Our invention relates to an improved method of mending the broken thread in reknitting or repairing runs in hosiery or other knitted goods; and it is more particularly adapted to the final fastening of reknitted runs in knitted fabrics, such as hosiery and other knitted articles.

Different methods have been employed for effecting this final fastening of the reknitted run. They may be divided into two classes:

1. Methods requiring stitching or sewing of either the entire break or a part of it, and
2. Methods of returning the broken threads to their original loops as a part of the reknitting process with a hook needle, the fabric being held over one or more fingers, said hook needle being employed for the reknitting as well as the relooping or mending.

The first method, which is the one generally used commercially, is objectionable because of the impossibility of making the stitching or sewing invisible even though the restored run itself might not be discernible to the eye.

The second method being practically a part of the hook needle reknitting method is too slow for commercial value.

Our improved method overcomes the objectionable features of the first method and improves the second one by increasing the speed with which the operation can be accomplished, whereas heretofore the mend of the broken thread or threads has been either unsightly or accomplished too slowly to be of commercial value. Our improved method of mending eliminates both of these objections.

The accompanying drawings represent the different stages of the mending operation, progressively, from the original break to the complete repair of the run, and thus:

- Fig. 1 is a view illustrating a piece of knitted fabric, such as hosiery, merely showing a break in a loop preceding a run;
- Fig. 2 shows the start of the run in one direction;
- Fig. 3 shows the run progressing in both directions from the break;
- Fig. 4 illustrates the run progressing still further, with a single run in one direction, and a typical double run in the opposite direction.

- Fig. 5 is a view showing a latch needle in the final loop of a reknitted run just prior to being inserted from the bottom, into the nearest half-loop while holding the final loop of the reknitted run on its latch and shank;
- Fig. 6 shows the needle pushed into this half-loop until the latter clears the latch, the needle reaching out and hooking the broken end to return it to both the said half-loop and the last loop of the reknitted run;
- Fig. 7 shows the latch closed and the needle drawing the thread through the loops;
- Fig. 8 is a view showing this broken end after it has been returned to the half-loop, and drawn into the last loop at the end of the adjacent run where it has been left as a means for holding that loop which has now become a half-loop, while the needle has been used to reknit the next adjacent run preparatory to restoring the other broken end to a similar position at the other or adjacent side of the one in which the first end has been left;
- Fig. 9 shows the needle drawing the other broken end through the nearest half-loop and the last loop of the reknitted run, the loops on the needle closing its latch to bridge the hook;
- Fig. 10 shows the needle in the last loop of the reknitted single run, reaching out for the two ends, each of which has in the meantime been drawn into its respective half-loop, which half-loops are adjacent to the last loop of the reknitted single run, i.e., one half-loop on each side of the last loop of the single run.

- Fig. 11 shows these ends being pulled through the loop, the latch of the needle having been closed by the loop;
- Fig. 12 shows both broken ends having been pulled through the last full loop preparatory to drawing one of the ends through the remaining two half-loops;
- Fig. 13 shows the final stage before the fastening or tying of the ends of the thread together, with the hook of the needle drawing one broken end through the last two adjacent half-loops;
- Fig. 14 shows the broken ends, tied together in a knot, after restoration;
Fig. 15 is a perspective view showing the fabric stretched over a holder and in process of having a run mended; and

Fig. 16 is a sectional view through the same. The letter A represents a small piece of knitted fabric, in which adjacent threads are joined by a series of loops. As is well understood, these loops are so interlaced, and dependent on one another, that the breaking of a thread in any one of these loops will cause a run or unraveling as the fabric is stretched, and very often there will be at least one run in one direction, and two in the opposite direction from the hole as a result of the break.

A run results from a break in the thread.

Fig. 1 is a view illustrating the original break in the thread, preceding a run. The two ends are indicated by the numerals 1 and 2.

In Fig. 2, the loop thus broken has pulled entirely apart, due to the stretch of the fabric, and has disappeared, having pulled out of, and released, the loop 3, which, as the run in that direction progresses, pulls out of loop 4, which loop in turn pulls out of loop 5, and loop 5 out of loop 6, and so on, in one direction, from the break and hole first formed.

A further stretching of the fabric and the pulling of the broken ends is illustrated in Fig. 3, in which the end 1 has just left the loop 7 on the opposite side of the hole or break. In Fig. 4, this end 1 has also pulled out of the loop 8, leaving it a half-loop, and the end 2 has pulled out of the loops 10 and 9, leaving the latter a half-loop, and the adjacent loops 7 and 10 have been pulled out into the straight cross-thread 11 of a double run just started. The next two loops 12 and 13 are just ready to pull out of the loops 14 and 15 to form another cross-bar of a so-called "ladder."

Meanwhile the loop 3 in the opposite direction or on the opposite side (see Fig. 2) has become a cross-thread or bar 5' (see Figs. 3 and 4), and the loop 4 (of Fig. 2) a cross-thread or bar 4' (see Figs. 3 and 4), and the loop 5 is just about to leave the loop 6 (in Fig. 4).

The foregoing figures illustrate a typical break and the start of a run, which, of course, might extend on indefinitely, or throughout the length of the fabric, and often does, but the foregoing figures will serve to illustrate a typical condition which is to be met and dealt with in the operation of our improved method, with the final result that an invisible mend is rapidly and effectively produced.

The remaining figures of the drawings progressively illustrate in consecutive order the final mend of a reknitted run, and the method by which this mend is made.

B represents any kind of latch needle or needle with means of bridging the hook while being pulled through a loop. Any other instrument or tool may be used in place of the needle which is suitable for the purpose.

On starting the repair of a run, after stretching the fabric over any suitable holder, preferably an egg-cup or the like, as shown at C in Figs. 15 and 16, the first thing the operator does is to take hold of the broken ends 1 and 2, and give them a slight pull in order to prevent further runs and also to provide sufficient length of these ends to be pulled through the final loops with a latch needle to make the final mend. This has the same effect that a snag or pulled thread has, but this is a temporary expedient, and the last step is to re-distribute the loops to restore them to their original place by means of a snagger, or other suitable straight or hooked instrument.

The operator, while stretching the fabric over a suitable holder, proceeds to reknit one run at a time, preferably with a latch needle, and where there is a double run as indicated in one direction in Fig. 5, the operator usually chooses the shorter one, if there is a difference in length; and, in the instance illustrated, we shall assume the one chosen has been reknitted, and the last loop 7 is still on the needle as shown in that figure.

The next step is to return the broken end 1 to its original positions in the adjacent half-loop 8 and the loop 7, which are still on the hook. In order to do this, the operator manipulates the needle B somewhat as shown in Fig. 6, and while still holding the loop 7 thereof reaches from beneath up through the half-loop 8 and, after pushing needle B through the loops 7 and 8 until they clear the latch, he grasps the broken end 1 of the thread with the hook. The needle B is then rapidly withdrawn, as indicated by the arrow in Fig. 7, the loop 8 automatically closing the latch, which latch bridges the hook and forming an eye in which the end 1 is disposed. The end 1 is pulled back through the half-loop 8, and then through the half-loop, as we term it, of loop 7, and there the end 1 is left, as the hook of the needle B slides off the end 1. This disposition of the end 1 of the thread is shown in Fig. 8.

The operator now reknits one of the other runs, for example the adjacent run, and in Fig. 8 the needle is shown in the last loop 10 of this run, and while this loop 10 is still on the needle, the hook on the needle is inserted through the half-loop 9 adjacent thereto and the end 2 of the thread is grasped by the hook and is drawn successively through the half-loop 9 and through the loop 10, as shown in Fig. 9, making the latter a half-loop; and there it is left temporarily until the run in the opposite direction is reknitted.

By half-loop we mean a loop that is incomplete and has only one instead of both leads of the thread in it. A single thread in one of these loops or stitches will stop the run. Consequently, when the two runs have reached the stage just...
described they are held temporarily against further ravelling.

The operator now proceeds to reknit the single run in the opposite direction, in the same manner as shown in Figs. 5 to 9, and as above described. As a matter of convenience, in doing this, the position of the fabric is preferably reversed on the holder, or the fabric and holder turned 180 degrees.

The operator then proceeds to insert the needle in the last loop at the distant end of the remaining run and reloops or reknits the successive ends as above assume that this has been done until the loop 5 (see Fig. 4) has been formed by drawing the thread through the loop 6. Loop 5, being on the needle, thread 4' is picked up and drawn through loop 5, forming loop 4 (Fig. 2) as loop 5, having cleared the latch, has been cast off when the needle was withdrawn with the latch closed. This leaves loop 4 in the hook of the needle. The needle is next inserted into the fabric, loop 4 sliding up the shank to clear the latch. When the needle is withdrawn, thread 3' is caught in the hook and loop 3 is formed (Figs. 2 and 10) in a manner similar to the formation of loop 4. Loop 3 is still on the needle, and as there are no more broken threads, the loops in all of the runs are now reknitted except for the final mend.

The operator pushes the needle through the loop 3 to clear the latch as shown in Fig. 10, and heaves the ends 1 and 2 of the broken thread; the end 1 having previously been drawn through loops 7 and 8 into the half-loop 17, and in so doing completing a loop 17 as well as 16, as viewed in Fig. 10; the end 2 having previously been worked in the same manner on the opposite side. The needle is then withdrawn from loop 3, pulling the ends 1 and 2 through loop 3 where they are temporarily left, as shown in Fig. 12, thereby forming a full loop of loop 3.

The operator now removes the needle and inserts it through the last remaining half-loops 7 and 10, passing said loops over the latch, and grasps the end 2 in the hook, where it is enclosed by the closing of the latch, as shown in Fig. 13, and then, the operator pulls the end 2 of the thread through both of said half-loops 7 and 10, thus completing those loops. The ends 1 and 2 of the thread are then tied together in a knot 18, as shown in Fig. 14, or they may be otherwise fastened together.

This knot is made as tight and small, and with the use of as little of the thread, and as near the very ends, as possible; and any excess thread beyond the knot may be cut off with a pair of scissors and the knot tucked inside. The operator then takes a snagger or other instrument and restores the drawn threads (caused by initially pulling these ends out to the required length) to their normal position, and the mend is completed, and is for all ordinary purposes entirely invisible.

The operations herein above described are preferably made while stretching the fabric over a suitable object which permits manipulation with the hand not occupied with the needle; said manipulations and movements of the fabric assisting in the rapid accomplishment of the mending operation.

Although we have illustrated and described a method in which the operator reknits the double run first, and then the single run, it should be understood that the operator sometimes completes one of the double runs, and then, turns the fabric around and reknits the single run, and by another turn of the goods proceeds to complete the job by reknitting the second of the double runs. The experience of the operator dictates the order in which the runs should be reknitted, this depending very largely on the character of the break and the run, and the exercise of the operator's best judgment.

While we have only shown and described a method of repairing a double run and a single run running in opposite directions, the same principle applies where there are more runs, for instance as many as four or five or any number of runs for that matter.

Also the same method is employed where more than one thread is broken, although we have only described a single break. Where more than one thread is broken, the ends of all but one thread are slightly pulled, fastened to each other and snagged back or restored to their original positions.

We claim:
1. A final repair of a run in hosiery or other knitted goods by fastening the thread ends directly together by means of a latch needle for the combined operation of reknitting and mending the break in the thread.
2. A final repair of the broken thread of a run in hosiery or other knitted goods by bringing the ends directly together by a latch needle, and fastening said ends together without the use of additional thread or material.
3. A final repair of a run in hosiery or other knitted goods without the use of additional thread or material, comprising using a latch needle in reknitting the run and restoring the loops of the run and the broken ends to their original positions, and finally bringing the ends together in the form of the final loop in the reknitted fabric and permanently fastening said ends directly together.
4. A mend in knitted fabric in which the unraveled loops are reknitted and the broken ends are restored to their original positions, all, by a latch needle and said broken ends are fastened directly together.
5. An improved method of repairing runs in knitted goods, which consists in succe -
sively threading the severed ends of the thread, which caused the run, into the loops, where they originally belonged, all, by a latch needle, and finally fastening their ends directly together.

6. An improved method of repairing runs in knitted goods, which consists in reknitting each run, drawing a broken end of the thread into the last loop, forming a half-loop, then successively reknitting any additional runs, drawing one of the broken ends into the last loop to form a half-loop, drawing the broken ends into any remaining half-loops, thus returning said ends to their original positions, all, by the use of a latch needle, and finally fastening the broken ends together.

7. A final repair of a run in hosiery or other knitted goods by fastening the thread ends directly together comprising stretching the goods over a suitable holder other than the operator's fingers, for the combined operation of reknitting and mending the broken thread.

8. A final repair of the broken thread of the run in hosiery or other knitted goods by stretching the goods over a suitable holder other than the operator's fingers, and bringing the ends directly together without the use of additional thread or material.

9. A final repair of a run in hosiery or other knitted goods without the use of additional thread or material comprising stretching the goods over a suitable holder, other than the operator's fingers, reknitting the run, restoring the loops of the run and the broken ends to their original positions, and finally bringing the ends together in the form of the final loop in the reknitted fabric and permanently fastening said ends directly together.

10. A mend in knitted fabric in which the unraveled loops are reknitted and the broken ends are restored to their original positions, all, while stretching over a suitable holder other than the operator's fingers, and said ends being fastened together.

11. An improved method of repairing runs in knitted goods such as silk hosiery or the like, comprising stretching the goods over a holder, successively threading the severed ends of the thread which caused the run into the loops where they originally belonged, and finally fastening the ends directly together.

12. An improved method of repairing runs in knitted goods such as silk hosiery or the like, comprising stretching the goods over a holder, reknitting each run, drawing a broken end of the thread into the last loop forming a half-loop, then successively reknitting any additional runs, drawing one of the broken ends into the last loop to form a half-loop, thus returning said ends to their original positions, and finally fastening the broken ends together.

13. An improved method of restoring runs in knitted fabrics, which consists in stretching the goods over a holder, and while stretching inserting an instrument or tool into a loop of a run, reknitting the run with the instrument or tool, then drawing one of the broken ends into the last loop while held on the instrument or tool, reknitting any other run or runs, successively drawing the broken ends of the thread to their original positions, and finally fastening the ends directly together.

14. An improved method of restoring runs, which consists in stretching the broken fabric over a holder, drawing out the broken ends to afford sufficient length to work with, reknitting the several runs while stretching the goods over the holder, successively drawing one of the broken ends into the last loop by the aid of the hook of the needle while withdrawing the needle from the loop, thereby restoring the ends to their original positions, and finally fastening the ends together to form the final loop.

15. An improved method of restoring runs, which consists in stretching the broken fabric over a holder, drawing out the broken ends to afford sufficient length to work with, reknitting the several runs while stretching the goods over the holder, successively drawing one of the broken ends into the last loop by the aid of the hook of the needle while withdrawing the needle from the loop, thereby restoring the ends to their original positions, and finally fastening the ends together to form the final loop, and then re-distributing the threads, which were brought under tension in originally pulling the ends out, to their original positions.

16. An improved method of repairing runs in knitted goods, comprising successively threading the severed ends of the thread which caused the run into the loops, where they originally belonged while stretching the goods over a suitable holder other than the operator's fingers, and finally fastening the ends directly together.

17. An improved method of repairing runs in knitted goods, comprising successively threading the severed ends of the thread which caused the run into the loops, where they originally belonged, while manipulating the goods, and finally fastening the ends directly together.

18. An improved method of repairing runs in knitted goods, comprising successively threading the severed ends of the thread which caused the run into the loops where they originally belonged, while stretching and manipulating the goods, and finally fastening the ends directly together.

19. An improved method of repairing runs or ravelings in a fabric comprising stretch-
ing the fabric over a suitable holder, inserting a latch needle through a loop formed in the run or raveling, continuing this movement on through the fabric while holding the needle laterally out of alignment with the run or raveling until the loop has slid back over the latch, then reversing the movement of the needle through the loop, catching the next forward thread in the hook while the loop is being pulled over the latch causing the latch to close over the thread, and the loop to be cast off over the end of the needle, the thread caught in the hook thereupon forming a new loop, taking the place of the first-mentioned loop, then reinserting the device into the fabric as before, and repeating the operation until the run or raveling has been repaired, and finally bringing the broken ends together and fastening said ends directly together by the needle.

In testimony whereof we have affixed our signatures.

CAROLINE R. DUNN.
ALICE E. RAHN.