Sept. 22, 1959 H. SCHURICH ET AL 2,904,978

ACTUATOR OF A HAND KNITTING APPARATUS

Filed April 30, 1956

Fig. 1.

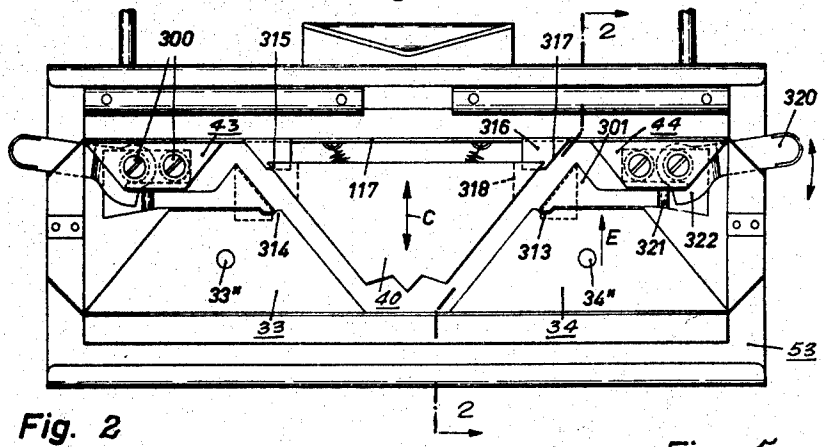


Fig. 2

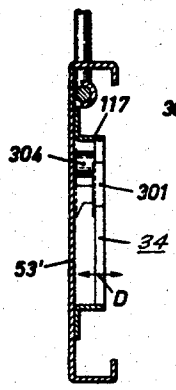


Fig. 3

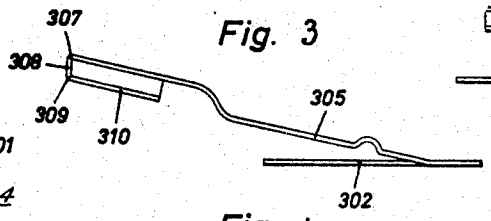


Fig. 5.

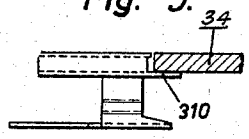


Fig. 4.

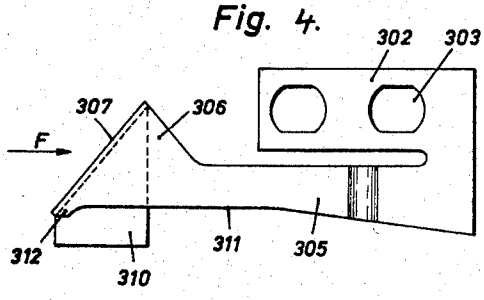


Fig. 6.

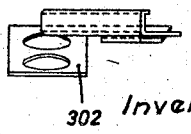
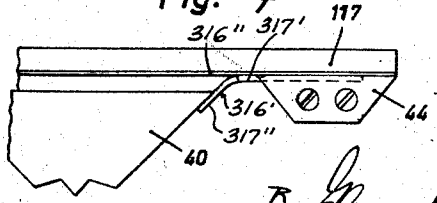


Fig. 7



Inventors

H. Schurich

O. Brunge

By Glascock Downing Seebold,

Attys.

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ACTUATOR OF A HAND KNITTING APPARATUS

Herbert Schurich, Berlin-Reinickendorf, and Otto Bunge, Berlin-Charlottenburg, Germany

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9 Claims. (Cl. 66—78)

The invention relates to a hand knitting apparatus and more particularly to a lock therefor.

Broadly, the lock includes a single lowering cam, a lifter cam at each side of the single cam, an auxiliary lowering cam above each lifter cam, and a spring latch having inclined surfaces operably associated with each auxiliary cam, and arranged at the transfer point between the lifter cams and their associated auxiliary lowering cams whereby during reciprocation of the lock, the needle butts alternately slide once over one latch and push the needles substantially out of the needle bed, and during the next movement slide beneath the latch with the needle butts lifting the latch.

In the invention, in lieu of a latch being pivotal about a pin or the like, a spring latch is employed, which latch is securely affixed to the lock plate and is formed so as to substantially extend in parallelism to the lock plate, and is provided with an offset portion so formed that during the relative movement of the needle butts from the respective outer lock edge in a direction toward the single cam, the needle butts contact the offset portion with their head portion, and press the same in sliding over the surface of the latch against the lock plate, thereby overcoming the spring action. In this fashion, the needles move rectilinearly in the space or hiatus between the lower edge of the auxiliary cam and the upper edge of the lifter cam until the same contact the inclined surface of the single cam, and will move downwardly thereon.

After the needles have been lifted by the opposite lifter cam, the needle butts slide along the inwardly inclined edge of the spring latch, with such edge being formed approximately as an extension of the inclined edge of the lifter cam, until the needle butts reach the uppermost point of the spring latch. The needle butts then contact the inclined face of the auxiliary cam to be moved by such cam again in a downward direction, until the needle butts finally leave the lock at the other edge. While the needle butts thus slide along the other spring latch, there is no depression of the spring latch against the lock plate.

The present spring latch is a material improvement over a pivotally supported latch, since in the case of such latter latches which slide with their broad face or surface along the rear wall of the lock plate during their pivotal movements, steps must be taken to avoid the risk that the latches may be deterred in their movement, and eventually even jammed by deposits of oil, dirt, knitting yarn fibers, or other foreign matter. With the present invention, such objectionable features are not present, since the spring latches are solely, flatly supported for oscillation on the lock plate, thereby obviating any rotational movement about a pivot.

Another important advantage of the present spring latch resides in the fact that there is no risk of blocking the lock, regardless of the manner in which the knitting device may be used, since the spring latch is provided at its lower area with a flap with which the latch engages under the respective lifter cam. If the lifter cam is

rendered inoperative, by lifting the same at the guide bolt, then the spring latch is also drawn toward the inner lock plate surface by means of the flap.

With latches swingable about a pivot, such an arrangement was not possible, and there was the risk that in lifting the lifter cam, the needle butts in the interior of the lock may strike the inner edge of the latch when the lock is moved, and thereby block the lock, resulting in the relatively easy fracture of the needle bed during rough movement of the components.

An additional advantage of the present spring latch resides in the fact that it is possible to easily produce the so-called net patterns, if a disengaging lever for the latch is employed, so that on actuation of the lever the latch becomes inoperative, being displaced towards the inner latch plate surface.

The invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a bottom view of the lock of the hand knitting apparatus;

Fig. 2 is a section along the line 2—2 of Fig. 1;

Fig. 3 is a front view of the disassembled spring latch looking in the direction of the arrow E in Fig. 1;

Fig. 4 is a top view of the disassembled spring latch;

Fig. 5 is a side view of the spring latch in the direction of the arrow F in Fig. 4, and simultaneously a partial section of the associated lifter cam;

Fig. 6 is a perspective view of the spring latch; and,

Fig. 7 is another embodiment of a deflecting spring adjacent the top of the lowering cam.

Referring to the drawings, a lock plate is identified **53**, and a lowering cam **40** is secured at approximately the center of the lock plate. At each side of the centrally located cam **40** there is provided a lifter cam, **33** and **34**, respectively. With the cams being secured on bolts **33''** and **34''**, respectively, with cams being movable up and down in the direction of the bolts by means of buttons in the direction shown by the double arrow D in Figure 2. The cam **40** may be moved upwardly and downwardly, as shown by the arrow C to permit precise adjustment of the mesh width. Auxiliary lowering cams **43** and **44**, respectively, are fastened above the cams **33** and **34** to the lock plate **53**, by means of two pins or bolts **300**. The bolts **300** also function as anchoring points for spring latches **301**. Each spring latch is provided with a flap or extension **302** provided with apertures **303**, and the spring latch is positioned over the pins **300** by means of the apertures **303**. As shown in Figure 2, sleeves **304** are positioned about the pins **300**, and are slightly longer than the free length of the pins, whereby the flap **302** is firmly pressed against the lock plate when the auxiliary cam **43** or **44** is secured. The resilient portion of the spring latch **301** comprises elongated portion **305**, and a substantially triangular guide portion **306**. At the outer upper guide edge denoted **307** the latch is bent at right angles to constitute a guide web **308**. Lower guide edge **309** of the web **308** is bent again at right angles to provide what might be termed a tappet flap **310**, which flap projects in top plan over lower edge **311** of the latch. Hence, the projecting portion of the flap **310** can rest on the bottom surface of its associated cam, such as cam **34**, as shown in Figure 5. At the front end of edge **311**, there is provided a projection **312** which extends downwardly and which engages a corresponding recess such as the recess **313** of the cam **34**, in such a manner that a small clearance of approximately 0.5 mm. is left at all edges. The projection **312** functions to guarantee proper upper travel of the needle butt. If the projection was not present, the needle butt could easily be jammed in sliding from the lift cam edge to the spring latch edge in the narrow hiatus, which affects free sliding. This danger is particularly great, as the dimensions of the

needle butt are within the range of the dimensions of the hiatus, and the hiatus can not be smaller than 0.5 mm., so as to avoid the danger of dragging, and thus of jamming the spring latch at the upper edge of the lifter cam. Due to the arrangement of the projection **312** respecting the recess **313** a projection **314** is formed at the front edge of the lifter cam, and the rising needle butt must slide over the projection **314** to reach inclined edge **307** of the latch **301**, without any danger of the same entering the hiatus between the latch and the lifter cam.

During the adjustment of the lowering cam, especially in the middle and lower portions, a problem exists, in that during operation by a skilled person, the needle butts may contact outer points **315**, and thereby block the lock. To avoid this feature, deflecting flaps **116** are bent downwardly at right angles from upper guide rail **117** of the lock within the range of such points, and the respective outer edges **317** of such flaps extend in the direction of the inclined edge of the cam **40**. The flaps **316** are arranged on the guide rail **117** in such a manner that they engage under the points of the cam **40**, and in the range of the points **315** the cam is thinner up to edge **318**, whereby the deflecting flap may engage this offset portion of the cam **40** without contacting the cam, per se.

In lieu of deflecting flaps, deflecting springs may be used. Such springs are shown at **316'**, and are flat springs having an obtuse angle, as at **316''**, and a portion **317'** secured to upper guide rail **117** by spot welding or the like. Portion **317''** bears resiliently against one inclined edge of the cam **40**.

To knit net patterns, a flap disengaging lever **320** is pivotable about one of the pins **300**, preferably the outermost pin, and the lever engages an offset **321** of the spring latch by a projection **322**, and thus pivots the spring latch against the inner surface of the lock plate, so that the needles have less movement from the bed. Hence, the previously formed loops of the work do not move behind the tongues of the needles, but lie between the hook and tongue, so that net meshes are formed in a manner known, per se.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. A lock for hand knitting apparatus including a plate, a central needle cam on the plate, a lifter cam on the plate on either side of said central cam, an auxiliary cam on the plate on either side of the central cam and spaced from said lifter cam, a latch component of spring material secured to the plate above each lifter cam and including a flat portion extending in the direction of the central cam, and an offset on said flat portion operative during relative movement of the needle butts from the edge of the plate in a direction toward the central cam upon the head portion of the needle butts contacting the offset to press the latch during sliding movement thereover against the plate overcoming the spring action of the latch.

2. A lock for hand knitting apparatus as claimed in claim 1 in which said latch is provided at the lower side with a tappet flap engageable under the lifter cam.

3. A lock for handknitting apparatus as claimed in in claim 1 in which the latch component is provided with an extension having spaced apertures therein registering with spaced apertures in the auxiliary cam, bolt means passing through said spaced apertures to secure the auxiliary cam and latch component to the plate and a sleeve of slightly greater length than the bolts, positioned about the bolts, thereby rigidly anchoring the latch component to the plate.

4. A lock for hand knitting apparatus as claimed in claim 1 wherein said flat portion is bent at right angles thereto to define a guide web having an outer guide edge extending substantially in the direction of the inclined edge of the lifter cam, with the lower edge of the web being bent at right angles to provide a tappet flap projecting over the lower edge of the latch component.

5. A lock for hand knitting apparatus as claimed in claim 4 in which the forward end of the lower edge of the guide web is provided with a downwardly extending projection engageable in a recess formed in the lifter cam to provide a small clearance therebetween.

6. A lock for hand knitting apparatus as claimed in claim 1 further including a guide rail along the plate in proximity to the upper edge of the plate thereof, a deflecting flap extending downwardly from said rail in parallelism to the plane of the plate adjacent the points of the central cam and each flap having an outer edge extending in the direction of the inclined edge of the central cam.

7. A lock for hand knitting apparatus as claimed in claim 6 wherein the central cam is of thinner cross section in the area of the points whereby the deflecting flaps may engage such area without contacting the central cam.

8. A lock for hand knitting apparatus as claimed in claim 7 further including a deflecting spring arranged at the upper edge of each auxiliary cam and having a flat curved portion engageable over a lateral point of the central cam, thereby sealing the hiatus between the upper edge of the central cam and the guide rail to prevent the needle butts from striking the outer and upper point of the central cam.

9. A lock for hand knitting apparatus as claimed in claim 1 further including a disengaging lever pivotally connected to the plate and a projection on the lever contacting an offset on the latch component upon pivotal movement of the lever, thereby swinging the latch component toward the surface of the lock plate.

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