June 17, 1924. 1,498,248

G. STIBBE

KNITTED WELT AND METHOD OF MAKING SAME

Filed Nov. 7, 1919 4 Sheets-Sheet 1

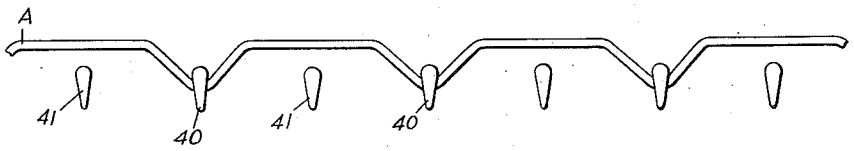


FIG. 1.

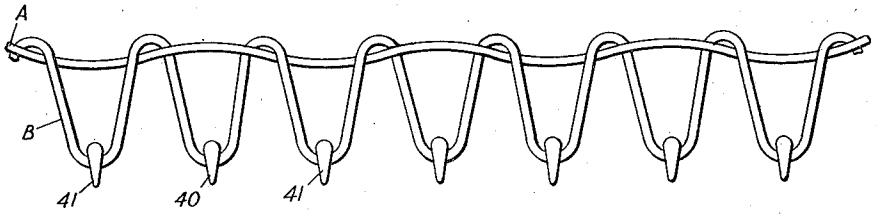


FIG. 2.

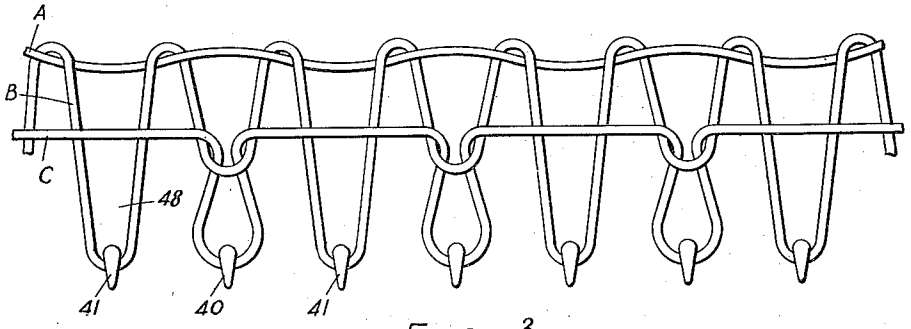


FIG. 3.

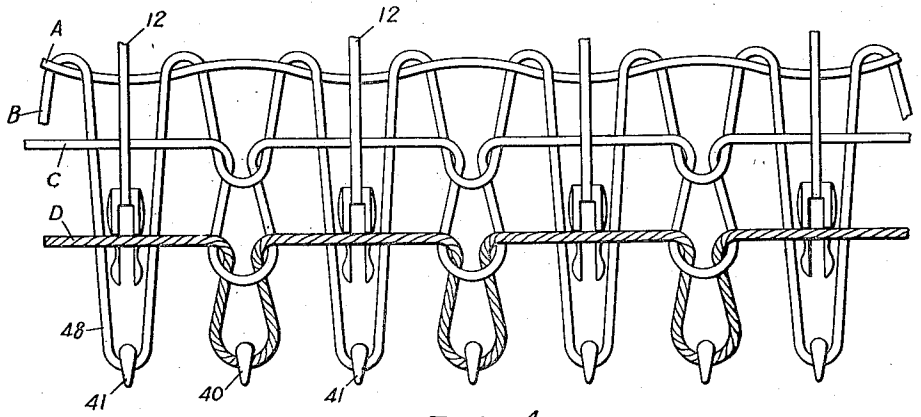


FIG. 4.

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KNITTED WELT AND METHOD OF MAKING SAME

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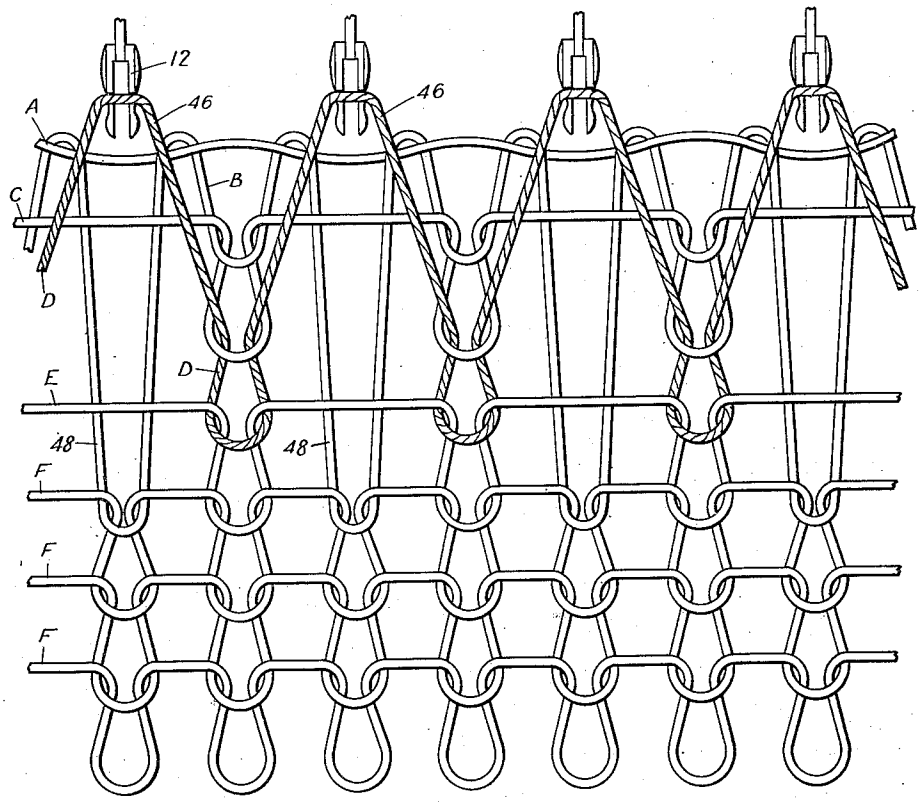


FIG. 5.

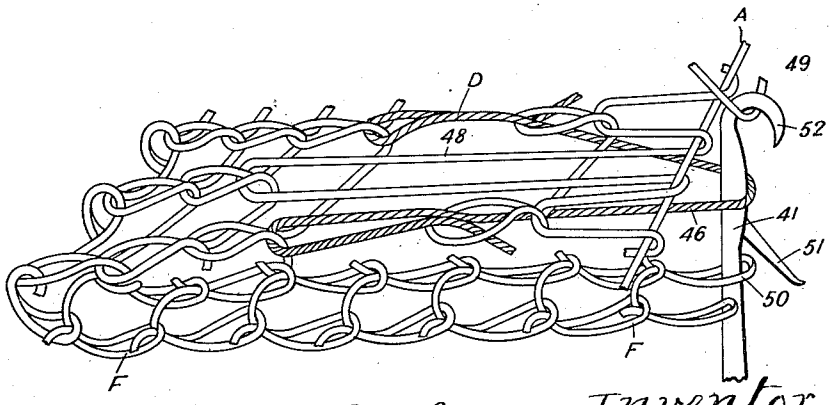


FIG. 6.

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KNITTED WELT AND METHOD OF MAKING SAME

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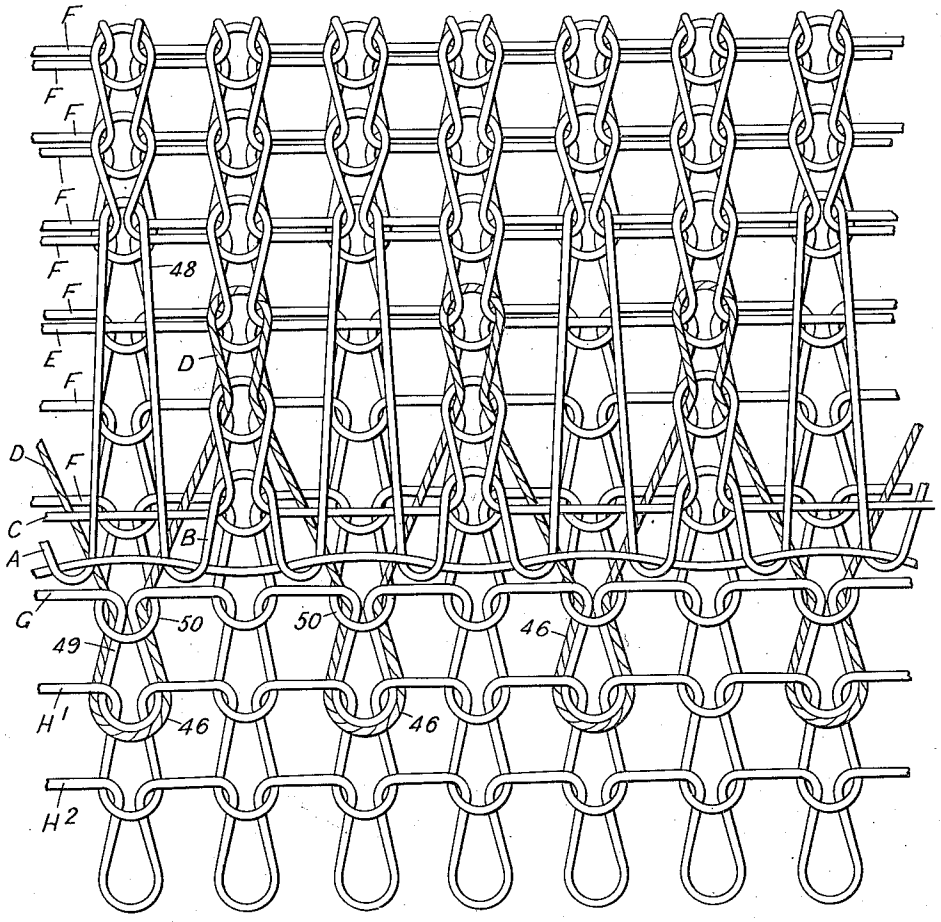


FIG. 7.

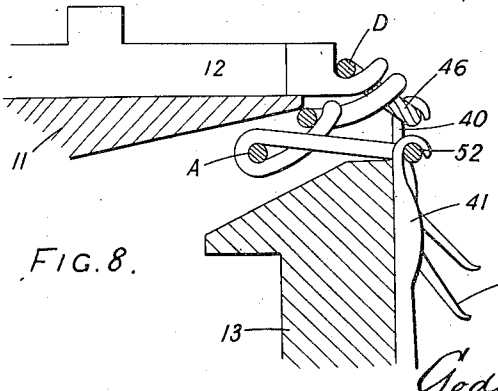


FIG. 8.

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KNITTED WELT AND METHOD OF MAKING SAME

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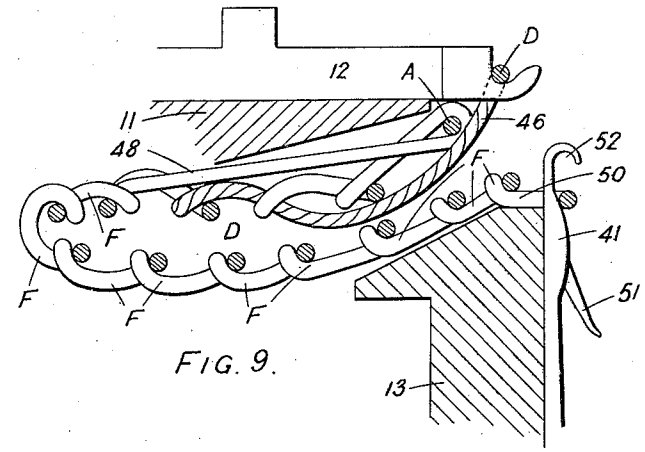


FIG. 9.

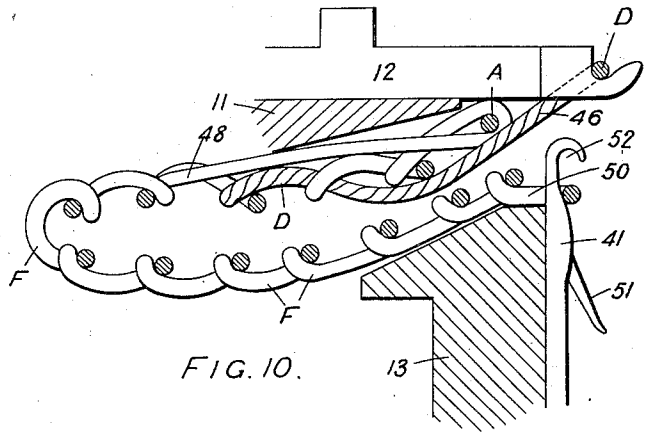


FIG. 10.

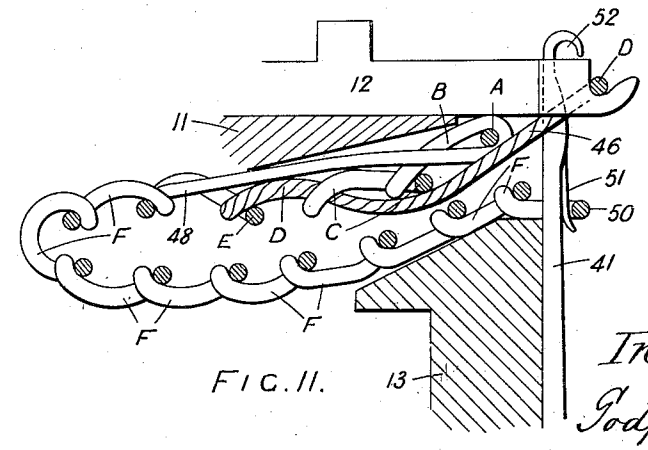


FIG. 11.

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Patented June 17, 1924. 1,498,248

UNITED STATES PATENT OFFICE.

GODFREY STIBBE, OF LEICESTER, ENGLAND.

KNITTED WELT AND METHOD OF MAKING SAME.

Application filed November 7, 1919. Serial No. 336,438.

To all whom it may concern:

Be it known that I, GODFREY STIBBE, a subject of the King of Great Britain, residing at Leicester, in the county of Leicester, England, have invented certain new and useful Improvements in or Relating to Knitted Welts and Methods of Making Same, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to knitted welts and the method of producing the same on a circular knitting machine, and has reference more especially to the formation of seamless welts on stockings.

The invention concerns the formation of what is known as an inturned welt, produced on a circular knitting machine, such as a seamless hose machine, by the known method which consists in holding up on a circular series of instruments situated inside the needle circle, the loops of one of the initial course of a tubular fabric while the welt fabric is formed on the cylinder needles, and then transferring said held up loops to the cylinder needles so that when knitting proceeds they become united or connected to the main fabric thus completing the turned welt.

The present invention has for its object the production of an improved welt of the character above referred to, one feature being the avoidance of any overlapping in the region of the commencement and termination of the joining or connecting course, while a further feature, and one which I believe to be entirely novel in the formation of a turned welt, is the joining of the turned welt fabric to the main fabric by a course of loops which are interknitted with loops of the main fabric as contradistinguished from turned welts made according to methods hitherto used which result in a welt wherein the loops of the connecting course are merely caught by or linked on to the loops of the main fabric, and thus form a somewhat loose connection.

The invention consists of a knitted inturned welt of the kind herein referred to characterized by the feature that the loops of one of the initial courses of the welt fabric together with loops of the first course of the main fabric are drawn through loops in the last course of the welt fabric.

In previous methods of welt formation the loops of the joining course, that is the course which is held up by the retaining instruments during the knitting of the welt fabric and afterwards transferred to the cylinder needles, have been connected to the main fabric merely by the drawing of a new loop of yarn through them. The important and distinguishing feature of the present improved method is that the loops of the joining course are drawn, in company with the new loops of yarn, through the old loops on the needles and therefore become interknitted with the main fabric, in addition to which at the next course they form tuck loops (as will be described later herein) which is a valuable feature in so far as such course serves to prevent running back. This method of joining up the welt also produces a union which is not only very secure but is also neat in appearance on account of the joining loops being short and firmly held. The elasticity of the welt is unimpaired as the joining loops instead of lying on the surface are absorbed into the fabric.

In the present improved method the held up loops of the joining course are, on the completion of the welt fabric, transferred to the cylinder needles in such a manner that they are left on the latter at a point remote from the old loops thereon, preferably above the belly and near the hook, so that when the needles rise they will clear the old loops (these being held down by the sinkers) but not the joining loops, the latter remaining above the ends of the latches so that upon the needles descending and taking yarn to knit, the old loops will be knocked over around the new loops and the joining loops. At the subsequent course the yarn is drawn through both the joining loop and the previously formed loop.

To effect the desired result just mentioned, I find it convenient to transfer the held up joining loops to the needles at a higher level than that at which they are laid on the retaining instruments. This difference in level may be obtained by raising the series of loop retaining instruments bodily in a manner hereinafter described.

In further describing the invention reference will be made to the accompanying drawings wherein:—

Figures 1 to 5 illustrate diagrammatically the method of forming the setting up courses and the welt fabric.

Figure 6 is a perspective view showing the

old loop and the transferred loop in their relative positions on the needle on completion of the welt fabric preparatory to joining up the welt.

Figure 7 shows the welt fabric turned over and united to the main fabric.

Figures 8 to 11 are sectional views showing successive steps in the method of holding up the setting up courses, forming the welt, and transferring the held up loops.

The figures of the drawings are drawn to an exaggerated scale in order to clearly show the loop formation. Like parts are designated by the same reference characters throughout the drawings.

For carrying out the present method for the production of the improved inturned welt, I prefer to use a circular knitting machine equipped with means such as described in my United States Letters Patent No. 1,361,291, in addition to which, further means, which will now be described, are employed.

In the present case I use an arrangement of loop retaining instruments or jacks 12 in the dial 11 comprising a section of long butted jacks, and a section of short butted jacks, and cams for projecting and withdrawing the jacks.

Also in the present case I employ a convenient arrangement wherein the dial 11 carrying the jacks 12 is capable of a limited upward and downward movement relatively to the needle cylinder 13.

The dial 11 is driven in strict unison with the needle cylinder 13 by means substantially the same as those described in the aforesaid United States Letters Patent, and the operation of forming the improved welt is as follows:—Preferably the operation is commenced on empty needles, the jacks 12 in the dial 11 being withdrawn and following an idle track. At the first revolution of the needle cylinder the alternate needles 40 (Figure 1), which are moved by jacks having butts of different length from the butts on the jacks which move the other needles are selected, and a complete round A is made so that yarn is taken by these alternate needles as shown. At the same time the dial with its jacks is moved down from its normal raised position to the low position shown in Figure 8. Following this one complete round B is made on all the needles 40 and 41 as shown in Figure 2, and then after a further half round has been made on all the needles, a complete round C is made on the alternate needles 40 as shown in Figure 3. While the last mentioned round C is being formed, the long butted jacks are caused to move out and in idly. The round of knitting C formed on the alternate needles 40 just mentioned, combines with the previously formed round B to tighten the initial courses so that loops in the subsequent course which, as will be described presently, are laid on the jacks, will be drawn tightly about said jacks and thereby rendered less liable to slip off these instruments.

In the operation of the jacks above mentioned, the long butted jacks are moved to their extreme outward position (which is the position for transfer) but said jacks are withdrawn before they reach the yarn laying position. The short butted jacks when they come around will be similarly projected. The withdrawal of the long butts will be continued but the short butts will be missed and allowed to follow a track to which they are directed so that they pass the yarn laying position in the properly projected position and receive yarn. It should be stated here that after the long butted jacks have been withdrawn the long butts will again come around and will follow the short butts and also receive yarn. Consequently, commencing with the first jack in the short butted section, the jacks take yarn in succession as they pass the yarn laying position, and during this revolution the cylinder needles 41 corresponding with the jacks are suppressed so that the course D is formed on the alternate needles 40 and the jacks 12 as shown in Figure 4. After passing the yarn laying position where they receive the yarn on their hooks, the jacks are withdrawn so that the butts follow a track which brings the jacks to a position immediately behind the cylinder needles, and as soon as the long butts have, as mentioned above, come round to a position to be so projected they will be projected to the outward position to receive yarn, but the first or subsequent jacks of the short butted section to which yarn has already been supplied will not be again projected. In this manner the loops 46 of the course D which are received on the jacks are laid without overlapping between the termination and commencement of such course seeing that, as just described, the course is started on a definite jack viz: the first in the short butted section and is completed on the jack immediately preceding the commencing jack viz: the last in the long butted section.

It may be mentioned here that after the jacks have received yarn at the feeding position they are first moved inwards as previously mentioned to a position where their hooks are situated close behind the needles and then they are further withdrawn to an inward position which will prevent them taking yarn a second time on passing the yarn laying position and will also counteract any tendency there may be for the jacks to move outwards.

During the formation of the course D just described when the jacks take loops 46 which would otherwise have been taken by

the corresponding cylinder needles 41 which as already stated remain suppressed, the dial 11 is in its low position as shown in Figure 8.

A further round E (Figure 5) is now formed on the alternate needles 40 during which the jacks, which as just described have been withdrawn, follow a retracted course and hold up their loops 46 which loops constitute the joining loops for use subsequently. In Figure 5 the jacks are shown in the retracted position holding up their loops. After the formation of the round E the dial 11 rises to an extent limited by the courses of loops D and E between the jacks and the needles the effect being that the loops 46 on the jacks are further tightened about these instruments and drawn well into the hooks to obviate accidental shedding of said loops during the subsequent knitting of the welt. A further half round is now made on the alternate needles 40, and then knitting proceeds on all the cylinder needles 40, 41 to form the welt fabric F, (Figure 5). During the knitting of the above mentioned half round on alternate needles and the welt fabric F, the dial continues to rise until it reaches its highest position (shown in Figure 9). This raising of the dial provides sufficient space between the cylinder needles and the jacks for the insertion of the blade (not shown) which forms the fold in the welt fabric as it is produced.

It may be observed here that the cylinder needles 41 which operated during the second revolution and took yarn in forming the row B (Figure 2) and which needles during the formation of the subsequent rows C, D and E were suppressed and consequently retained their loops 48 as shown in Figures 3 and 4, come into action again during the formation of the first of the welt rows F so that at this stage the retained loops 48 become knitted as shown in Figure 5. While the knitting proceeds on all the cylinder needles 40, 41 to form the welt fabric F, the jacks remain retracted and the dial remains in the raised position as shown in Figure 9. Upon completion of the welt fabric F, and while the dial still occupies its high position, the projecting and withdrawing cams are moved to the "half in" position with the result that at the next revolution the long butted jacks are first projected and then withdrawn and the short butted jacks following the long butted jacks will be similarly projected and withdrawn. While the jacks are in the projected position the corresponding cylinder needles 41 which, during the outward movement of the jacks, are deflected below the level of said jacks, rise between the limbs of the bifurcated heads of the jacks and consequently through the loops 46 held by the jacks as shown in Figure 11. Then when the jacks are withdrawn, their loops 43 are left on the needles as shown in Figure 6, the withdrawing cam directing all the butts to the original idle track where they remain during the subsequent operation of the machine. A complete round G (Figure 7) is now knitted on all the needles 40, 41 during which revolution the needles 41 which have received the loops 46 from the jacks after rising to clear the old loops draw the loops 43 together with the new loops 49 of the course G through the old loops 50 on their stems (i. e. the loops 50 in the last welt course F) thus joining the welt as shown in said figure. The course G constitutes the first course of the main fabric and knitting now proceeds on all the needles to form the main fabric further courses of which are shown at H^1, H^2, the course H^1 being the tuck course previously referred to.

It is an important feature of the invention that the process of transferring the held up loops 46 from the jacks to the cylinder needles 41 is done in such a manner that the said joining loops are deposited on the needles in a position where they will remain above the latch 51 whereby upon descent of the needle to knit, the loop 46 will be engaged by the needle hook 52. This is clearly shown in Figure 6 by which it will be seen that upon the needle descending, the hook will take the new loop 49 and the joining loop 46 and draw them together through the old loop 50 thus knitting the loop 46 with the loop 49 into the main fabric as represented in Figure 7.

The herein described feature of changing the position of the dial relatively to the needles is an important one as it not only enables the held up loops to be deposited in a high position on the cylinder needles for the purpose stated, but by placing the dial in the low position during the laying of said loops, the loop retaining instruments are brought close to the cylinder needles thus enabling the said loops to be made comparatively short in length thereby ultimately contributing to the production of a neat and compact joining of the welt fabric to the main fabric.

With regard to the setting up of the initial courses hereinbefore described, it may be stated that while the method referred to is a convenient one the invention is not to be limited in this direction as the formation of these courses and also the courses following the laying of the loops on the jacks may be varied if desired. Further, with regard to the half rounds referred to in connection with the courses preceding and following the laying course, it may be mentioned that these are not essential to the welt but are more for convenience in getting the cams into and out of action and therefore they

are not shown in those figures of the drawings representing the setting up and welt courses.

What I claim then is:—

1. A knitted inturned welt of the kind herein referred to distinguished by the feature that the loops of one of the initial courses of the welt fabric together with loops of the first course of the main fabric are drawn through loops in the last course of the welt fabric, substantially as described.

2. A knitted inturned welt of the kind herein referred to, wherein the loops of a joining course, constituted by one of the initial courses of the welt fabric, together with loops of the first course of the main fabric are drawn through loops in the last course of the welt fabric, the said joining course being formed without overlapping in the region of its commencement and termination, substantially as herein described.

3. The method of producing the knitted welt herein described, wherein a suitable number of initial courses are first set up, a joining course of loops is then laid on alternate cylinder needles and a series of loop retaining instruments, the welt fabric is then knitted while the said instruments hold up their loops, and the said held up loops are then transferred to the cylinder needles, distinguished by the feature that the said transferred loops together with new loops are then drawn through the loops of the last welt course, substantially as described.

4. The method of producing the knitted welt herein described, wherein a suitable number of initial courses are first set up, a joining course of loops is then laid on alternate cylinder needles and a series of loop retaining instruments and the welt fabric is then knitted while the said instruments hold up their loops, distinguished by the feature that the said held up loops are then transferred to the cylinder needles in such a manner that they are deposited on the latter in a position where they will remain above the latches of the needles and above the old loops on said needles so that upon the needles descending to knit, the old loops will be knocked over around the new loops and the joining loops, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GODFREY STIBBE.

Witnesses:

R. W. C. TAYLOR,

GEORGE LESTER.