

March 17, 1942.

G. BÜGGE

2,276,608

PRODUCTION OF WOVEN FABRICS

Filed Aug. 3, 1939

4 Sheets-Sheet 1

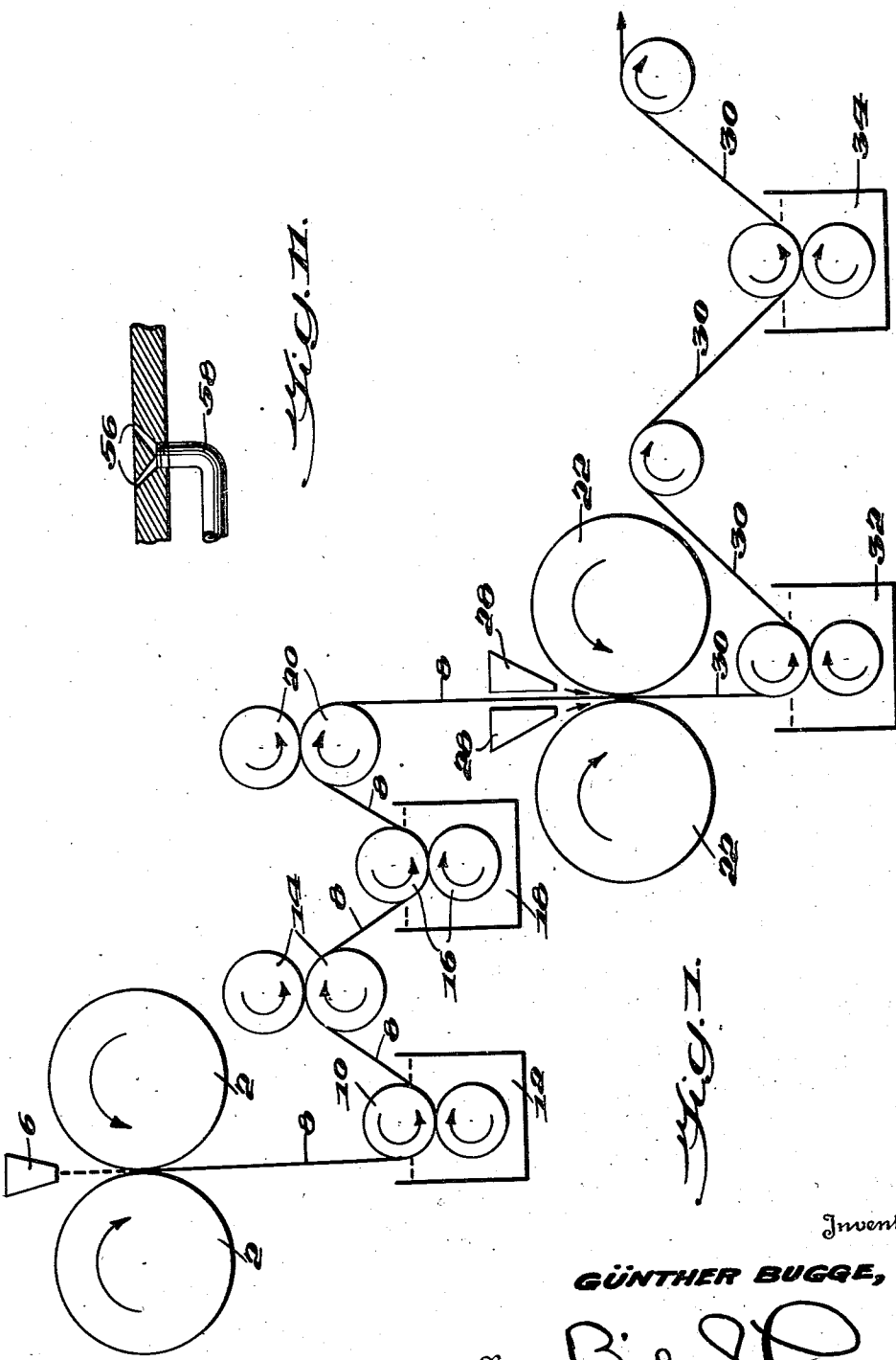


Fig. I.

Fig. II.

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Fig. 2.

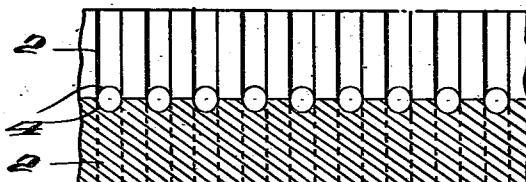


Fig. 3.

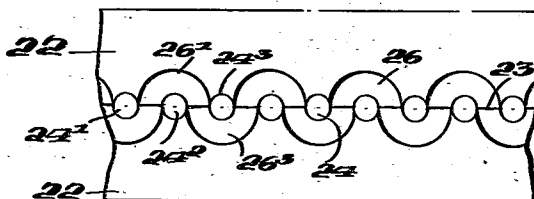


Fig. 4.

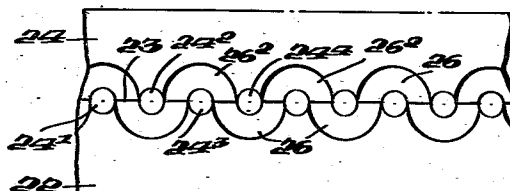


Fig. 5.

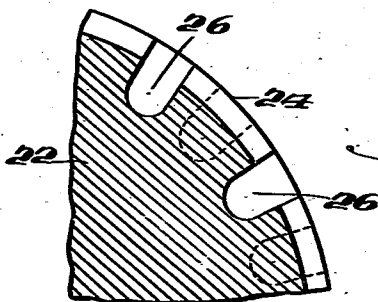
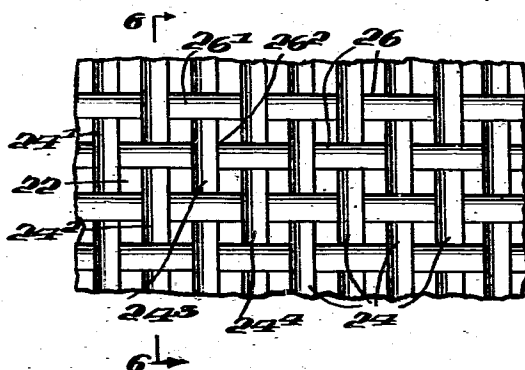


Fig. 6.

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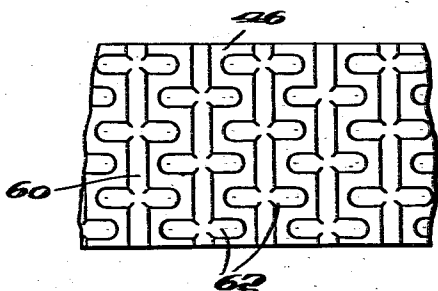
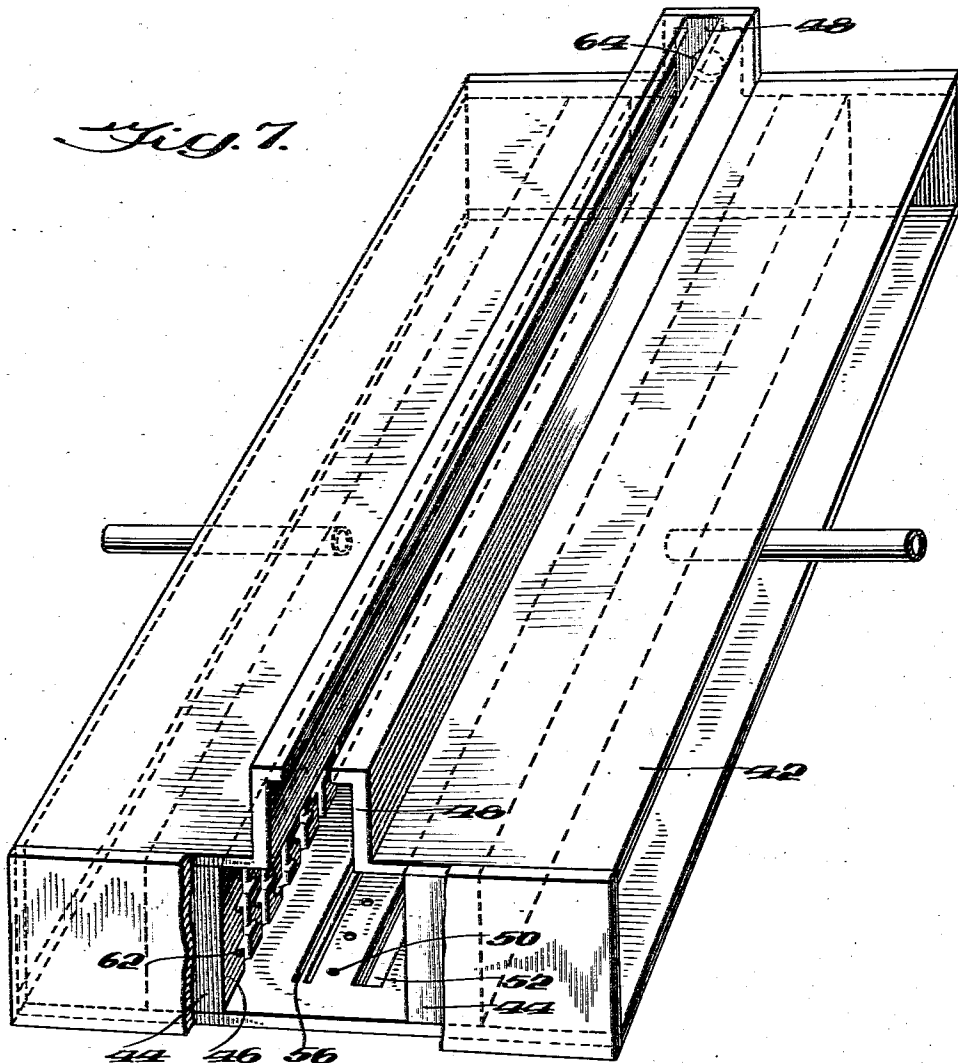
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Fig. 8.

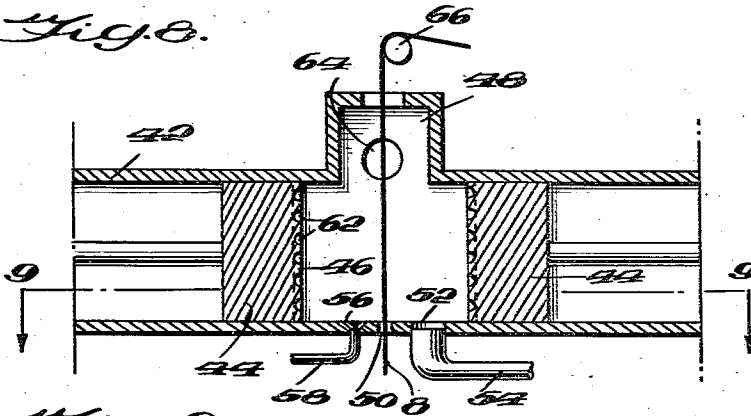
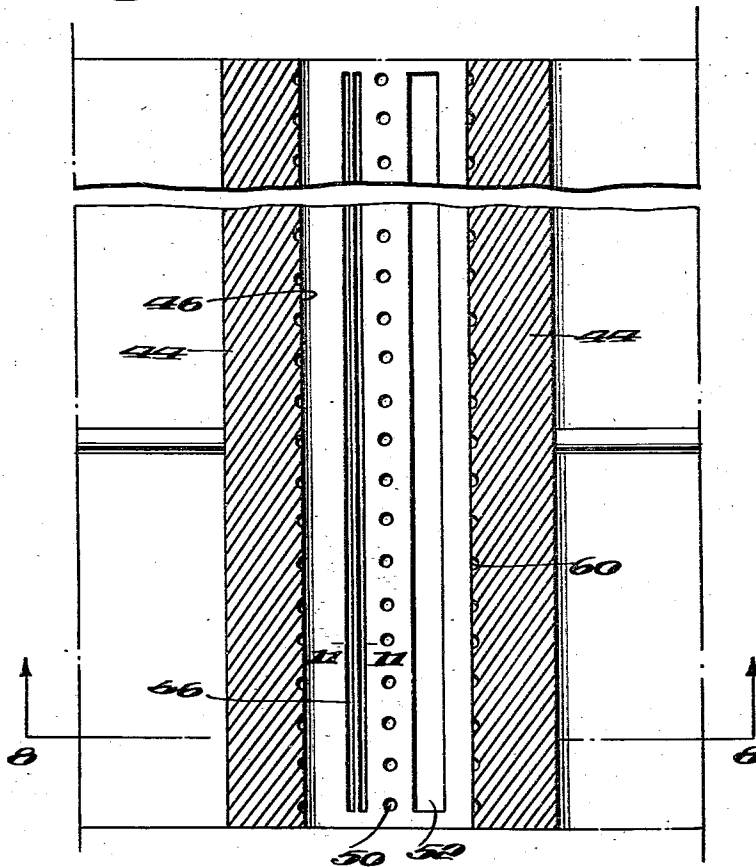


Fig. 9.



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UNITED STATES PATENT OFFICE

2,276,608

PRODUCTION OF WOVEN FABRICS

Günther Bügge, Neu-Isenburg, Germany

Application August 3, 1939, Serial No. 288,240
In Germany June 19, 1937

16 Claims. (Cl. 18—8)

The invention relates to the production of woven fabrics from artificial plastic material, particularly artificial silks.

Artificial silk fabrics are usually produced by making threads of viscose, acetyl cellulose, or the like, and weaving the finished fibres or threads on looms. These main operations, the spinning and weaving, include many intermediate chemical and mechanical treatments, among the latter being the preliminary and final twisting or doubling, reeling or winding, and the like.

Various attempts have been made to produce fabrics which imitate woven fabrics directly from a mass of artificial silk material, and to obtain such fabrics more rapidly and inexpensively and in a more simple manner by omitting the operations necessary for the production of the finished filament and its preparation for weaving. These attempts consist generally in applying a mass of artificial silk on a rotating roller which has a fabric pattern engraved on its surface, the excess material being stripped off; and then, after the structure is hardened by precipitants, removing it from the roll and washing it (such a process is described, for example, in German Patents No. 200,509 and 271,020; and in Zeit. f. Ange. Chem., 27, 1914, III, p. 272).

Imitation fabrics are thus obtained which consist of interrupted sheets, but they do not have crossing, interwoven threads like real woven fabric particularly warp and weft threads. As a result, such imitation fabrics have little strength, are very stiff and have other undesirable properties.

The object of the present invention is to produce a woven fabric composed of crossing, interwoven threads without the previous production of separate weft threads and without the use of spinning and weaving machinery.

A further object of the invention is to produce a fabric in this manner which is strong, soft and pliable, and in which the crossing threads are distinct and separate.

Still another object of the invention is to form weft threads in situ crossing and interwoven with the weft threads.

Another object of the invention is to provide novel and simple devices for carrying out the process.

Generally, the process is carried out with the use of two opposed surfaces which are provided with a series of parallel grooves and with partial grooves crossing the parallel grooves. Previously formed warp threads are arranged in the parallel grooves, and the space between the surfaces

is supplied with a mass of artificial silk. The surfaces are then brought together so as to force the material into the partial grooves to form in situ weft threads crossing and interwoven with the warp threads. These weft threads can be hardened in any suitable manner, and the fabric will be complete.

Further objects and advantages of the invention will appear more fully from the following description, particularly when taken in conjunction with the accompanying drawings which form a part hereof.

In the drawings:

Fig. 1 shows in side elevation a machine for carrying out the invention.

Fig. 2 is a detail view, partly in section, of a portion of the first pair of rolls.

Figs. 3 and 4 are detail views, in section, of portions of the second pair of rolls, showing successive cross grooves.

Fig. 5 is a detail of a part of one of the roll surfaces.

Fig. 6 is a cross section on the line 6—6 of Fig. 5.

Fig. 7 is a perspective view of a modified form of device for producing woven fabrics, with parts broken away.

Fig. 8 is a vertical section therethrough on the line 8—8 of Fig. 9.

Fig. 9 is a horizontal section on the line 9—9 of Fig. 8.

Fig. 10 is a detail view of a portion of the face of one of the plates of Fig. 7.

Fig. 11 is a detail cross section on the line 11—11 of Fig. 9.

In carrying out the invention when using the type of apparatus shown in Figs. 1 to 6, there are provided two opposed rolls 2, 2 (see Fig. 2) mounted to turn in contact with each other.

These rolls are provided with mating grooves 4 of semicircular cross section extending around the rolls. A feeding mechanism 6 feeds a mass of artificial silk or other plastic material into the space between the rolls. As the rolls are turned, they will press the plastic into the grooves 4 and thus form a series of parallel filaments or threads 8, hereafter referred to as the warp threads. These threads are led between a grooved guide roller 10 into a precipitating bath 12, which is a necessary feature of the invention in its hardened the threads.

While the above procedure represents a pre-broader aspects. The warp threads can be produced independently by any suitable process, such

as conventional doubling and spinning processes, and subjected to the steps now to be described.

Preferably the warp threads pass between grooved guide rollers 14 and then 16, the latter rolls being located in a bath 18 of a suitable liquid (paraffin oil, soap solution or the like) which will prevent the weft threads, to be formed as described below, from sticking or adhering to the warp threads. The warp threads then pass between grooved guide rollers 20 to the weft forming rolls 22, which meet along line 23.

Rolls 22 are shown in more detail in Figs. 3 to 6. Each of them is provided with parallel mating grooves 24 of semicircular cross section which extend around the rolls, these grooves corresponding to grooves 4 of rolls 2 and serving to receive and guide the warp threads 8. Crossing the grooves 24 are partial grooves 26. These grooves 26 are so arranged as shown in Figs. 3 and 4, that when filled with a plastic material they will form weft threads interwoven with the warp threads 8.

For producing a plain woven fabric, these grooves 26, as shown in the drawings, extend from one groove 24 across the next groove 24 to the second succeeding groove 24, the grooves 26 of successive rows being staggered. For example, groove 26¹ (see Figs. 3 and 5) runs from the left hand edge of groove 24¹ across groove 24² to the right hand edge of groove 24³. The groove is deepest where it crosses groove 24² (See also Fig. 6) so as to provide a space behind a warp thread arranged in groove 24². The groove 26² of the next row runs from 24² across 24³ to 24⁴. The cross grooves on the opposed rolls are also staggered, so that one end, as the right hand end, of groove 26¹ is opposite the other, or left hand, end of a groove 26² on the other roll. Thus the series of grooves 26 on the two rolls in any transverse row form a continuous sinuous space which interweaves with the warp threads in grooves 24.

Obviously, where the type of fabric desired is different from a plain weave, the shape and arrangement of the grooves must be modified accordingly.

Plastic material, such as artificial silk, is introduced into the space between rolls 22 from suitable feeding devices 28. The quantity of material fed is just sufficient to fill the cross grooves 26. As the rolls turn, they press this material into the grooves 26 thus forming in situ weft threads which are interwoven with the warp threads. Since the warp threads have been treated in bath 18, the weft threads do not adhere to them but are entirely separate. Because of the staggered arrangement of grooves 26, the weft threads are properly arranged, and a woven fabric 30 is produced.

The fabric is then passed over suitable rolls through a precipitating bath 32 and a washing bath 34. The finished fabric is strong, soft and pliable, and is satisfactory for any purpose.

The procedure above described is a wet process, but the invention is obviously equally applicable to a dry process.

The form of apparatus shown in Figs. 7 to 11 does not use rolls, but plates. A casing 42 is provided in which are slidably mounted two blocks 44 having opposed faces 46. The bottom wall of casing 44 is flat. Across the top wall there is provided an upstanding chamber 48 communicating with the space between blocks 44.

In the bottom of the casing are a plurality of apertures 50 for receiving warp threads 8, 75

which may be supplied in any suitable manner. Also, there is a slot 52 extending across the bottom of the casing and connected by a pipe 54 to any suitable source of plastic material. Finally, the bottom wall contains two oppositely inclined nozzle-like slots 56 (Fig. 11) which may be supplied with an adhesion-preventing liquid or vapor by pipe 58.

Faces 46 of blocks 44 are provided with mating vertical grooves 60 aligned with the warp thread openings 50. There are also partial grooves 62 crossing the vertical grooves 60, generally similar to the cross grooves 26 of Figs. 1 to 6. In other words, these cross grooves are deepest where they cross the grooves 60, and are arranged in staggered relation. Also, each end of the groove 62 in one face is always opposite and overlapping the opposite ends of similar grooves in the opposed face.

At one end of chamber 48 is an overflow opening 64, the bottom edge of which is level with the upper edges of blocks 44.

The process, using this apparatus, is carried out as follows:

Warp threads 8, previously treated with an adhesion-preventing substance, are led up through holes 50 and over roller 66, and are thus held in parallel relation in casing 42. An adhesion preventing liquid is supplied to nozzles 56 and is sprayed on the faces 46 of blocks 44. Spinning fluid, such as a solution of artificial silk, is now supplied to opening 54 into the space between blocks 44. Blocks 44 are moved together, the grooves 60 engaging the warp threads. The plastic material fills the cross grooves 62, thus forming weft threads interwoven with the warp threads. Any excess of material is squeezed up into space 48 and escapes through hole 64.

The blocks 44 are now moved back, the finished fabric is drawn up by the height of casing 42, and the above steps are repeated. The fabric so formed may be further treated in any suitable manner.

While I have described herein some embodiments of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the appended claims.

I claim:

1. Process for the production of woven fabrics from plastic materials, which comprises holding a plurality of filaments in parallel relation, and forming in situ from plastic material filaments crossing and interwoven with said first filaments.

2. Process for the production of woven fabrics from plastic materials, which comprises holding a plurality of filaments in parallel relation, and forming simultaneously in situ from plastic material a plurality of filaments crossing and interwoven with said first filaments.

3. Process for the production of woven fabrics from plastic materials, which comprises continuously moving a plurality of filaments in parallel relation, and forming in situ from plastic material filaments crossing and interwoven with said first filaments.

4. Process for the production of woven fabrics from artificial plastic material, by means of opposed surfaces having mating parallel grooves therein and partial grooves crossing said parallel grooves with the ends of each partial groove of one surface opposite the other end of a partial groove of the other surface, and with the portion of each partial groove which crosses one of the parallel grooves deeper than said parallel

groove at the point of crossing, comprising introducing filaments into said parallel grooves, introducing an artificial plastic material between such surfaces, and bringing the surfaces together to force the plastic material into the partial grooves, whereby to produce filaments crossing and interwoven with said first filaments.

5. In a process as claimed in claim 4, the step of treating said first filaments before they are introduced into said parallel grooves with an adhesion-preventing liquid.

6. In a process as claimed in claim 4, the step of treating said surfaces before the first filaments and plastic material are introduced with a thin film of an adhesion-preventing substance.

7. Process for the production of woven fabrics from artificial plastic material, by means of rollers having opposed surfaces having mating parallel grooves therein and partial grooves crossing and parallel grooves with the ends of each partial groove of one surface opposite the other end of a partial groove of the other surface, and with the portion of each partial groove which crosses one of the parallel grooves deeper than said parallel groove at the point of crossing, comprising introducing filaments into said parallel grooves, introducing an artificial plastic material between such surfaces, and bringing the surfaces together to force the plastic material into the partial grooves, whereby to produce filaments crossing and interwoven with said first filaments.

8. Apparatus for producing woven fabrics from artificial plastic material, comprising cooperating elements having surfaces having mating parallel grooves therein and partial grooves with the ends of each partial groove of one surface opposite the other end of a partial groove of the other surface and with the portion of each partial groove which crosses one of the parallel grooves deeper than the parallel groove at the point of crossing.

9. Process for the production of woven fabrics

from plastic materials, which comprises holding a plurality of filaments in parallel relation, moulding from a material in a plastic condition partial sections of crossing filaments on opposite sides alternately of said first filaments and causing each partial section to merge at its ends while still plastic with the ends of the adjacent sections, thus forming integral filaments crossing and interwoven with the first filaments and hardening the fabric so formed.

10. A process as claimed in claim 9 in which said first filaments are continuously produced and moved longitudinally during the production of the fabric.

11. A process as claimed in claim 9 in which said first filaments are continuously produced and moved longitudinally during the production of the fabric, and said partial sections are continuously and successively produced.

12. In a process as claimed in claim 9, the step of treating said first filaments before the moulding of said partial sections with an adhesion-preventing liquid.

13. Apparatus as defined in claim 8 in which said cooperating elements are engaging rollers, said parallel grooves running around the rollers.

14. Apparatus as defined in claim 8 in which said cooperating elements are engaging rollers, said parallel grooves running around the rollers, means to feed filaments to said parallel grooves, and means to feed plastic material between the rollers.

15. Apparatus as defined in claim 8 in which said cooperating elements are plates, and means for moving said plates together.

16. Apparatus as defined in claims 8 in which said cooperating elements are plates, means for moving said plates together, and means to feed a plastic material into the space between said plates.

GÜNTHER BÜGGE.