Jan. 26, 1954 E. ST. PIERRE ET AL 2,667,053

MECHANISM FOR DOUBLE SOLE TRIMMING

Filed May 20, 1952

3 Sheets-Sheet 1

FIG. 1.

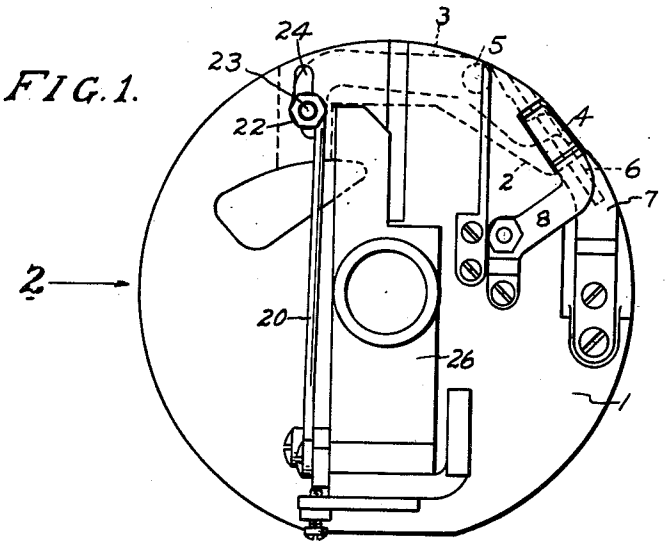
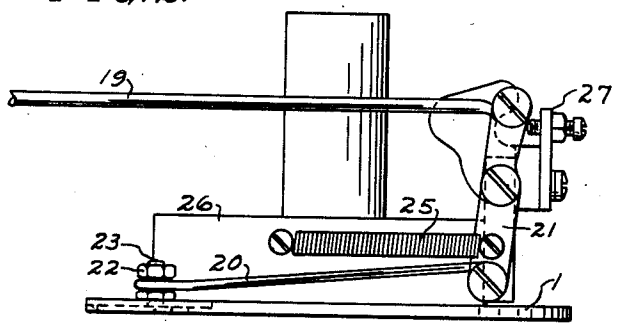


FIG. 2.



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FIG. 3.

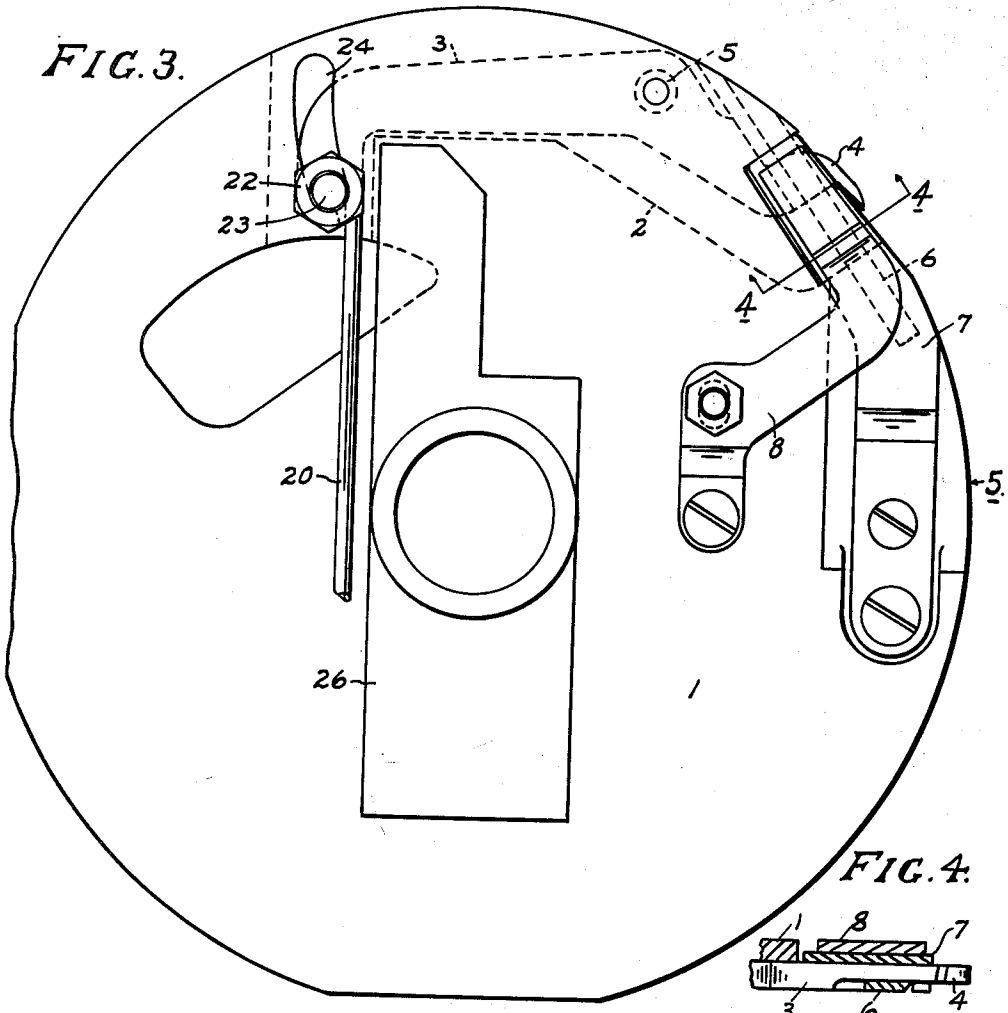
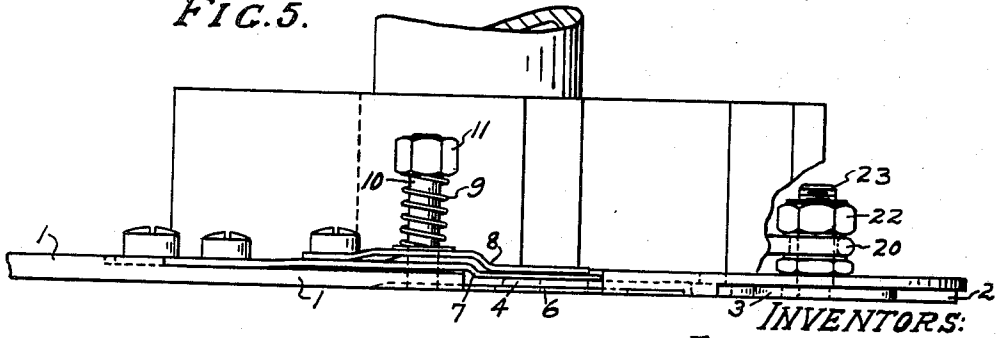


FIG. 4.

FIG. 5.



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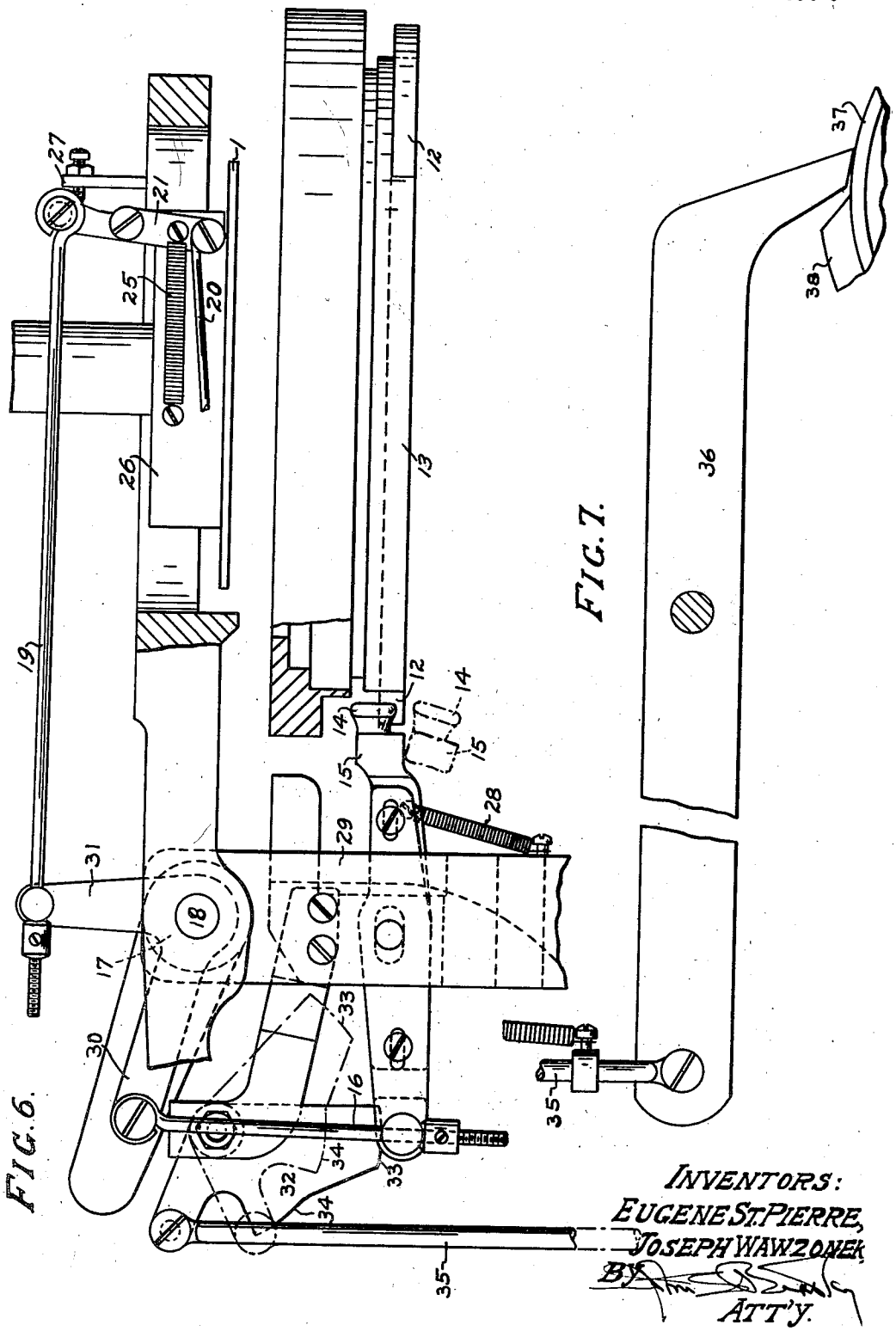


FIG. 6.

FIG. 7.

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MECHANISM FOR DOUBLE SOLE TRIMMING

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6 Claims. (Cl. 66—134)

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This invention relates to circular, independent needle, knitting machines of the dial type. It is particularly concerned with cutters and binders for trimming double sole hosiery knit on such machines and their method of operation.

There are two general types of double sole hosiery, the reinforced sole and the cushion sole. The reinforced sole has an auxiliary yarn knit with the main yarn into the bottom half or sole area of the foot. In the cushion sole, the auxiliary or second yarn is likewise knit in the sole area but with longer sinker loops than those knit by the body yarn. These longer loops produce the cushion or terry effect.

In either type, the foot is knit by the body yarn being fed to all the needles of the rotating cylinder. The second yarn is fed only to the needles that knit the sole portion of the hosiery. This can be accomplished by floating the yarn across the instep needles and later trimming away the floats, but to do so involves a waste of yarn, and the increased cost in labor and time of an extra cutting operation after the knitting is completed. As an alternative, the second yarn can be cut and bound while the machine knits on the instep needles. But ordinarily, the top of the cylinder is occupied by a dial and the cutter and binder are so positioned that at least one long loose end is left hanging inside the fabric in each course so that a subsequent trimming operation is still necessary.

A further problem is that, with a conventional binder, the ends of the second yarn on either side of the double sole portion are uneven. This is because the trimmer is located remotely from the yarn feeding point on the needle circle, thereby leaving a relatively short end on one side of the sole where the yarn is cut and bound, and a relatively long end on the other side where the yarn is pulled from the binder.

Thus, an object of the present invention is to provide a method and apparatus which will cut and bind an auxiliary yarn sufficiently close to its entering and exit points that relatively short and uniform loose ends are left on either side of the double sole.

A further object is to provide a more serviceable cutter and binder than those of the prior art, and an improved means for operating such a device.

These, and related objects are accomplished in accordance with the invention by a cutter and binder built into a recess in the dial cap and operated by a cam mounted on the rotating sinker head of the machine.

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The invention is explained by reference to the accompanying drawings in which:

Fig. 1 is a top view of a dial cap showing, in dotted lines, a cutter and binder built into an underneath recess in the cap, after the manner of the invention;

Fig. 2 is a side view of the mechanism of Fig. 1, taken from the direction of the arrow 2 of Fig. 1;

Fig. 3 is an enlargement of Fig. 1 showing, in more detail, the cutter and binder and associated mechanism;

Fig. 4 is a cross sectional view of the cutting blades, binder plate, etc., on the line 4—4 of Fig. 3 taken in the direction of the arrows;

Fig. 5 is a side view of the mechanism of Fig. 3 from the direction of the arrow 5 of Fig. 3;

Fig. 6 is a side view of the mechanism of the other figures together with the sinker head of the machine and the means for controlling the operation of the trimmer blade; and

Fig. 7 is a side view of a rocker arm and cam row by which some of the control mechanism shown in Fig. 6 may be operated.

Referring to Fig. 1, the cutter and binder assembly or "double sole trimmer" shown includes a dial cap 1 having a recess 2 in which a lever 3, having a trimmer blade 4 at one end, is mounted on a pivot 5. Across the bottom of the recess (see Figs. 1 and 3) a member 6, having a sharp cutting edge, is rigidly mounted. At the top of the recess and above the blade 4, a second member 7, having a dull or "binding" edge, is resiliently held against the blade 4 by a leaf spring 8. This also holds the blade 4 in frictional contact with the cutting member 6. The amount of pressure the leaf spring 8 exerts against the binding member 7 is controlled by a coil spring 9 (see Fig. 5) adjustably held against the member 7 by a threaded stud 10 and a nut 11. The relative positions of the cutting blade 4, the binding member 7, spring 8, and cutting member 6 are shown sectionally in Fig. 4 and also in Fig. 5.

Lever 3 is operated (see Fig. 6) through a system of rods and levers by a cam 12 mounted around the edge of the rotating sinker head 13. A cam follower 14 on the end of a lengthwise adjustable pivoted lever 15 is adapted to operate a rod 16 as it rides upon or below the level of cam 12. Rod 16 in turn rocks a bell crank 17 on a pivot 18. Bell crank 17 pulls a rod 19 which operates another rod 20 through a pivoted lever 21. Rod 20 is attached to lever 3 by means of a nut 22 and a threaded stud 23 passing through an opening 24 in dial cap 1.

A coil spring 25 attached between the dial bracket 26 and the same end of lever 21 to which rod 20 is attached urges forward rod 20 and stud 23, thereby pushing the end of lever 3 to which the stud is attached and holding blade 4 inside the dial cap between cutting member 6 and binding member 7.

An adjustable stop assembly 27 (see Figs. 2 and 6) and adjustments on the operative length of rods 16 and 19 control the operating range of lever 3 and prevent blade 4 from being thrust too far out of the dial cap and into the path of the needles where it might cause breakage, etc.

Another coil spring 28 attached between the cam following end of lever 15 and the dial assembly supporting bracket 29 urges cam follower 14 downward against cam 12. When cam follower 14 is not riding upon cam 12, i. e., when it is off or below the cam as shown respectively in full and dotted and dash lines in Fig. 6, lever 15 permits spring 25 to pivot lever 21 as explained above.

When, however, cam follower 14 is raised by cam 12, lever 15 is pivoted so as to pull rod 16 downward, thereby pulling against arm 30 of bell crank 17 so that its other arm 31 pulls against rod 19 which, in turn, pivots lever 21 against spring 25 so that rod 20 pulls stud 23 inward toward the center of the dial cap, thus pivoting lever 3 and thrusting blade 4 out from its recess in dial cap 1. In this position, blade 4 lies in the path of yarn from the double sole yarn feeding lever (not shown). When that lever moves out of feeding position, the yarn passes between blade 4 and dial cap 1 until the blade is pulled inward as a result of cam follower 14 dropping from the end of cam 12 to cut and bind the yarn.

The extent of cam 12 around sinker head 13 must conform to the number of needles which are to receive the double sole yarn before it is severed and bound. Thus, if the double sole yarn is to cover one-half of the foot of a stocking, cam 12 covers an area equivalent to approximately one-half of the needles in the dial cylinder.

Since the operation of trimmer blade 4 is useful only during double sole knitting and would interfere with the knitting of other portions of the stocking such as the leg, means is provided for excluding it from operation at these undesirable times.

This is accomplished by a swingable stop 32 which, in the solid line position shown in Fig. 6, holds cam follower 14 in operative relation with cam 12 through engagement of its end 33 with lever 15 but which can be swung to the dot and dash line position shown in Fig. 6 so that cam follower 14 can drop to the dot and dash line position shown, such dropping being assured by spring 28 and being limited by surface 34 of stop 32 with which lever 15 will then engage. Cam follower 14 is now inoperative and, in consequence, so is the cutter and binder.

Control of stop 32, as above described, is effected by a rod 35 pivotally attached to stop 32, the other end of which is pivotally connected to a rocker 36 which is operatively associated with a drum 37 so as to be rocked by cams thereon such as 38. When rocker 36 is riding upon the surface of drum 37, stop 32 is in the full line position shown in Fig. 6 and consequently the cutter and binder are operative. When rocker 36 rides up onto a cam such as 38, stop 32 is swung to its dot and dash line position and the cutter and binder become inoperative through the moving of cam follower 14 out of the path of cam 12.

Lever 3, being held in the recess 2 by means of a simple pivot 5 and a nut 22 threaded on a stud 23 passing through the opening 24 in the dial cap 1, is easily removed for cleaning and sharpening purposes.

The ideal location for the double sole trimmer is where the cut end of the outgoing yarn equals the end of the incoming yarn extending from the cutter and binder to the first needle to knit it.

Exact equality may not be possible but a satisfactory approach thereto can be had. To assist in this, the dial cap may be turned either way upon its shaft to a small extent without seriously impairing the knitting or transfer qualities of the machine.

In this manner, the invention provides a double sole trimmer which will cut and bind yarn close to the knitted fabric, one which will stand up under continuous operation and is adjustable to provide desired lengths of trimmed yarn, and an improved method for operating the same.

We claim:

1. A yarn cutter and binder for a circular, independent needle, knitting machine of the dial type which comprises a dial cap having a recess, a lever with a cutting blade having a sharp edged side and a dull edged side pivotally mounted in said recess, means for operating said lever so as to move said blade between an "open" position and a "binding" position, a first member mounted in said recess and having a cutting edge held against the sharp edged side of said cutting blade when said blade is in the "binding" position, and a second member also mounted in said recess and having a dull edge resiliently and adjustably held against the dull edged side of said cutting blade when said blade is in the "binding" position.

2. The invention according to claim 1 and wherein said means for operating said lever includes a rotatable sinker head, a cam mounted on the rim of said sinker head, a cam follower in the path of said cam and adapted to be raised by said cam, and connecting means between said cam follower and said lever whereby said cam as it rotates with said sinker head imparts motion to said cam follower and operates said lever.

3. The invention according to claim 2 and wherein said cam extends only partially around said rim of said sinker head thereby providing an open area in the path of said cam with relation to said cam follower where said follower can pass below the path of said cam, a pivoted member attached to said follower, a spring urging said member in a direction to cause said follower to pass below the path of said cam where said cam gives way to said open area in its passage with relation to said follower, and means for locking and unlocking said pivoted member with respect to control by said spring.

4. The invention according to claim 3 and wherein said means for locking and unlocking includes a pivoted finger adapted to press against and swing clear of said pivoted member, said pressing and swinging being controlled by means independent of said connecting means between said cam follower and said lever.

5. For a circular, independent needle, knitting machine of the dial type, a dial cap having a recess a yarn binding member located within the confines of said recess, a yarn cutting member having a body portion and cutting portion, said body portion being contained within said recess, and said cutting portion being movable between a position where it projects from said recess and a position within said recess.

6. A circular, independent needle, knitting machine of the dial and cylinder type having a dial cap having a recess, a yarn cutter and binder mounted in said recess, means for operating said cutter and binder including a rotatable sinker head with a cam mounted thereupon and a cam follower adapted to engage said cam, and means for bringing said cam follower into and out of a path of engagement with said cam including a pivoted lever supporting said follower, and means for locking and unlocking said lever with respect to the engaging position of said cam.

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