

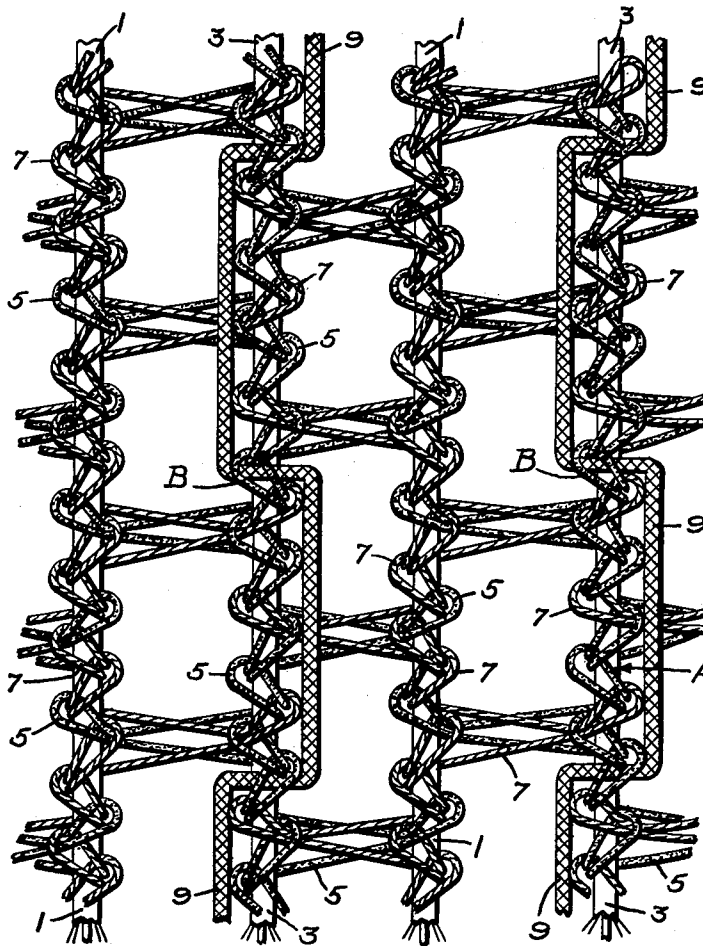
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ELASTIC FABRIC

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ELASTIC FABRIC

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This invention relates to flat elastic fabric of warp knit type commercially known as power net and widely used for the manufacture of girdles and other supporting and body-molding garments. The elasticity and corresponding contractive effort of these fabrics is conferred through the inclusion of rubber strands inserted in stretched relation during their manufacture. The fabric is of two-way stretch character, capable of stretching simultaneously lengthwise and crosswise, as well as in all intermediate directions.

Elastic fabric is used in many instances as an addition applied locally to garments of non-elastic materials to support or anchor these garments in place on the wearer's body. In the case of strapless dresses, gowns, slips, brassieres, bathing suits and other articles, the need is for a material which will cling to the skin of the wearer. But such material must have a relatively smooth surface for comfort and to avoid marking the skin by imprinting. To avoid an uneven surface, the rubber strands which confer the elasticity and contractive effort to the fabric are necessarily largely buried in the fabric, and so whether covered with the conventional spirally wrapped fibrous yarns or left bare are shielded from contact with the wearer's skin. Hence, to prevent the garment from slipping, the elastic fabric used to anchor the garment or its edges in place has to rely almost wholly on its tight fit, its radially directed pressure against the encircled portion of the wearer's body, with consequent discomfort to the wearer and displacement of the flesh and distortion of the lines of the body.

Being thus shielded, the rubber in the elastic fabric of the garment has no chance to exert on the skin of the wearer the well-known clinging or non-slipping action which comes from its high coefficient of friction. Instead, only the non-elastic yarns, conventionally of smooth and slippery nylon or rayon for appearance, engage the skin.

The present invention aims to provide an elastic fabric of increased frictional resistance to slipping on the wearer's skin, whereby a garment in which it is used will be held more securely against slipping, though looser and hence more comfortable and with avoidance of marking or distorting the flesh.

To this end, the invention provides a novel elastic fabric in which the conventional covered rubber elements are employed to provide stretch and create a contractive effort, while supplemental bare rubber elements are disposed wholly at one surface of the fabric with practically their entire length exposed so as to be in contact with the wearer's skin and create a powerful resistance to sliding along the skin.

Additional aims of the invention are to provide a fabric thus utilizing the high coefficient of friction of rubber without impeding the free circulation of air therethrough needed to carry off body moisture, and one which will provide a relatively smooth surface to go against the

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wearer's skin. A further aim is to devise a fabric to these ends which can be cheaply and rapidly produced, of conventional appearance, and in a form adapted both for localized application to garments and also to the making of complete garments of body-molding character.

To these ends, the novel fabric comprises a two-way stretch power net fabric, characterized by knitting fibrous yarns with elastic covered rubber warps laid in the wales thereof and with bare rubber strands floated solely at one surface of the fabric and wholly exposed except where they are tacked to the rubber warps by being caught under one or two stitches of the knitted fibrous yarns after floating over a relatively large number of courses of the knitted fibrous yarns. Preferably the bare rubbers will be of much smaller diameter than the covered warps, and will be inserted with much less tension so that they will be slack or nearly so when the fabric is in normal unstretched relation.

Other objects of the invention and the manner of their attainment are as set forth hereinafter.

An illustrative embodiment of the invention is shown in the accompanying drawing, which is a diagrammatic portrayal of the novel fabric, showing the surface intended to go against the skin, the fabric being in longitudinally stretched condition.

The improved fabric is as noted of warp knit construction such as made on a Raschel type warp knitting machine of single needle bar type, and hence capable of extremely high speed and economical production in any desired width. In the pattern shown, a covered rubber warp 1, 3, forming a part of the body of the fabric is laid in each wale or chain of crocheted loops, the non-elastic fibrous yarns 5, 7 proper to each wale being shifted alternately to left and right into the two respective adjacent wales for one stitch only after each two stitches in its own wale. Thus, starting at course A for example, the fibrous yarns 5 are knitted around rubber warps 3 for two stitches or courses, while fibrous yarns 7, normally identical with 5 but shown differently in the FIGURE for clarity, are being knitted for two stitches around rubbers 1 symmetrically to the stitches formed in yarns 5. Then in the third course each yarn 5 is racked or shogged to the right to form a needle loop through the second stitch of yarn 7 and overlying the adjacent rubber 1, while yarn 7 is racked to the left to form a needle loop overlying rubber 3 and extending through the second stitch of yarn 5. For the fourth course each fibrous yarn returns to its proper rubber warp, yarn 5 being drawn through the racked needle loop of yarn 7 overlying rubber 3, and yarn 7 being drawn through the racked needle loop of yarn 5.

After making of the two stitches of the fourth and fifth courses around their proper rubbers, each fibrous yarn is racked reversely to what has just been described, yarn 5 being shifted to the left to overlie rubber 1, while yarn 7 is racked to the right to rubber 3 at that side, forming the 6th course, where each is secured by the needle loop of its neighboring fibrous yarn upon the latter's return to its proper rubber warp as just described, such needle loops forming the seventh course.

At this point a bare rubber cord 9 which is run in association with each alternate covered rubber warp, herein the rubber warps 3, is guided across its rubber 3 from right to left so as to be bound to the latter by the

needle loop B of fibrous yarn 5 in forming this seventh course.

The fibrous yarns 5, 7, then make one more stitch about their proper rubbers, making the eighth course, and then are racked respectively to right and left, completing the ninth course and the repeat of their pattern upon their return.

The bare rubber cord 9 meanwhile floats alongside and to the left of its wale and its covered rubber 3 while the next six courses of the fibrous yarn repeat are being knitted, and is then laid across its associated rubber 3 from left to right so as to be overlain and bound thereto by the needle loop of the yarn 5 in forming the sixteenth course from a point A. Thus the bare rubbers 9 float for eight courses and are tacked to the covered rubbers at every ninth course by the yarns 5.

These bare rubbers 9 are of course the elements which give the fabric its vastly increased frictional character. They lie wholly outside the plane of the covered rubbers 1, 3, and of the body of the fabric. They are inserted in as slack condition as proper handling permits, and at any rate under far less tension than the covered rubbers 1, 3, so that they never are pulled straight but always undulate in serpentine curves from one side to the other of their associated covered rubbers. Since very fine extruded rubber filaments of about the diameter of 50's cotton yarn are used for the rubbers 9, and because run slack, they do not add materially to the contractive effort or resistance to stretch of the fabric. But of course they can be made to do so if desired, by making them heavier or running them tighter, or both.

The bare rubber loops have the unusual effect of resisting the slipping of the fabric along the skin or other underlying surface, far more strongly when the fabric is moved at right angles to the covered rubbers 1, 3 than when moved lengthwise of the rubbers 1, 3. The main contractive effort and stretch of the fabric are lengthwise of rubbers 1, 3, and in garments the fabric is mainly used with these rubbers running around the body. Hence when thus disposed in strapless gowns, brassieres, bathing suits and other garments, the novel fabric has great supporting power and preponderant resistance to slipping down or up, coupled with a much less degree of resistance to rotation about the body or limb, which latter feature facilitates adjusting the garment into proper alignment.

Preferably the bare rubbers are applied only to some of the covered rubber warps, as to the alternate ones 3 herein, to retain most of the porous nature of the basic power net fabric, an inherent advantage of knit fabrics over woven elastic fabrics. Also, the warp knit construction is lighter and more flexible than woven webbing. But the bare rubbers 9 may of course be applied to all covered rubber warps 1, 3, if desired. Also, the bare rubbers 9 may be run directly parallel to the covered rubbers 1, 3 by being laid into the wales the same as and upon the rubbers 1, 3 for one or more stitches (courses) and then floated for as many courses as desired, and then again tacked to the rubbers 1, 3, in obvious manner, and without the angular crossing which gives the serpentine course to the bare rubbers pictured in the drawing. Or if a more pronounced zigzag course is desired, the bare rubbers may be shifted back and forth from one wale to another. But the construction shown makes a smoother surface to go against the wearer's skin, because the floats of bare rubber will be pressed down to normally lie in and level the depressed intervals between the relatively larger covered rubbers 1, 3 until a force tending to slide the garment down or up is applied, whereupon they roll up onto their proper covered rubber warps and increase their grip on the skin.

As will be seen, the enhanced frictional grip of the surface having the bare rubbers makes it unnecessary to fit the garment or the cling-producing part thereof tightly about the wearer's body in order to prevent slipping, so

that a lessened degree of distortion of the flesh at and above the point of application occurs, and much less imprinting of the skin results from this reason as well as because of the avoidance of prominent wales, courses, ribs, or pits on the flesh side. The other side of the fabric presents no material difference in appearance from the standard power net. The novel material stretches freely around the body when expansion is needed, and yet has enough vertical yield to stay in place when used throughout the garment, as in girdles and bathing suits.

This fabric can also be made in different grades and weights for other articles, as in golf, shooting, driving, or riding gloves, and other uses where a non-slipping grip or surface is needed.

While I have illustrated and described a certain form in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular form shown, or to the details of construction thereof, but

What I do claim is:

1. Warp knit elastic fabric having in combination knitted fibrous yarns, elastic warps laid in the wales of the knitted yarns, and bare rubber strands attached at intervals to the elastic warps by stitches of the knitted fibrous yarns and floated over a relatively large number of courses between the points of their attachment, such bare rubber strands being floated solely at one surface of the fabric and wholly exposed except where bound to the elastic warps by the said stitches.

2. Warp knit elastic fabric having in combination knitted fibrous yarns, elastic warps laid in the wales of knitted yarns, and bare rubber strands extending along the elastic warps and bound thereto at intervals only by a single stitch of the knitted yarns and floating over a relatively large number of courses of such yarns and wholly exposed solely at one surface of the fabric except where bound to the elastic warps.

3. Warp knit elastic fabric having in combination knitted fibrous yarns, elastic warps laid in the wales of knitted yarns, and bare rubber strands extending along the elastic warps and lying wholly outside the plane of the elastic warps and being bound against such warps at intervals between which the strands float.

4. Elastic fabric according to claim 3 in which the bare rubber strands each float solely at one surface of the fabric and first at one side and then at the other side of the warps to which they are bound.

5. Elastic fabric according to claim 3 in which the bare rubbers are in substantially slack relation.

6. Warp knit elastic fabric having in combination knitted fibrous yarns, elastic warps laid in the wales of knitted yarns, and bare rubber strands overlying and bound to the elastic warps and floated except where so bound.

7. Warp knit elastic fabric having in combination knitted fibrous yarns, elastic warps laid in the wales of knitted yarns, and bare rubber strands each extending along an elastic warp, crossing and re-crossing its elastic warp at spaced intervals, bound to its elastic warp by a stitch of the knitted yarns at each crossing, and floating alongside its elastic warp between crossings.

8. Flat warp knit elastic fabric having in combination elastic warps, chains of fibrous yarns knitted around the elastic warps and interconnected at spaced intervals, and bare rubber filaments bound against the elastic warps at intervals by the fibrous yarns and floated over the portions of the fibrous yarns interconnecting adjacent chains.

9. Flat warp knit elastic fabric having in combination elastic warps, chains of fibrous yarns knitted around the elastic warps and interconnected at intervals by interchange of the yarns from one chain to another after a plurality of stitches, and bare rubber filaments each crossing and re-crossing an elastic warp and bound thereto at each crossing by a stitch of the fibrous yarns.

10. The combination according to claim 9 in which the bare rubber filaments float, between crossings, over the portions of the fibrous yarns that extend from one chain to another.

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