Feb. 11, 1936. M. M. HARRISON 2,030,208

METHOD OF MAKING ELASTIC THREAD AND RETICULATED SHEETS OF RUBBER OR SIMILAR MATERIAL

Filed Oct. 20, 1932 2 Sheets-Sheet 1

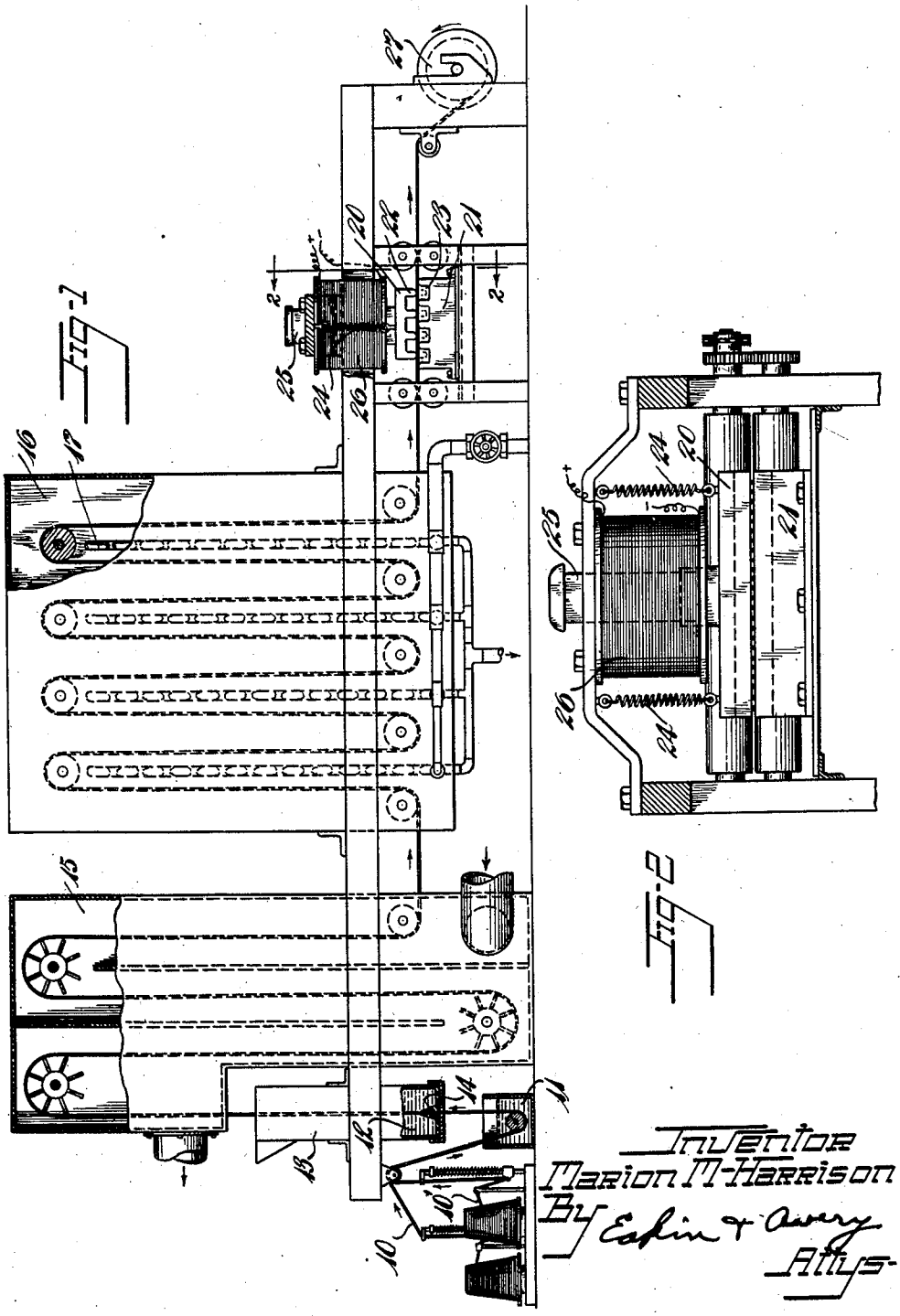


FIG. 1

FIG. 2

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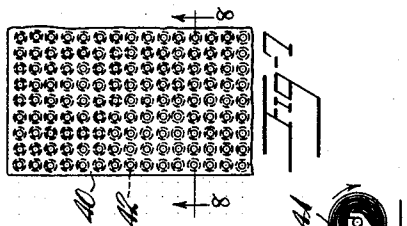


Fig. 1

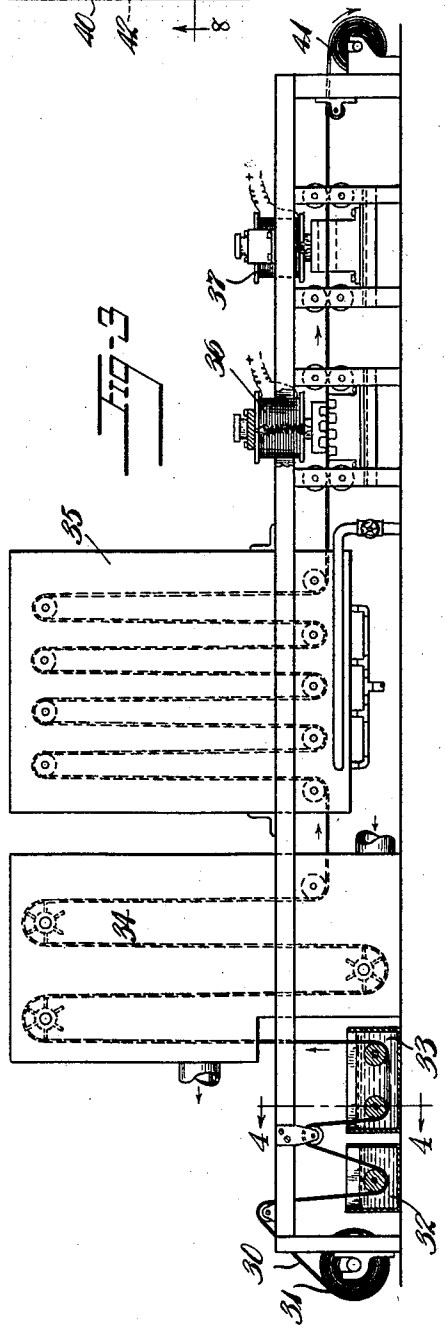


Fig. 3

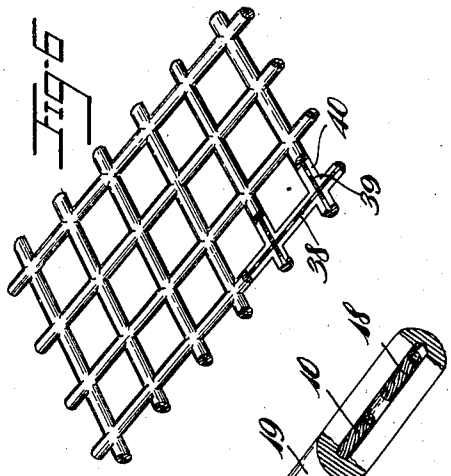


Fig. 6

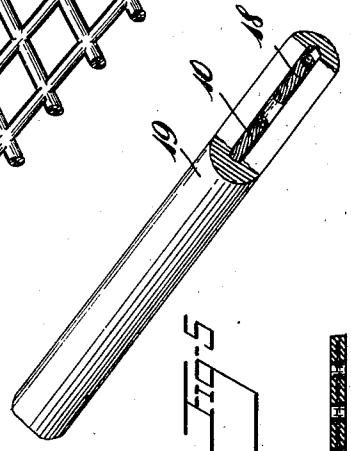


Fig. 5

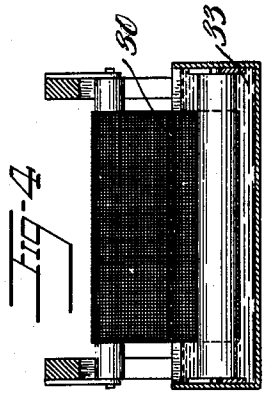


Fig. 4



Fig. 8

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UNITED STATES PATENT OFFICE

2,030,208

METHOD OF MAKING ELASTIC THREAD AND RETICULATED SHEETS OF RUBBER OR SIMILAR MATERIAL

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Application October 20, 1932, Serial No. 638,772

10 Claims. (Cl. 18—54)

This invention relates to a method of making elastic thread and reticulated sheets of rubber or similar material and articles produced thereby and is especially useful in the production of such materials to be used in the manufacture of elastic fabrics.

The principal objects of the invention are to provide a method by which a product may be produced with a minimum expenditure of labor and without waste material, and to provide a new and useful product of uniform quality.

Other objects of the invention will appear from the following description and the accompanying drawings illustrating the method.

In the drawings:

Fig. 1 is a diagrammatic view showing in elevation and partly in section apparatus which may be used in practicing the method of the invention in the manufacture of elastic thread or sheet material.

Fig. 2 is a section on line 2—2 of Fig. 1 showing the support-breaking device.

Fig. 3 is a diagrammatic view showing in elevation and partly in section apparatus which may be used in practicing the method of the invention in the manufacture of reticulated sheets of material.

Fig. 4 is a section on line 4—4 of Fig. 3.

Fig. 5 is a perspective view of the finished elastic thread partly broken away and in section to show the construction thereof.

Fig. 6 is a perspective view of a piece of reticulated elastic sheet material or fabric, parts being broken away and in section to show the construction thereof.

Fig. 7 is a plan view of a perforated sheet of material having a coating of elastic material deposited thereon.

Fig. 8 is a section on line 8—8 of Fig. 7.

Briefly stated, the invention consists in depositing a solution or dispersion of rubber or similar elastic material upon a filament or netted web of material constituting a temporary support, vulcanizing or otherwise chemically changing the deposit to provide an elastic coating on the support, and progressively or otherwise disintegrating the support to provide an elastic and extensible structure.

Referring to the drawings, the invention may be practiced by drawing one or more filaments or cords 10, 10', of weak material such as loosely twisted short cotton fibers or of untwisted cellulose or other material through a bath 11 of a solution adapted to coagulate the material to be deposited thereon whereby the filaments or cords are impregnated or coated with the coagulant solution. The filaments or cords are then passed through a solution or natural or artificial dispersion of rubber or similar material 12, whereupon the coagulant carried by the filament or cord will cause the coagulation of a film of the solution or dispersion upon the surface of the filament or cord. A sufficiently thick film may be obtained by repeated dipping and drying without the coagulant if desired, but when a coagulant solution such as zinc chloride is used, the coagulant may also act to disintegrate or substantially weaken the supporting cord or filament.

Where it is desired to deposit rubber or a similar material from a solution of the same in organic solvents the coagulant may be dispensed with and the filaments or cords 10, 10', passed directly through the bath 12 of rubber or similar solution in which case a thinner deposit will ordinarily result.

The bath 12 may be contained in a tank 13 through the bottom of which the filaments or cords 10, 10', may enter through a flexible self-closing guide 14 formed of soft vulcanized rubber.

After receiving a deposit of the required thickness, which may sometimes necessitate the application of more than one coat of deposited material, the filaments or cords are drawn through a drying chamber 15 through which heated air or other gases may be circulated to facilitate drying. The filaments or cords are then subjected to vulcanization, preferably by being passed through a chamber 16 heated by steam coils 17.

After vulcanization the supporting filaments or cords, when not completely disintegrated, may be disintegrated by being broken into discontinuous sections 18 within the elastic coating 19 to provide an elastic extensible thread or cord. A convenient apparatus for this purpose comprises a pair of platens 20, 21, located along the path of the cords and provided with spaced ribs 22, 23 on their opposed faces arranged to traverse the path of the cords. The platen 21 is stationarily mounted so that its ribs 23 contact with or barely clear the coated cords passing thereover and the platen 20, whose ribs 22 are in intercalated relation to the ribs 23, is mounted for vertical movement. Platen 20 is provided with means for intermittently raising and lowering it to such an extent as to force its ribs 22 into the spaces between ribs 23, as indicated by the dot and dash lines, thereby stretching the cords beyond their elastic limits, whereupon the cords are broken into short lengths whereas the elastic coatings are unbroken. For this purpose the platen 20

may be supported by contractile coil springs 24 and an armature 25 extending above the platen through a solenoid 26 may be used to project the plate against the cords at timed intervals by intermittent energizing of the solenoid.

The elastic cords having their fibrous or filamentous supports broken are then wound upon a reel 27. By close spacing of the cords 10 a continuous sheet may be produced if desired.

In applying the method to the production of reticulated or perforated sheets of elastic material a weak net fabric 30 or a perforated web of paper 42 is provided in place of the filaments or cords and is coated in a similar manner as shown in Fig. 3 by being passed from a roll 31 through a coagulant bath 32, a bath 33 of rubber latex or other solution or dispersion of rubber or similar elastic material, and then through a drying chamber 34 and vulcanizing chamber 35.

The reticulated or perforated sheet of material is then passed successively through devices 36 and 37 adapted to break the support. For this purpose a device 36 similar to that previously described for breaking cord supports may be used for breaking the longitudinal or warp cord members of the support and a similar device 37, but having its platens arranged with their cord-breaking ribs across the weft threads of the support, may be used for breaking the lateral elements or weft threads. When net fabric is used as the support the resulting reticulated sheet comprising a support having its warp and weft elements broken to provide discontinuous portions, 38 and 39, all enclosed in a continuous elastic covering 40 of reticulated form, is then wound on a reel 41. The reticulated or perforated sheet will be extensible and elastic in all directions and may be used for manufacturing elastic bandages, girdles and the like where both elasticity and porosity to facilitate ventilation are necessary or desirable.

Where perforated paper is used as the support the rubber coating 40 will extend over the faces of the sheet and through the apertures leaving smaller apertures in the resulting sheet of material than there were in the original sheet of paper. When such a sheet is stretched the paper support, which is entirely enclosed in rubber, will be broken or torn into small disconnected portions thereby providing a perforate elastic sheet of material.

I claim:

1. The method of making an elastic structure which comprises providing a substantially non-extensible support of substantially the same extent as that of the elastic structure to be produced, forming a coating of elastic material around the support, and so disintegrating the support as substantially to destroy its effectiveness as a tension element..

2. The method of making an elastic structure which comprises providing a substantially non-extensible cord with a coating of elastic material, and disintegrating the cord by tension intermittently applied to successive portions of the finished article.

3. The method of making an elastic cord which comprises providing a substantially non-extensible cord with an enclosing coating of elastic material and treating the resulting article to substantially destroy the effectiveness of the cord as a tension member.

4. The method of making a reticulated sheet of elastic material which comprises providing a reticulated support of substantially non-extensible warp and weft members, coating each warp and weft member with a continuous elastic coating without filling the interstices of the support, and so disintegrating the support as to substantially destroy its effectiveness as a tension member.

5. The method of making a reticulated sheet of elastic material which comprises providing a reticulated support of substantially non-extensible warp and weft members, treating the support with a substance adapted to coagulate a coating material, depositing an elastic coating thereon, and disintegrating the support by tension applied in a plurality of directions.

6. The method of making a reticulated sheet of elastic material which comprises providing a reticulated support of substantially non-extensible material, treating the support with a substance adapted to weaken the support and coagulate a coating, applying a coating of an elastic substance to the support and completing disintegration of the support by tension applied to the resulting sheet of material in a plurality of directions.

7. The method of making a reticulated sheet of elastic material which comprises providing a reticulated support of substantially non-extensible sheet material, treating the support with a substance adapted to eventually disintegrate the support and to coagulate a coating applied thereto, and depositing a coating of elastic material about each member of the support without filling the interstices of the sheet.

8. The method of making an elastic structure which comprises providing a substantially non-extensible support, treating the support with a substance adapted to weaken the support and to coagulate a coating, applying an elastic coating to the support, and completing disintegration of the support by tension applied to the resulting structure.

9. The method of making a reticulated sheet of elastic material which comprises providing a reticulated support of substantially inextensible material having warp and weft members, coating each warp and weft member with a continuous coat of elastic material, disintegrating the warp members of the support by tension applied longitudinally of the sheet, and disintegrating the weft members by tension applied cross-wise of the sheet.

10. The method of making an extensible structure which comprises providing a tension-resisting support having a relatively low extensibility and having substantially the same extent as that of the extensible structure to be produced, forming a coating of highly extensible material upon the support, and then substantially destroying the effectiveness of the support as a tension-resisting element.

MARION M. HARRISON.