March 13, 1962 J. KUNTZ 3,024,633

FLAT KNITTING APPARATUS

Original Filed April 6, 1956

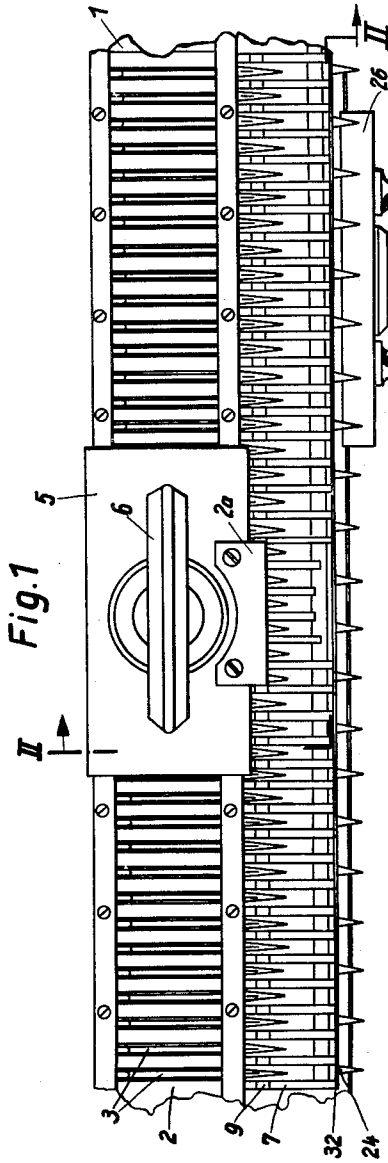


Fig.1

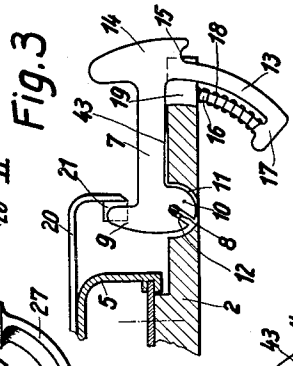


Fig.3

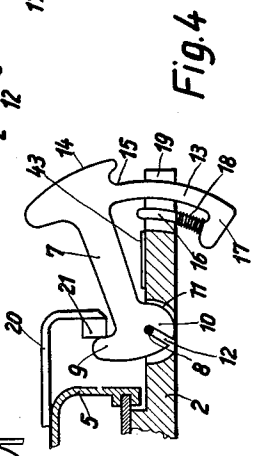


Fig.4

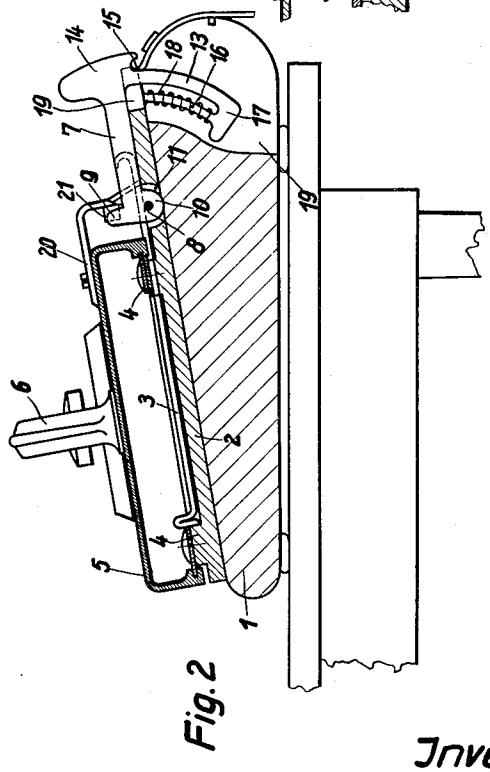


Fig.2

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FLAT KNITTING APPARATUS

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Original application Apr. 6, 1956, Ser. No. 576,743, now Patent No. 2,893,225, dated July 7, 1959. Divided and this application Apr. 16, 1959, Ser. No. 806,972
Claims priority, application Germany Apr. 28, 1955
4 Claims. (Cl. 66—60)

The present invention relates to improvements in the sinkers or holddown plates in a flat knitting apparatus having a needle bed constructed with parallel needle guide grooves therein and a row of latch needles slidably disposed within said grooves for reciprocable movement for manufacturing knitted fabrics. Such knitting apparatus are usually adapted for and used for hand powered small-scale uses.

A plurality of the sinkers embodying this present invention are disposed in alternating relationship with the row of latch needles. These sinkers are mounted upon a transverse axle, which is affixed to the needle bed, for oscillatory motion and extend past the outlet side of the needle bed. A hand actuating member is slidably disposed upon tracks affixed to the needle bed. This actuating member actuates both the needles and the needle bed and the oscillatory sinkers.

This is a division of my application Ser. No. 576,743, filed April 6, 1956, now Patent Number 2,893,225, issued July 7, 1959.

In the known knitting apparatus of this kind the sinkers have disadvantages with respect to the shape, disposal and guiding in the needle bed which cause difficulty in manufacturing these sinkers and often disturbances in their operation during the knitting operation.

The object of the invention is to overcome these disadvantages. This is obtained by forming each of the sinkers at their rearward end with upward curved projections and lower rounded extensions. The rounded extensions conform over a part of their periphery to a radial arc from the transverse axle and are adapted to support and guide the sinkers in their oscillatory motion upon the needle bed. The curved projections are positioned upwardly so that the hand actuated member or carriage engages the same to impart oscillatory motion to the sinkers.

Each individual sinker has formed intergrally therewith at the outlet side of the needle bed an upwardly directed protruding part and a downwardly directed abutment member. The protruding part has an outer most edge curved along a radial arc from the rearward transverse axle. Likewise, the abutment member is curved along a radial arc from the transverse axle and this member is so curved at both front and rear edges thereof. A hook or recess is formed by the protruding part extending downwardly and outwardly with respect to the abutment member. An end cross piece is formed intergral with the sinker at the lower end of the abutment member, and on the rearward end of this cross piece is formed an upwardly directed curved spring core which conforms to a similar radial arc as does the abutment member. A return spring is placed around this core and is in compression between the cross piece and the bottom of the needle bed. The hook or recess is positioned generally at the outlet edge of the needle bed, while, the upper elements are generally placed above the bed and the lower elements extend through the guide slots to below the bed.

It is to be noted that the entire sinker, including the spring core, may be stamped in a single operation from sheet or plate material.

By so providing a return spring for each sinker which reacts against an integral portion of the sinker the oscillatory motion of the sinker, when viewed along the yarn contact line, is rendered uniformily arcuate and, therefore, more efficient in hooking and forcing downwardly the line of yarn. This uniform motion along the arcuate path is further enhanced by the sinker being supported at its rearward end by the roundward extension which permits oscillatory motion around a curved radial arc which is proportional to the curved radial arc formed by the front edges of the protruding part, the abutment part, and the spring core.

Further details of the invention will be pointed out in the following description, reference being made to the accompanying drawings.

In the accompanying drawings an embodiment of the flat knitting apparatus according to the invention is diagrammatically represented.

FIG. 1 is a plane view of an embodiment of the flat knitting apparatus,

FIG. 2 shows the same apparatus in vertical cross section taken on line II—II of FIG. 1, and viewed in the direction of the arrows.

FIGS. 3 and 4 show a sinker for the knitted fabric with a part of the needle bed and of the slide of the main knitting apparatus in side elevation, partly in vertical section, and respectively, in lower and lifted position.

In FIGS. 1 and 2, an under frame **1** of the main knitting apparatus is shown with a needle bed **2**, latch needles **3** carried in parallel grooves, guide rails **4** for the slide or carriage **5** rectangularly arranged to the needles **3**, and the handle **6** of the member **5**. Between each two adjacent needles **3** a sinker **7** is pivotally mounted on a common axis or on pivot pins **8** for oscillating movement. Each of said sinkers **7** has at its rear end an upwardly directed projection **9** and a downwardly directed rounded extension piece **10**. This latter extension **10** is guided in a slot **11** of the needle bed **2** and has a bore **12** for a pivot pin **8**. The front part or abutment member **13** for the knitted fabric of each sinker **7** extends downwardly and arc-shaped about said pivot **8** and has at its top a somewhat protruding part **14** which extends beyond the abutment member **13** and forms a hook-shaped recess **15** with the abutment member **13**. The recess **15** acts as a hook for holding down the finished knitted fabric.

Behind the front abutment member **13** and parallel to it there is provided a similarly arc-shaped spring core **16** with an end cross piece **17** as support for a holding-down or return spring **18** for said sinker **7**. The elements **13** and **16** are guided in a slot **19** at the outlet edge of the needle bed **2** or of the underframe **1**. The holding-down spring **18**, which is a helicoidal spring abuts with one end against the radial end cross piece **17** and with the other end against the under face of the needle bed **2** at either side of the guide slot **19**.

The sinkers **7** repose with their central horizontal, bodies between the rearward extension piece **10** and upward projection **9** and the front abutment member **13** on the upper continuous surface of the needle bed **2**, which may be provided at this point with an elastic noise damping layer **43** of felt, rubber or the like.

The upwardly extending projection **9** at the rear end of each sinker **7** is controlled by a cam-like abutment **21** fixed by means of an angular bracket **20** at the slide or carriage **5**. By sliding lateral engagement of the cam-like actuating member or abutment **21** with the projection **9**, the individual sinkers **7** are pivoted about their pivots **8**, thus lifting their front ends **13**, **14**, **15** against the action of the individual return springs **18**. Upon return of the sinkers **7** to their rest position under the influence of springs **18**, their hooks **15** grasp the recently formed row of meshes and hold them down. Movement of the actuating member or carriage **5** along the needle bed **2**, with attendant engagement between cam **21** and projections **9**

of successive sinkers 7, results in the aforedescribed operation of each of the sinkers 7, one after the other.

What I claim is:

1. In a flat knitting apparatus having a needle bed, parallel needle guide grooves, a row of latch needles slidably disposed therein for reciprocating motion for manufacturing knitted fabric, a plurality of sinkers for the finished knitted fabric, each of said sinkers secured to a rearward transverse axle in said needle bed for oscillatory motion and disposed intermediate between two adjacent needle guide grooves at the outlet side of said needle bed, vertical guide slots disposed in said needle bed from the outlet edge thereof rearwardly to provide for guiding of said sinkers, a hand actuated member slidably disposed upon said needle bed for actuating said needles and said sinkers, the improvement of each of said sinkers comprising a downwardly directed extension and an upwardly directed projection at its rearward end, said extension adapted for supporting and guiding said sinker upon said rearward transverse axle in said needle bed, said projection adapted for actuating said sinkers through said hand actuated member, an upwardly and forwardly protruding part and a downwardly extending abutment part for the knitted fabric both curved about said rearward transverse axle, said protruding part and said abutment part offset in a forward direction from one another at the front edge of said sinker to form a recess therein, said recess acting as a hook for said knitted fabric, a return spring for each sinker placed and guided in rigid connection with said downward front abutment member and reacting between said abutment part and the undersurface of said needle bed on either side of said guide slots, said abutment part extending through and guided by said vertical guide slots.

2. In a flat knitting apparatus having a needle bed, parallel needle guide grooves, a row of latch needles slidably disposed therein for reciprocating motion for manufacturing knitted fabric, a plurality of sinkers for the finished knitted fabric, each of said sinkers rigidly connected to a rearward transverse axle in the needle bed for oscillatory motion and disposed intermediate between two

adjacent needle guide grooves at the outlet side of said needle bed, vertical guide slots for each of said sinkers extending from the outlet edge of said needle bed rearwardly, a hand actuated member slidably disposed upon said needle bed for actuating said needles and said sinkers, the improvement of each of said sinkers comprising a downwardly directed extension and an upwardly directed projection at its rearward end, said extension adapted for supporting and guiding said sinker upon said rearward transverse axle in the needle bed, said projection adapted for actuating said sinkers through said hand actuated member, an upwardly and forwardly protruding part and a downwardly extending abutment for the knitted fabric both curved about said rearward transverse axle on radial arcs therefrom, said protruding part and said abutment part offset from one another in a forward direction at the front edge of each of said sinkers to form a recess therein, said recess acting as a hook for said knitted fabric, said downwardly directed extension curved on a radial arc from said axle, a spring core arcuately parallel to said abutment part and affixed to said part at its lower end rearwardly thereof, a return spring for each sinker placed on and guided by said core and reacting between said abutment part and the undersurface of said needle bed at either side of the vertical guide slot for each sinker, and said vertical guide slot guiding each of said sinkers through said downwardly extending abutment part.

3. A flat knitting apparatus as defined in claim 1 wherein, a noise damping strip is disposed between the undersurface of the body portion of said sinkers and the uppersurface of said needle bed.

4. A flat knitting apparatus as defined in claim 1 wherein, said hand actuated sliding member consists of a forwardly projecting supporting arm and a curved cam-like actuating means acting upon said upwardly directed projection of each of said sinkers.

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