May 19, 1925. 1,538,836

A. H. McCARREL

WOVEN FABRIC

Filed June 13, 1923 3 Sheets-Sheet 1

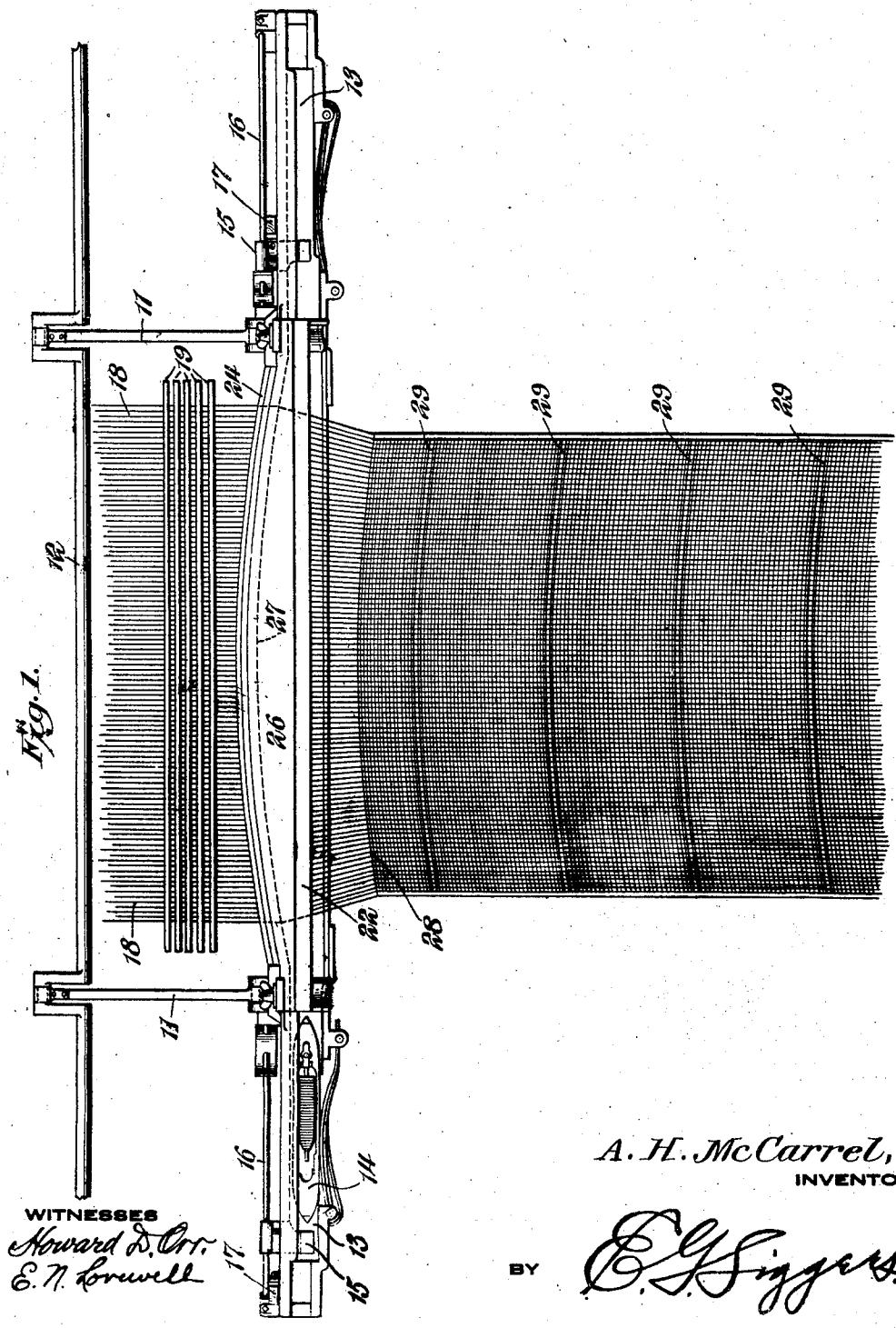


Fig. 1.

WITNESSES

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WOVEN FABRIC

Filed June 13, 1923 3 Sheets-Sheet 2

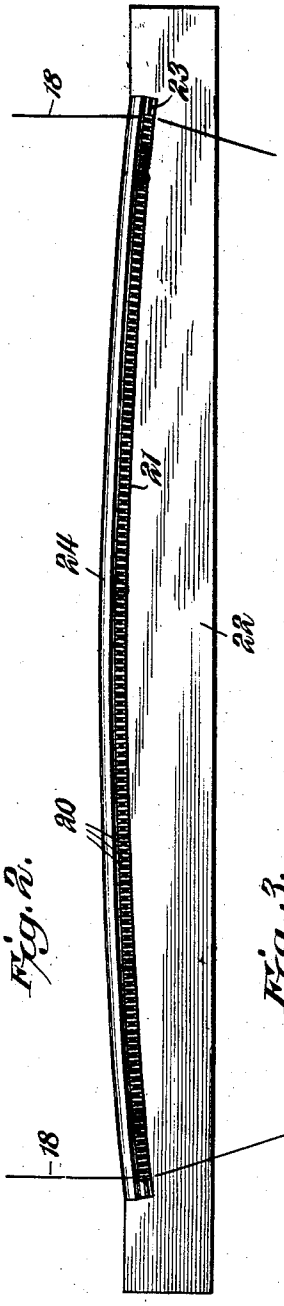


Fig. 2.

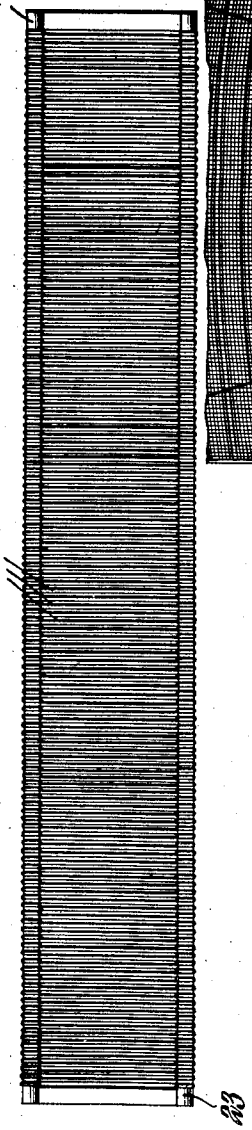


Fig. 3.

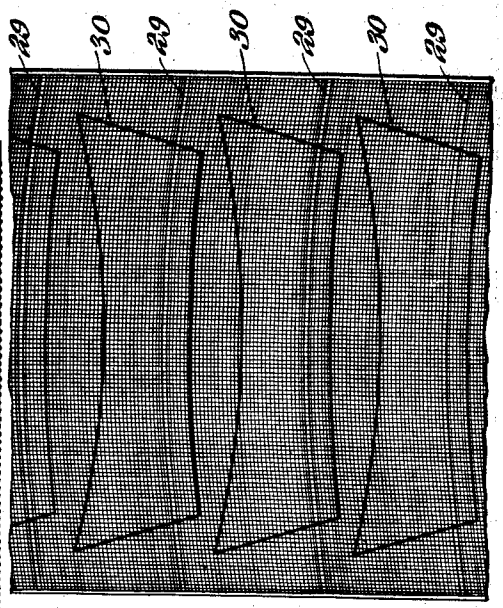


Fig. 5.

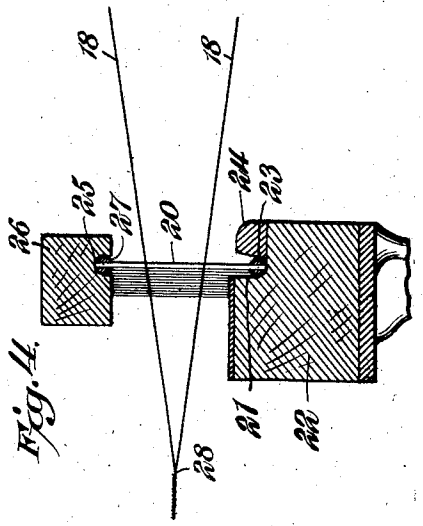


Fig. 4.

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WOVEN FABRIC

Filed June 13, 1923 3 Sheets-Sheet 3

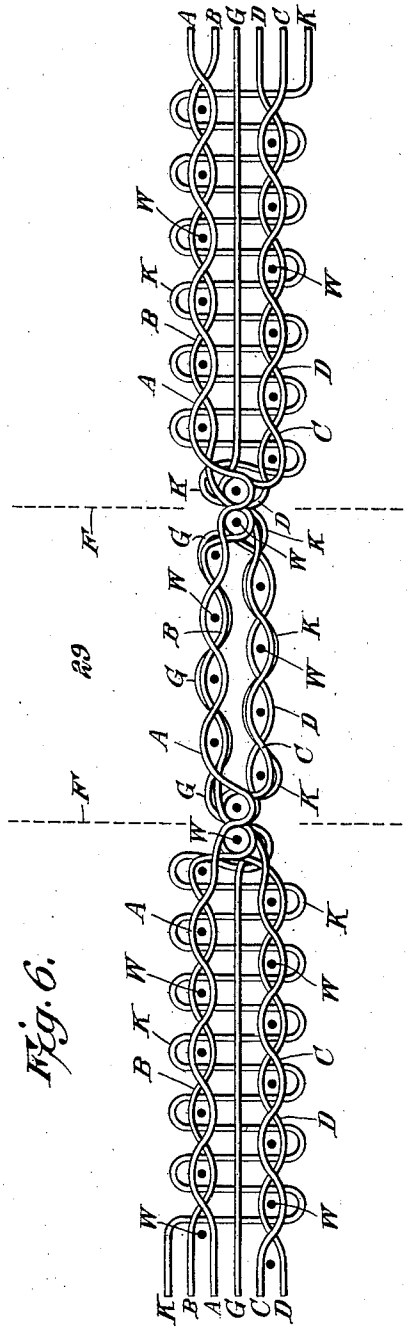


Fig. 6.

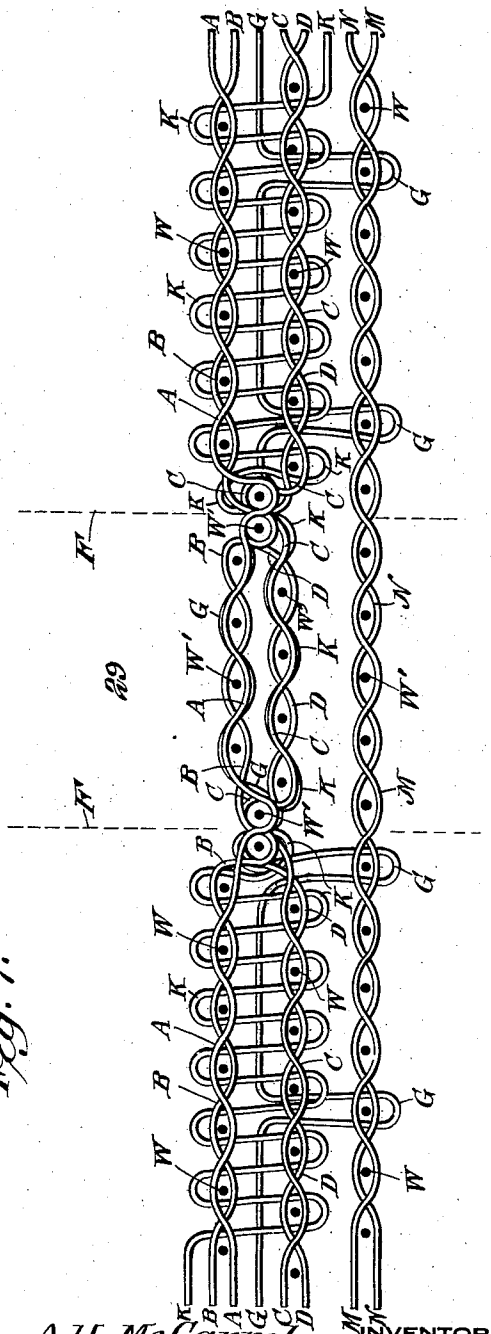


Fig. 7.

WITNESSES

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Patented May 19, 1925. 1,538,836

UNITED STATES PATENT OFFICE.

ARTHUR H. McCARREL, OF WASHINGTON, DISTRICT OF COLUMBIA.

WOVEN FABRIC.

Application filed June 13, 1923. Serial No. 645,180.

To all whom it may concern:

Be it known that I, ARTHUR H. McCARREL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a new and useful Woven Fabric, of which the following is a specification.

This invention relates to a fabric of special weave which is particularly designed for the manufacture of soft or semi-soft folding collars.

The object of the invention, broadly, is to enable those skilled in the art of weaving to produce suitable fabrics of a texture, design, construction, type and detail out of which a soft or semi-soft folding collar can be manufactured with economy of labor; the collar being of a turned-down or folding type formed from one blank stamped out of the special fabric, and capable of being completed in a workman-like manner, and with a desirable finish as to details.

A more specific object of the invention is to produce a firm, smooth, level fabric which will be free from any internal stresses, and which will ordinarily admit of easy and economic handling and manipulation in all subsequent processes of boiling, bleaching, drying, finishing and calendering, preparatory to the stamping of the blanks for the collars; and owing to the manner and method of weaving this special fabric the degree of curvature in the filling picks will remain constant throughout these processes.

It is a further object of the invention to produce a fabric of suitable width so that the collar patterns extend transversely of the warp, and when the collar is cut, the warp threads extend transversely of the folding line, thus producing the greatest durability along the line where the greatest wear occurs.

It is also intended to produce a fabric in which the filling threads extend in parallel arcs across the warp; and in a narrow strip across each pattern, the picks are deposited under a different weave from those elsewhere in the cloth, in order to form a slightly curved folding line of the proper curvature for the correct folding of the collar. This folding line may also be produced by a change in the filling, or both the filling and the weave may be changed.

According to one method of producing fabrics for the manufacture of collars, narrow fabrics are woven on narrow-ware looms with the conical take-up motion so as to make one side slightly longer than the other, to adapt it for the curvature of the collar. Narrow fabrics so woven assume a twisted spiral shape when doffed from the looms, and this causes extra care, trouble, waste and expense in handling throughout all subsequent processes of bleaching, calendering, drying and finishing. The weaving of such narrow-ware fabrics on the narrow-ware looms with the conical take-up motion is expensive; it is also impossible to distribute the tension uniformly across the width of the fabric; and the processes of bleaching and finishing produce strains in such fabrics which are apt to change the set of the curved folding line, which is specially woven for the manufacture of collars.

In the weaving of a flat, level, special fabric, such as is described in this application, either a standard loom with a fly-shuttle pick motion, or one with a shuttle positively actuated by rack and pinion may be used. In either case, a chain motion or dobby head is used.

In the weaving of ordinary cloth the warp threads run lengthwise thereof and the filling is beaten up by a straight reed at right angles to the length of the cloth, each pick of filling extending across the width of the cloth at right angles to the warp. In the weaving of this special type of fabric each pick of filling when beaten up and permanently set in the cloth forms a curve across the width of the cloth, the nature and extent of the curvature depending upon the shape of the reed used in weaving the same. In this special type of fabric the reed used is curved to the arc of a circle, a reed twenty-four inches long forming an arc with a middle ordinate of about one inch. The reed is preferably arranged so that the center of the circle forming the arc is in front of the loom.

In the standard fly-shuttle loom the inside surfaces of the rear faces of the shuttle boxes on each side of the loom, and the front surfaces of the reed in place are all in line and form one vertical plane; and the upper surfaces of the shuttle box plates or lay ends, and of the race plate are all in line and form one horizontal plane; so that in such a loom, when adjusted, the axes of the shuttle boxes coincide and the boxes aline with each other and with the reed and the lay. In such a loom, so adjusted, it is possible to operate with a shuttle and

without any warp thread in the loom, the shuttle traversing from box to box across the lay and parallel with the reed. In a narrow loom properly adjusted with the above described curved reed, the curve is so slight, the radius of the circle forming the same being about six feet, that it is also possible to operate the loom with the shuttle traversing properly from box to box to distribute each pick of filling, and to beat the same up properly to the fell of the cloth.

In order that the specific manner of weaving this special fabric, and the means by which the same is accomplished may be clearly understood, the same will now be described in detail in connection with the accompanying drawings, which show the preferred manner of carrying out the invention.

In the drawings:

Figure 1 is a plan view of a portion of a loom, showing a piece of fabric being woven therein.

Figure 2 is a plan view of the reed and lay detached.

Figure 3 is a front elevation of the reed.

Figure 4 is a vertical cross section through the lay, reed and cap.

Figure 5 is a plan view of a portion of the fabric, showing the collar blanks marked off.

Figure 6 is a diagrammatic view showing the course of the warp threads through a two-ply fabric woven according to my invention.

Figure 7 is a similar view of a three-ply fabric.

One form of loom on which the improved fabric may be woven is partially illustrated in the drawings and is of the fly-shuttle type comprising a lay 22, which is oscillated by means of the usual crank arms 11 from the crank shaft 12. At each end of the lay is a shuttle box 13, and the shuttle 14 is reciprocated back and forth to carry the weft thread through the shed by means of pickers 15 slidably mounted on guide rods 16 and actuated by the picker sticks 17. The warp threads 18 are actuated by the harness 19 and held in the usual manner between the wires 20 of the reed. The parts thus far described are those found in a standard fly-shuttle loom.

In adapting the loom to weave the special fabric, which is the subject of the present application, the rabbet 21 formed in the lay 22 for receiving the lower rib 23 of the reed is in the shape of an arc of about six feet radius, the center of the arc being in front of the loom and the cleat 24, which retains the reed in the lay is similarly shaped. The groove 25 in the reed cap 26 is also in the shape of an arc parallel to the rabbet 21, and receives the upper rib 27 of the reed. Thus it will be seen, that when the reed is secured to the lay the wires 20 will form the elements of a cylindrical surface, having a radius of about six feet, and the picks, as they are beaten up to the fell of the cloth, as shown at 28, will extend across the fabric in a series of parallel curves, while the warp threads 18 are all straight and run lengthwise of the fabric. For a fuller discussion of the modifications in looms by which the special fabric may be woven reference is made to my co-pending application on improvements in looms filed June 13, 1923, Serial Number 645,179.

By means of the chain head or dobby head of a loom in combination with the multiplier motion, and the standard methods of shifting from one dobby pattern to another, all of which are supplied on looms of this type, as will be clearly understood by those skilled in the art of weaving, the special fabric may be woven to produce a successive reproduction of duplicate patterns each of which is of sufficient dimensions and shape for the production of one stamped collar blank for the manufacture of one collar. These successive patterns consist of a predetermined number of picks woven in a predetermined manner, as will be more fully explained hereinafter. Each weave is periodically changed to form a narrow strip 29 of a distinctive weave formed by a change in the manner of shedding the harness, or if desired; by changing the character of the filling yarn, which may be brought about by the shifting of the shuttle boxes; or by a change in both weave and filling.

Each pattern is of sufficient size to permit the cutting of a collar blank, as indicated by the line 30 in Figure 5. This collar blank, as will be noted, is cut across the fabric so that the narrow strip 29 of distinctive construction forms the line on which the collar is to be folded and the warp threads run transversely of the collar and of the folding line. It will be understood, therefore, that since there are considerably more warp threads to the inch than there are filling threads, the collar on the folding line where the greatest wear occurs will be more durable than if the fold ran lengthwise of the fabric. The narrow strip 29 is also woven in a manner which facilitates the ready folding of the collar along this line.

The principles which govern the weaving of these patterns will be understood from Figures 6 and 7. A fabric woven as indicated in Figure 6 includes an upper ply formed by the warp threads A and B, woven one up and one down, and filling threads W, and a lower ply consisting of warp threads C and D and filling threads W woven in a similar manner. These two plies are bound together by binding threads K, and between them run the gut threads G. When

it is desired to change the weave to form the narrow strip 29, the harness is shifted in a different manner so that each binding thread K runs with a warp thread C, and each gut thread G runs with a warp thread B, thus offering less resistance to the folding strain than is offered by a fabric in which the binding thread runs above and below the successive filling threads W of each ply. A different filling thread also may be used for this folding strip if desired as indicated at W′ in Fig. 7, this being obtained by a shifting of the shuttle boxes in a well known manner. In this manner a special folding strip is woven between the dotted lines F in Figures 6 and 7.

In the diagram shown in Figure 7, the normal weave consists of an upper two-ply cloth woven from the warp threads A, B, C, D, G and K and filling threads W, in the same manner as the fabric shown in Figure 6, and also includes a single plain cloth woven from the warp threads M and N and filling threads W. The upper and lower cloths are entirely separate from each other except that periodically the gut thread G is dropped down into the lower fabric for one pick to spot-bind the two cloths together. The special folding strip in this fabric is woven in the same manner as in Figure 6 with the gut thread following the thread A, and the binding thread following the thread C while the threads M and N of the lower cloth continue in the same manner as before.

The style of weave illustrated in Figure 7, in which the two-ply upper cloth is woven separately from the single plain lower cloth except for the spot-binding effected by the gut thread G, is designed for a special purpose. The binding stitches of the gut thread will be close enough to give the fabric the appearance of the usual three-ply fabric in which the several plies are all closely bound together, but it has the advantage that by running a sharp knife around the edge of the fabric between the upper and lower cloths the gut threads G may be severed to separate the two cloths, and the edges may then be turned inwardly and hemmed without whipstitching and without tape, and both sides will have a finished appearance. For a fuller exposition of this feature, reference may be had to my co-pending application for improvements in collars filed June 13, 1923, Serial Number 645,178, Patent Number 1,538,835.

In each of the illustrations shown in Figures 6 and 7, the special folding strip forms a hinge line on which the collar may be folded, and since this line extends across the fabric in the arc of a circle, it follows that the collar is naturally folded on this line to the proper shape without setting up any internal stresses. It is to be understood that these different weaves are shown merely for the purpose of illustration, and that it is within the skill of the weaver to devise many other weaves by means of which the principles of the invention may be carried out. It is my intention to include all such modifications which come within the scope of the appended claims.

What is claimed is:

1. As an article of manufacture, a flat level closely woven multiply fabric for collars in which the warp threads run straight along the length of the fabric and the successive filling threads describe a succession of uniform continuous arcs of equal radii, each extending from selvage to selvage of the fabric.

2. As an article of manufacture, a closely woven multiply fabric for collars in which the warp threads run straight along the length of the fabric and the filling threads describe a succession of uniform continuous arcs of equal radii, each extending from selvage to selvage of the fabric, said fabric having narrow transverse arcuate strips occurring periodically and having a distinctive weave, each of said strips continuing for the distance of a predetermined number of picks.

3. As an article of manufacture, a multiply fabric comprising successive repetitions of a pattern, each repetition being of sufficient size and proper shape to form a collar blank transversely of the fabric, and having a narrow arcuate strip extending from selvage to selvage of the same strength and more flexible than the remainder of the pattern, whereby to form a fold line for the collar.

4. As an article of manufacture, a fabric having superposed layers, one layer having a gut thread which is periodically sunk into the other layer to bind two layers together, said layers being otherwise separate, whereby they may be entirely separated by cutting the gut thread at the points where it passes from one layer to the other.

5. As an article of manufacture, a flat level fabric with straight parallel warp threads and filling threads which are permanently set so as to describe a succession of uniform continuous arcs of equal radii extending from selvage to selvage of the fabric, said fabric having an arcuate fold portion of distinctive weave extending transversely thereof and coinciding with certain of the filling threads.

6. As an article of manufacture, a straight level closely woven multiply fabric for collars, having a fold line in the form of a continuous uniform arc extending from selvage to selvage of the fabric, and of greater flexibility but not weaker than the rest of the fabric.

7. As an article of manufacture, a closely woven multiply fabric suitable for the man-

ufacture of one-piece turned-down collars, having a narrow curvilinear fold line extending in the form of a continuous uniform arc transversely across the entire width of the fabric, said fold line being developed by a change in weave during the insertion of the picks constituting said fold line.

8. As an article of manufacture, a closely woven multiply fabric suitable for the manufacture of one-piece turned-down collars, having a narrow curvilinear fold portion extending in the form of a continuous uniform arc transversely across the entire width of the fabric, said fold portion being developed by the use of a special filling thread of different character and different weave than that in the remainder of the fabric.

9. As an article of manufacture, a straight flat level multiply fabric for the manufacture of one-piece turned-down collars, in which the warp threads are under constant tension throughout the fabric, said fabric having a fold line extending in the form of a continuous uniform arc transversely across the entire width of the fabric, said line being of different weave and more flexible than the remainder of the fabric.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

ARTHUR H. McCARREL.