This invention relates to a new and improved stocking, particularly for women.

The object of the invention is to provide a "self-fitting" stocking which normally, and when not worn, is considerably less in its dimensions than a standard full-dimensioned woman's stocking, but which is capable of extension to provide the required full dimensions both lengthwise and peripherally. One of the desirable characteristics of women's stockings is that they shall fit snugly and conform exactly to the ankle and calf of the wearer's leg, but by reason of the wide variance in the dimensions of the individual person's ankle and calf, it has been the practice of some stocking manufacturers to prepare stockings of varying ankle and calf dimensions for the purpose of permitting purchasers to select stockings conforming to their individual leg measurements.

This invention provides a stocking which, with respect to its particular foot size, will snugly fit and conform exactly to the ankle and calf measurements of the wearer, without regard as to whether the ankle and calf measurements or leg lengths may vary with respect to persons normally wearing a given foot size. In other words, taking into consideration a large number of persons who would normally wear, for instance, a size nine stocking, such persons would be found to have ankle and calf measurements varying considerably, but, nevertheless, the stocking of this invention will fit the legs of each of said persons snugly and to exact conformity, which is highly desirable. In addition to the foregoing advantages, the stocking can be caused to accommodate the varying leg lengths and the varying thigh dimensions of the individual wearer. Such stockings are strong and durable and, in the course of manufacture, the material may be cut to general stocking formation without unraveling and/or running. This characteristic is also a great advantage in the finished stocking in that if a thread is torn, a run will not result. Strains upon individual points are entirely avoided, such strains being distributed over a substantial portion of the material.

Stockings of this invention have the inherent characteristic of adhering closely to the leg and do not tend to sag or wrinkle.

In the accompanying drawings, Fig. 1 is a view of a finished stocking, laid flat, made according to this invention, representing about one-third the dimensions thereof when not upon the wearer's leg; Fig. 2 is a view representing the stocking of Fig. 1 upon the wearer's leg, conforming to the leg configuration; Fig. 3 is a detailed enlargement of a section of the fabric, indicating the character and course of the threads, the arrow indicating a direction lengthwise of the stocking of Fig. 2, and Figs. 4 and 5 are views indicating modified forms of materials or fabrics from which stockings embodying this invention may be made.

The body 1 of the stocking is made of a woven material illustrated at the portions 2, in Figs. 1 and 2, and in enlargement, in Fig. 3. The individual threads which constitute the fabric comprise an elastic filament which has spirally wound thereon a covering of cotton, silk or other thread, the spiral windings being closely related, providing a stretchable composite thread. This combination of elastic thread 3 and its spirally wound covering 4 is hereinafter referred to as the base thread. A large number of such base threads are placed in a lace loom and, together with bobbin threads 5, are woven to produce the peculiar fabric from which the body of the stockings is made. Each base thread has associated with it, its own bobbin thread, and each bobbin thread accompanies a definite base thread throughout its change of direction or course. In Fig. 3 an enlarged section of the weave of the fabric is illustrated, but in a somewhat distorted condition, resulting from the fabric conforming to the leg configuration of the wearer, while in Fig. 1 the fabric is illustrated in its normal character in the finished stocking, the material being made up of like units all woven to the same shape and configuration when the material is converted into a stocking but distorted when worn as illustrated in Fig. 3. Inasmuch as the character of the fabric and the course or direction of weave of the threads can be understood by reference to Fig. 3, reference is made to Fig. 3 in connection with the following description.

The fabric as a whole can be woven on a lace or net machine, in the form, or made up, of a large number of figures generally of the same shape and configuration. Each unit figure is formed with a configuration in which none of the individual threads run or have a course parallel to the length of the stocking, but, on the contrary, the threads forming each unit figure run at angles to the longitudinal line or length of the stocking. In Figs. 1, 2 and 3, each unit figure is five-sided. Following the course of the threads 1 and 8 with respect to the length or longitudinal line of the stocking, (which is indicated by the arrow alongside of Fig. 3), it will

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be noted (beginning at X in Fig. 3) that said threads 1 and 8 are initially in surface engagement and the bobbin thread 9, which is individual to the base thread 7, is thrown around both the base thread 7 and the base thread 8 to tie the two of them together, and the bobbin thread 10, which is individual to the base thread 8, is also thrown around both threads 7 and 8, to tie them together in surface engagement.

At the point 11, the base threads 7 and 8 diverge to form their first courses, the base thread 7 going to the right and the base thread 8 going to the left and, at and after the point 11 of divergence, the bobbin thread 9, which is individual to the base thread 7, is wound or thrown around the base thread 7 only through the length of its first course, while the bobbin thread 10, which is individual to the base thread 8, is thrown around the base thread 8, only through the length of its first course. The base threads 1 and 8 continue diverging for the length of the first course of each and then again commence to converge, as shown at 12 and 13, to form their respective second courses 14 and 15. The base thread 7, at the point 12 of its change of course, meets base threads 16 and 17, which, in advance of the point 12, are tied together in surface engagement by their respective bobbin threads being wound around both base threads 16 and 17.

At the point of junction of the base threads 7, 16 and 17, the bobbin threads of each are thrown around these three base threads in order that they are securely tied together by being encircled by the three separate base threads. Each of the three bobbin threads may be thrown around the point of junction of the threads 7, 16 and 17, two or more times, the point of importance being that each bobbin thread should go around the three base threads at their point of meeting in order to tie them together. The base thread 16 accompanies the base thread 7 in surface engagement through the second course of the base thread 7, while the base thread 17 diverges to the right to take part in the forming of another unit figure. The base threads 7 and 16, through the length of the second course of the base thread 7, are tied together by the bobbin thread 9 being thrown around both the base thread 7 and the base thread 16, and the bobbin thread, which is individual to the base thread 16, being also thrown around both threads 7 and 16 throughout the second course of the base thread 7. The base threads 16 and 17 diverge at the point 18, the base thread 7 then taking its third course.

At the point of divergence 18, the bobbin thread 9 and the bobbin thread individual to the base thread 18, cease to bind both base threads 7 and 16 together, each accompanying its individual base thread, the bobbin thread 9 being thrown around the base thread 7 throughout its third course 19 until it reaches the point 20. The base thread 7, when it reaches the point 20 at the end of its third course, again meets the base thread 8 on its second course 15, and also a base thread 16 and 21 at 20 the three base threads 7, 8 and 21 are triply bound together by a number of courses of the three bobbin threads passing around such three base threads. The base thread 7 then takes its fourth course 22, being accompanied throughout its fourth course by the base thread 8, the base threads 7 and 8 being tied together by the encircling bobbin threads 8 and 10. It will be understood from the foregoing description that the fabric is made up of a multiplicity of unit figures 6, formed by a plurality of base threads, each base thread being an elastic thread with a spirally wound thread forming a covering theron, each base thread having its individual bobbin thread that accompanies it, and when base threads meet, whether as a double or triple thickness, each individual bobbin thread encircles or envelopes and binds together such base threads at their meeting point and line of their courses. The thread 7, from its point of divergence 11, can be traced through its first course, its second course 14, its third course 15, its fourth course 22, its fifth course 23, its sixth course 24, and its seventh course 25. The base thread 8 can be traced through its first course, its second course 16, its third course 17, and its fourth course 21, at the end of which fourth course it again meets base thread 7. The base thread 16 can be traced through its first course, its second course 20, and its third course 28, and at an intermediate point of its third course it again meets the base thread 7. The base thread 17 can be traced through its first course, paralleling the base thread 16, its second course 30, its third course 31, and its fourth course 32, at the end of which fourth course it again meets the base thread 16. The base thread 21 can be readily traced from its surface contact with the base thread 8, at its first course 33, through its second, third and fourth courses, 24, 35 and 36 respectively. The base thread 21, at the end of its fourth course 36, meets the base thread 8 and, as explained, the bobbin threads bind the base threads together. It will be observed, from an examination of Fig. 3, that four base threads provide a repeat and such repeat consists of the unit figures A, B and C.

It is to be observed that the base threads, in the particular type of fabric shown in Fig. 3, do not run parallel to the longitudinal line of the stocking, but, in the change of direction with each succeeding course, they run at an angle to the longitudinal direction of the stocking. It is also to be observed that, in the type of fabric shown in Fig. 3, each unit figure is bounded by three courses of one base thread and two courses of another base thread. The base thread forms three sides of the figure, has two courses thereof single or unaccompanied by a course of another base thread and one course thereof double or accompanied by a course of another base thread and the base thread which forms two sides of the same figure is single for one course and accompanied by another base thread for the other course. This may be observed by an examination of unit figure A, which is made up of three courses of base thread 21 and two courses of base thread 8. The base thread 21 is single at course 34, double with another at course 35, and single at course 36 and the base thread 8 is double with base thread 7 at its first course, where it diverges from the base thread 21, and single at the course 26. The material is made of a suitable pattern and then folded and sewed at the back of the stocking along the line 31. The material, although woven on a lace or net machine, will not unravel and may be cut to stocking formation and easily sewn. A stocking made of this material would be as illustrated in Fig. 1, but is given a stocking or leg configuration with ankle and calf cut smaller than the smallest of a range of normal ankle and calf measurements. When the wearer draws the under-size, openwork, stocking over the leg, the material, throughout the body length of the
stocking, will stretch or extend itself to permit the insertion of the foot and leg, and will, when the stocking is finally positioned upon the leg, be drawn well up over the thigh of the wearer. One of the outstanding characteristics of this invention resides in the fabric of which the stockings are made. While the material is being made, the warp threads, which are in the nature of warp threads, are under tension or stretched, and there is a minute separation of the successive convolutions of the covering threads. When the bobbin threads are wound or thrown around the base threads, the bobbin threads interlock between convolutions of the covering of the base threads. Inasmuch as the separation of the covering of the base threads is slight and the bobbin threads are wound tightly around the base threads, the bobbin threads, where they cross the slight separation of the spirally wound threads, are forced, by the weaving action of the covered thread, to convolute and then to relax in the base threads. The convolution of the covering thread and the crosswise convolution of the cover of the base threads relax, the bobbin threads are grasped or held much firmer, eliminating slipping or separation. Consequently, when the material is cut, the elastic threads cannot escape from the grasp of the bobbin threads. An examination of the face of the cut of this material will show that the elastic threads are substantially flush with the line of the cut and have not slipped away from the line of cut by reason of secession. It is of great importance not only in that it eliminates unraveling or running, but also when stitching is applied with a sewing machine, there is a firm edge for seaming, including the elastic threads, and weakness of the edges is eliminated.

Although the base threads and the bobbin threads are tightly wound together, the stretch of the elastic thread is, nevertheless, possible without tearing either thread at the point of winding. Consequently, there is no tearing action at any particular point of the fabric, but the fabric responds to pull or tension over a large area and in the region of any point of the fabric set forth in the foregoing paragraphs, will also be present in the finished stocking or, in fact, in any other article into which the material is made.

In a stocking made according to this invention, the spiral covering thread 4 is tightly laid or wound over the elastic thread 3 and the bobbin threads are drawn or wound tightly around the base threads; nevertheless, the meeting points of two or more threads (for instance, at 11 and 20), as well as throughout the whole of the fabric, permit a relative stretch of the elastic thread and the accompanying convolution of the spiral covering thread and the bobbin thread, when the material is put under pull or tension, without tearing or disrupting the material. Under such conditions, the unit figures will retain their general five-sided character. These unit figures, 6, when the stocking is stretched by the force applied thereto by the wearer, are slightly deformed from the configuration shown in Fig. 1 to the slightly elongated configuration generally shown in Figs. 2 and 3; nevertheless, the courses forming each figure remain separate and do not pile up or slip one over the other. The maximum stretchability of the stocking is by no means exhausted when the stocking is worn by the wearer. This will be readily understood when it is taken into consideration that the stocking normally is much smaller crosswise and shorter lengthwise than the dimensions of the wearer's leg, and extends or extends itself both crosswise and lengthwise when worn, to sufficient extent to conform closely to the configuration of the wearer's leg, but still having a reserve stretchability or the further extension of the stocking beyond its fitting requirements.

In the course of stretching a stocking made according to this invention, stretching of the threads is permitted, and consequently a strain or pull at a particular point in the stocking is not confined to such point, but will be distributed over a larger area and there is little likelihood of tearing the fabric. The strain is prevalent even though the spirally wound covering threads and the bobbin threads are in wound relation in the fabric structure.

It is preferred to make such parts of the stocking, at the bottom thereof, as are confined within a slipper or pump, of ordinary knitted material, as is shown in Figs. 1 and 2, in connection with the toe 38, sole 39, and heel 40. It is also preferred to make the top 41 of the stocking of similar material, but the body 1 of the stocking, including all exposed parts when worn, are made of the special form of openwork, mesh, laced-like material, having the special characteristics aforesaid.

Further or other types of suitable weaves embodying the major characteristics of this invention are illustrated in Figs. 4 and 5. In Fig. 4, the longitudinal line of the stocking is indicated by the arrow and, in this form of openwork, mesh, laced-like material, each figure is six-sided. The base thread is of the same type and character as the base threads of Fig. 3, to wit, an elastic thread having a spirally wound covering. The two base threads 42 and 43, from their point of junction 44, follow parallel courses 45, 46 and are doubly bound together in face engagement by their respective bobbin threads 47, 48 encircling both base threads. At the point 49, the threads 42 and 43 diverge, respectively, to the left and right, to follow the second courses 50 and 51 where the courses are of individual base thread 42 with their bobbin thread winding. The thread 42 then diverges to its third course 52, where it meets and enters into surface engagement with a base thread 53, these threads being encircled by the bobbin threads of both base threads. The thread 42, at the point 54, again diverges to form both fourth and single course 55, and thereby complete one side of one of the unit figures. The thread 43 diverges from its first course at 56, to form its third course 57, where it meets and enters into surface engagement with the base thread 58, these threads being encircled by the bobbin threads of both base threads. The thread 43, at the point 59, again diverges to form both fourth and single course 60, and thereby complete the other side of one of the unit figures. The courses of the thread are then repeated, time after time, to complete the fabric suitable size for the production of one or more stockings.
vidual bobbin thread wound theretround, meets
a second base thread 62; both bobbin threads 63,
64 encircle and bind in surface engagement both
base threads 61 and 62. The base thread 61 then
diverses along the course 65 to the point 66 where
it meets another base thread 67, both base
threads being here bound together by their en-
circling bobbin threads. The base thread 61 then
diverses along its second course 68 forming
two sides of one of the unit figures at Fig. 5. The
base thread 63 then diverses along the course 69
to the point 70, where it meets another base
thread 71, both base threads being here bound
together by their encircling bobbin threads. The
base thread 62 then diverses along its second
course 72, meeting the base thread 61 at the
point 73, and both threads 61 and 62 being here
bound together by their encircling bobbin
threads, thereby completing the unit figure.

The courses of the threads are then repeated,
time after time, to complete the fabric to suit-
able size, for the production of one or more
stockings.

Many advantages over ordinary stockings,
other than those herein set forth, result from
manufacturing and using stockings made accord-
ing to this invention. It has thus been found
that when the under-size stocking is drawn over
a stout leg and the configuration of the unit
figures thereby elongated, the visual effect thereof
is to make such a stout limb seem thinner and
more slender than its appearance in the ordinary
stocking.

It has been found that by reason of making the
lower portion of the stocking with the open, lace-
like material of this invention, and by reason of
the stretchability thereof, the stocking, although
made with a definite foot size, will provide a slight
extension in the foot portion and may therefore
accommodate a foot size slightly larger than the
actual stocking size which may be found to be
advantageous for fitting and wearing qualities.

I claim:
1. A woman's stocking, made of woven, open,
lace-like mesh, the stocking in length, when not
worn, being materially shorter than that portion
of the leg to be enclosed therein and normally
smaller peripherally than the corresponding por-
tion of the leg, the open, woven, lace-like mesh
portion thereof comprising elastic threads having
a covering material spirally wound thereon, to
provide a base thread, each base thread being
accompanied in its course by a bobbin thread,
a base thread periodically meeting another base
thread, said meeting base threads being in sur-
face contact and accompanying each other for a
predetermined distance such distance being in
excess of one-half of the length of the accom-
pa ning courses, said base threads periodically
changing their courses to define the individual
mesh, the accompanying bobbin threads of each
base thread encircling all of the base threads
where they meet or coincide, said stocking when
worn being drawn to substantially leg length in a
direction lengthwise of the leg and being ex-
tended under resilient conditions in a direction
around the leg to snugly fit the leg and conform
to the varying contour thereof, the extension of
the stocking under such resilient conditions being
within the maximum stretchability thereof.

2. A stocking according to claim 1, in which
bobbin threads are tightly wound around elastic
threads and bobbin threads are between the
spiral covering threads, the elastic threads being
grasped by the bobbin threads and held thereby
against retraction when the fabric is put under
stretching tension.

3. A stocking according to claim 1, in which
the stocking is seamed lengthwise at the back
thereof and the edges of the stocking material
within the stitched seam exhibit elastic threads
substantially flush with the face of the cut of the
material along said edges, the stitching of the
seam embracing the rubber threads.

4. A stocking made of a multiplicity of threads
and materially shorter than that portion of the
leg to be enclosed therein, each thread consisting
of an elastic filament and a covering thread spir-
ally wound around said elastic filament, constitut-
ing base threads, each of said base threads run-
ning in a general lengthwise direction with respect
to the length of the stocking but at an angle to
the longitudinal line of said stocking, said threads
periodically changing their direction with respect
to the longitudinal line of said stocking and each
thread periodically meeting another base thread,
said meeting base threads being in surface con-
tact and accompanying each other for a pre-
determined distance, such distance being in excess
of one-half of the length of the accompanying
courses, a bobbin thread individual to each base
thread, said bobbin thread accompanying its per-
tinent base thread through the course of the
base thread and being wound around said base
thread at points where the base thread does not
meet another base thread, the bobbin threads in-
evident to each base thread passing around
meeting base threads at the parts where they
meet and engage, said bobbin threads retaining
said elastic threads from slipping when the fabric
is stretched, said fabric along a cut edge exhibit-
ing elastic threads substantially flush with the
face of the cut.

5. In a stocking according to claim 4, in which
the material comprising the body of the stocking
is made up of woven, open, lace-like mesh, having
a multiplicity of unit figures defined by said base
threads, said unit figures being formed by at
least two separate threads converging and diver-
ging with respect to each other, each of said unit
figures having at least four sides.

RICHARD BLOCH.