastic material and transverse threads of thermoplastic material joined together at the thread crossings by individually moulded masses of thermoplastic material characterised in that the threads are composed of thermoplastic material cross-linked by irradiation.

2. Netting according to claim 1 substantially as hereinbefore described.

3. A method of making netting by drawing transverse threads of thermoplastic material across longitudinal threads of thermoplastic material and bonding the threads together by moulding individual masses of thermoplastic material at the thread crossings characterised in that the material of the threads is subjected to irradiation to cross-link the thermoplastic material thereof prior to the moulding of the masses at the thread crossings.

4. A method according to claim 3 characterised in that the threads are formed from

polyethylene filaments subjected to a radiation dose of 15 to 25 Mrads.

5. A method according to claim 4 characterised in that the moulding of the individual masses is conducted at a temperature of 245 to 260°C.

REDDIE & GROSE,
Agents for the Applicant,
6, Breams Buildings, London EC4A 1HN

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon, Surrey, 1976.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from
which copies may be obtained.

1432773 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*