May 11, 1937. A. BAY ET AL 2,080,353

LOOP FORMING MECHANISM FOR STRAIGHT KNITTING MACHINES

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FIG. 1.

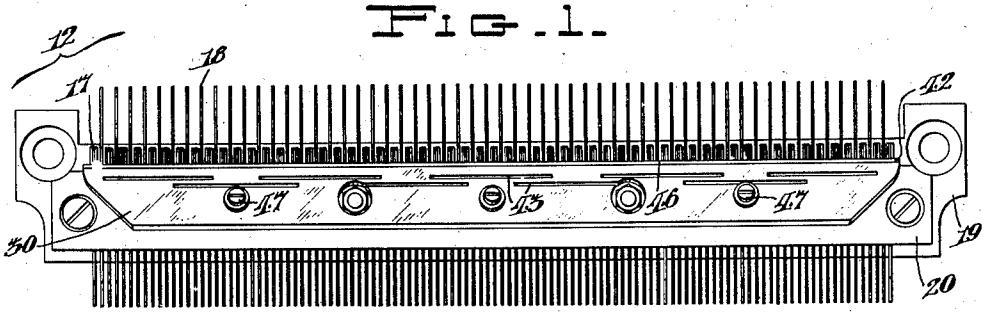


FIG. 2.

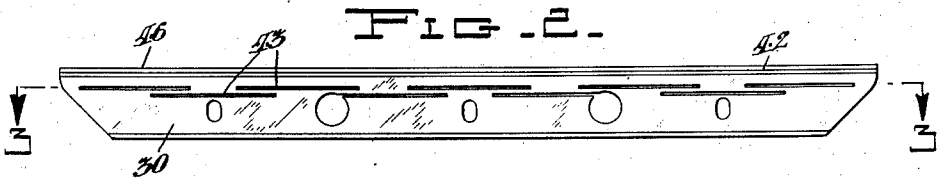


FIG. 3.

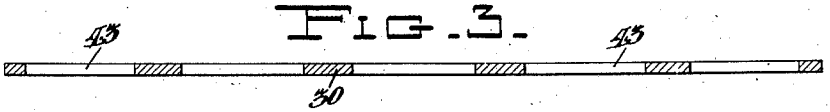


FIG. 4.

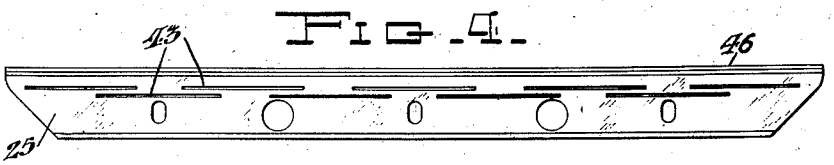


FIG. 5.

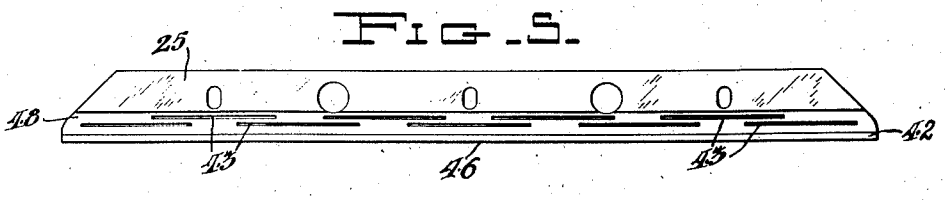
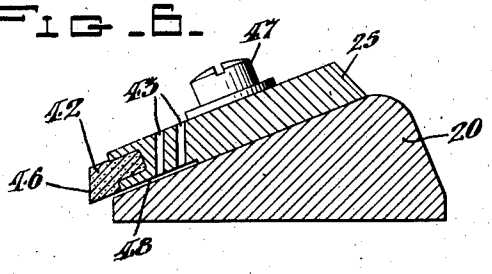


FIG. 6.



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Fig. 7.

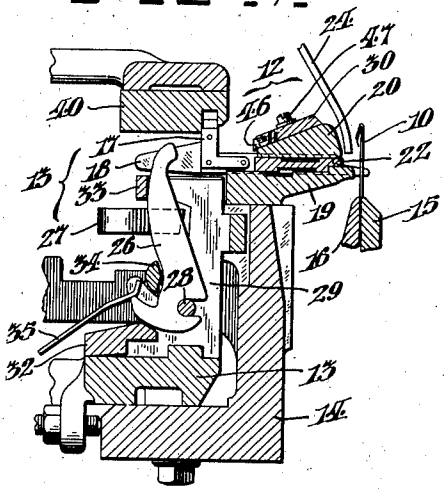


Fig. 8.

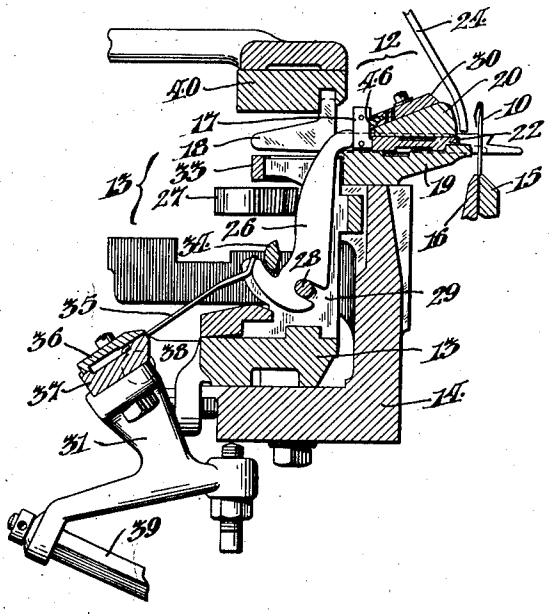


Fig. 9.

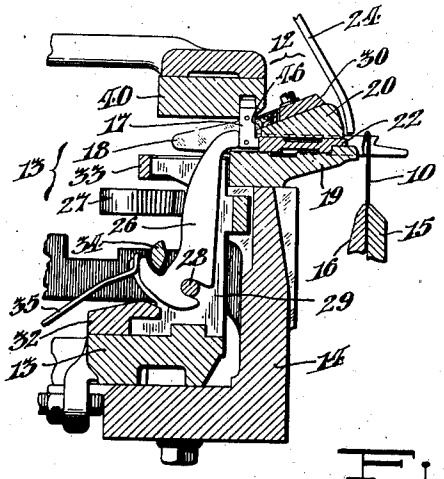


Fig. 10.

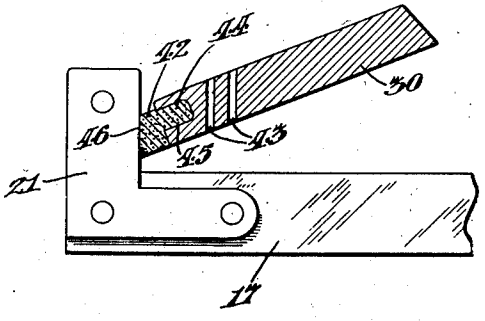
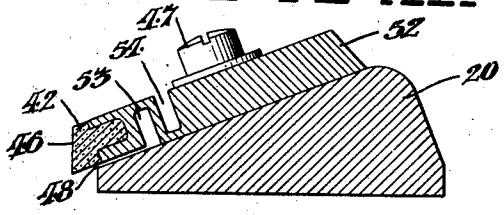


Fig. 11.



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Patented May 11, 1937 2,080,353

UNITED STATES PATENT OFFICE

2,080,353

LOOP FORMING MECHANISM FOR STRAIGHT KNITTING MACHINES

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Application May 2, 1935, Serial No. 19,340

13 Claims. (Cl. 66—110)

This invention relates to full fashioned knitting machines and more particularly to a new and improved verge plate for use with the loop-forming mechanism or sinker-head assembly of machines of this type.

It is well known that the sinkers, dividers and needles of a full fashioned knitting machine function cooperatively to form the loop structure of the fabric knitted thereon. Also that the uniformity of the loop lengths and in turn the evenness of the finished fabric depends largely upon the operation of the sinkers which sink the desired length of yarn between alternate pairs of needles.

To each sinker head of full fashioned knitting machines is secured a verge plate or folding bar for terminating the forward travel of the sinkers and the dividers on the same horizontal line for the purpose of effecting loops of equal length across the desired extent of the knitting field. In the operation of the knitting machine with the ordinary verge plate, the impact of the sinkers upon such plate causes the mechanism to vibrate, whereupon the sinkers tend to rebound or fly back, and this inexpedient action frequently results in the breaking of needles and the production of imperfect fabric. The usual verge plate, being of solid metallic construction, transmits the impact of the sinkers thereon directly to the sinker head and thus further enhances the rebound of the sinkers, which are slidably mounted in the sinker head. The incessant pounding of the sinkers on the usual non-resilient verge plate of the sinker head unit slowly forms grooves therein, and since said wear is not uniform the loops in certain wales become lengthened, subsequently forming sinker lines which in turn affect the appearance and decrease the value of the finished product.

An object of the invention is to produce a novel verge plate construction for the sinker head units of full fashioned knitting machines and one which has been especially designed to overcome the objections set forth above.

A further object is to provide a metallic verge plate for the sinker head units of full fashioned knitting machines constructed so as to confine the effect of sinker-shocks.

A still further object is to provide a perforated verge plate including a non-metallic sinker-abutting edge for cushioning the impact of the sinkers thereon.

Still another object is to improve the loop forming mechanism of full fashioned knitting machines, and more particularly by providing a novel structure for controlling the forward movement of the sinkers and dividers by means substantially unaffected by constant use thereby preventing the usual variations in the loop structure of the fabric due to uneven wear in the sinker and divider control mechanism.

It is also an object of the invention to render such device simple and durable in construction, economical to manufacture and effective in its operation.

With these and other objects in view, which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, the invention resides in the novel elements, features of construction and cooperation of parts, as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a plan view of a sinker head of a full fashioned knitting machine, with the invention operatively positioned thereon;

Fig. 2 is a top plan view of a verge plate constructed in accordance with the invention;

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 2 of a modified form of the invention;

Fig. 5 is a bottom plan view of the device shown in Fig. 4;

Fig. 6 is an enlarged sectional view of a portion of a sinker head having the verge plate shown in Figs. 4 and 5 secured thereto;

Fig. 7 is a sectional view of certain of the loop forming mechanism of a full fashioned knitting machine of which the invention forms an integral part;

Figs. 8 and 9 are views similar to Fig. 7 showing successive steps in the operation of the loop forming mechanism;

Fig. 10 is an enlarged fragmentary view, partially in section, of certain of the members positioned as illustrated in Fig. 8; and

Fig. 11 is a view similar to Fig. 6, illustrating another modified form of the invention.

The figures disclose various parts of a "Reading" full fashioned knitting machine embodying the mechanism and elements of the invention. For the sake of clearness only those parts of the various mechanisms have been illustrated which are necessary for an understanding of the invention; the various other parts and mechanisms and their manner of operation are well known in the art, and are shown and described in detail in the "Reading" Full Fashioned Knitting Ma-

chine Catalogue (copyright 1929) published by the Textile Machine Works, Reading, Pennsylvania.

Operation of the separate mechanisms of a full fashioned knitting machine of conventional type is effected through means of a series of cam elements carried by a central rotating cam shaft. The motion of each cam is transmitted to its respective mechanism through means of a cam follower element and associated linkage. The cam shaft is axially shiftable for the purpose of moving one set of cams out of operative engagement with the respective cam follower elements coincident with the operative positioning of a second series whereby the cycle of operations of the separate mechanisms may be changed as for instance is necessary when changing from plain knitting to fashioning and vice versa.

Included in the loop-forming mechanisms of machines of the type set forth, are, a needle 10, a sinker head 12, Fig. 1, and a jack bed 13 which are operatively positioned as illustrated in Figs. 7, 8 and 9, and which function unitedly in well known manner to effect the desired loop formation. The sinker head 12 and the jack bed 13 are secured to a center bed 14 which extends across the length of the machine. A needle bar 15, to which the needles 10 are secured in spaced parallel relationship, by a clamp member 16, is operated in well known manner to move the needles 10 through their loop-forming cycle. Sinkers 17 and dividers 18 which are slidably mounted in suitable grooves formed in the base 19 and top 20 of the sinker head 12, in turn spacedly positioned relative to each other by spacer elements 22, coact with the needles to effect the desired loop formation. Although the pitch of the sinker head grooves is identical to that of the needle positioning grooves, the sinker head 12 is so positioned on the center bed 14 as to guide the sinkers and dividers between the needles 10, and support them in a plane substantially perpendicular to that of the needles in manner well known in the art.

Following the feeding of yarn to the needles 10 by a yarn carrier 24, the sinkers 17 are successively advanced from the position shown in Fig. 7 into engagement with an opposing edge 46 of a verge plate 30, see Fig. 8, thereby sinking the yarn between adjacent pairs of needles. This successive forward movement of the sinkers is effected by separate jack elements 26 which are successively slurred from the position shown in Fig. 7 to the position shown in Fig. 8 by a reciprocating slur cam 27 which is operated by the couliering mechanism (not shown) in well known manner. The jacks 26 are pivotally supported upon an axle 28 carried by a series of spacer members or jack combs 29 which are clamped to the jack bed 13 by a clamp bar 32, and which function to hold the jacks 26 in the same pitch relationship as the sinkers 17, and thereby ensure alignment between said members. The forward movement of the jacks 26 is terminated by the sinkers 17 when the latter abut the verge plate 30, whereas the rearward movement is controlled by an upper comb guide 33, Fig. 7. Replacement of jacks may be effected upon removal of the stop bar 34.

A series of spring elements 35, respectively aligned with the jacks 26, are held by a clamp 36 in clamped relationship with a slotted spring bed 37 which is pivotally supported by suitable bearings 38, extending from the jack bed 13, which cooperate with trunnions extending from opposite ends of the spring bed 37, Fig. 8. The springs 35 exercise a biasing action upon the jacks 26, in the manner illustrated, to prevent inoperative movements thereof. A bracket 31 secured to the spring bed 37 and operable through means of a control rod 39 provides means for controlling the operation of the spring bed 37.

Following the sinking of the yarn between adjacent pairs of needles across the entire knitting field, all of the dividers 18 are advanced as a unit by a catch bar 40 to the position shown in Fig. 9, thereby sinking the yarn between the remaining needles. Coincident with the subsequent downward travel of the needles 10, the sinkers 17 and the dividers 18 are retracted as one group by the catch bar 40 while the newly formed stitches are interlooped with the loops or stitches of the last previously knitted course. Prior to the upward travel of the needles, the sinkers and dividers are simultaneously advanced to hold the newly formed loops thereunder in preparation for the couliering of another course of loops. However, before the yarn is again fed to the needles, the sinkers and dividers are again simultaneously retracted to the position shown in Fig. 7, when the catch bar 40 is raised out of operative engagement with the sinkers 17 substantially as illustrated therein, whereupon the knitting of the fabric is continued in the manner set forth.

The verge plates have heretofore customarily been made of solid metal, consequently when the sinkers were previously slurred into engagement therewith by the slur cam 27, the abutting of metal upon metal invariably resulted in the rebounding of the sinkers and the subsequent irregular formation of loops regardless of the biasing action of the jack springs 35 on the jacks 26; for although the spring 35 eventually forced the sinkers 17, through means of the intermediate jacks 26, into contact with the verge plate, nevertheless the correct positioning thereof was heretofore accomplished only following a rebounding and vibratory movement of the sinkers 17 which consequently effected a variation in the lengths of the loops and resulted in the production of fabric of imperfect texture.

The incessant pounding of the sinkers against the metallic edge of the verge plate likewise resulted in the wearing away of the contacting surfaces of the sinkers and of the verge plate, with most wear being centered on the verge plate which is ordinarily of a softer metal. The impact of the sinkers on the verge plate is likewise ordinarily transmitted to the sinker head 12 to which it is anchored, thereby vibrating the center bed 14 and finally distributing the shock to the entire knitting machine.

However, in accordance with the present invention, substantially all of the shock heretofore occasioned is now absorbed by the verge plate, and is isolated from the sinker head and the remainder of the machine through means of the novel construction shown. In the improved verge plate 25 and 30, I provide a multiplicity of longitudinal slots 43 arranged in overlapping relationship to each other and in spaced parallel relationship to the sinker abutting edge 46, Figs. 2 and 4. The slots 43 preferably extend through the plates 25 and 30, see Fig. 3, thereby effecting a shock-absorbing structure which will reduce the impact of the sinkers on the verge plate and correspondingly reduce the vibrating of the sinker head, since through means of this construction a barrier structure is effected which will prevent the transmission of the shock, occasioned by the sinker impacting the verge plate, to the sinker

head, since said barrier or cushioning structure is positioned intermediate the sinker abutting edge 46 and screws 47 which anchor the verge plate to the sinker head.

In the verge plate 25, see Figs. 5 and 6, the shock-absorbing zone, comprising a sinker-abutting structure 42 and the slots 43, is spaced above the supporting bar 20 for the purpose of preventing the transmission of sinker shock to the sinker head 12, which latter condition exists where the shock-absorbing zone is held in contact with the top 20 of the sinker head 12. The elevating of the shock-absorbing zone above the sinker head top 20 and out of contact therewith through means of a clearance area 48, permits absorption of the sinker shock by the slots 43 before any part thereof is transmitted to the sinker head, inasmuch as the shock-absorbing zone is spacedly positioned thereabove, Fig. 6, whereas the heavy portion of the verge plate is held in clamped relationship with the top 20 by means of the screws 47. Thus, it will readily be understood that all vibratory movements of the verge plate 25, as produced by the abutting of the sinkers and dividers thereagainst, will be confined to and absorbed by that portion of the plate adjacent the clearance area 48 before reaching the portion of the plate in contact with the top piece 20.

It follows that in a verge plate or folding bar, constructed in accordance with my invention, substantially all shock and vibratory influences arising upon abutment of the sinkers upon the verge plate will be transmitted through the bar to the barrier structure or shock-absorbing zone composed of the perforated portions 43, and will there be absorbed and terminated in the manner necessary to isolate said shock and vibratory influences from the sinker head and the remainder of the knitting machine. Likewise, through means of this structure the shock and vibratory actions of the sinkers and dividers are appreciably reduced and a fabric of substantially uniform loop structure results.

In the verge plates 25, 30 and 52, it will be observed that a cushioning element 42, preferably of a fibrous phenol condensate composition, forms the sinker abutting edge. The strip element 42 through its inherent resiliency, in addition to reducing the force of impact of the sinkers on the verge plate, supplements the cushioning action of the barrier structure 43 and is likewise more durable inasmuch as it is not as susceptible to wear as the metallic edge verge plates. Although the removable edge 42 may be formed of numerous materials while still effecting the desired results and remaining within the scope of my invention, it has been found that a fibrous phenol condensate composition is particularly adapted for use in connection with a verge plate.

In effecting the novel edge construction for verge plates and the like, a tongue 44 of the preformed strip 42 is preferably secured in a longitudinal groove 45, formed in a longitudinal edge of the verge plates 25, 30 and 52, by pressing an open end of the groove 45 upon the strip 42 after the latter has been positioned as shown in Fig. 10. Following the insertion of the preformed edge into the verge plate, the face 46 is machined to a straight surface and bevelled to the desired angle in the manner necessary to coact with the sinker backs 21, in the manner shown in Fig. 10, for limiting the forward movement of all of the sinkers 17 to the same extent of travel thereby producing loops of uniform length across the entire knitting field. This combination, of a detachable non-metallic edge member with a metallic supporting bar, prevents warping of the detachable member and permits the use of materials, such for instance as phenol condensate compositions, which are ordinarily unusable in verge plates and the like because of the difficulty in maintaining a straight edge structure.

It will be readily understood that the cushioning action and the barrier structure effected by the slots 43 and the clearance structure 48 makes it particularly desirable for use in the sinker head construction of a full fashioned knitting machine; whereas the supplemental cushioning action and durability of a preformed insert 42, of the type disclosed, coupled with the resilient and shock absorbing features thereof, appreciably lengthens the life of a verge plate, effects a smoother operation of the loop forming elements and in turn aids in the production of a knitted fabric of substantially uniform texture, thereby making a device of this construction particularly desirable for use in connection with a full fashioned knitting machine.

In the verge plate 52 secured to the sinker head top 20 by the screws 47, Fig. 11, the desired shock absorbing action is effected by means of a corrugated section, comprising a series of longitudinal grooves 53 and 54 respectively formed in the under and upper surfaces thereof in parallel relationship with the edge structure 42; whereas, isolation of shock from the sinker head top 20 is attained by providing a clearance area 48 intermediate the edge structure and the sinker head top 20 substantially as indicated in Fig. 11.

Of course, the improvements specifically shown and described, by which the above results are obtained, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

We claim:

1. A sinker head unit for full fashioned knitting machines comprising in combination, a sinker head, a series of sinkers reciprocably mounted in said sinker head, a plate member having a rearward edge for limiting the forward travel of the sinkers, anchorage means for securing the plate to the sinker head, and a series of perforated sections in said plate arranged in spaced overlapping relationship intermediate the rearward edge and said anchorage means for cushioning the impact of the sinkers on said plate and isolating the impact from the sinker head.

2. A sinker head assembly for straight knitting machines comprising, a series of reciprocable sinkers, a verge plate for limiting the forward travel of said sinkers, means for anchoring the verge plate to the sinker head; said verge plate having a resilient straight edge construction for receiving and cushioning the impact of said sinkers, and a plurality of parallel perforated areas arranged in staggered relationship intermediate the edge construction and anchorage means for supplementing the cushioning action of said edge construction and preventing the shock occasioned by the impact of the sinkers on the verge plate from being transmitted to the sinker head.

3. A verge plate for knitting machines comprising an elongated plate, a detachable operating edge thereon, and said plate having a series of perforated overlapping shock absorbing areas adjacent to and parallel with said operating edge.

4. In a straight knitting machine, loop-forming mechanism comprising a series of reciprocable

elements, a plate having a detachable edge adapted to engage said reciprocable elements to limit the loop-forming travel thereof, and means including a series of adjacent spaced openings extending through the plate and arranged in overlapping relationship to constitute a shock absorbing area.

5. Loop-forming mechanism for straight knitting machines comprising in combination, a sinker head, a series of loop-forming elements reciprocably mounted therein, a verge plate having a detachable straight edge portion for terminating the forward travel of said loop-forming elements, and a plurality of longitudinal perforated areas in said plate in spaced overlapping relationship to each other and parallel to said edge portion for cushioning the impact of said loop-forming elements and isolating the shock thereon from the sinker head.

6. Loop-forming mechanism for full fashioned knitting machines comprising in combination, a sinker head, a series of needles, a series of reciprocable members in said sinker head for coacting with said needles for forming loops, a plate carried by the sinker head including a straight edge portion for terminating the forward travel of the reciprocable members, a series of overlapping perforated areas in said plate, spaced in parallel relationship with said edge portion, said edge portion comprising a detachable strip member for receiving the impact of the reciprocable members.

7. A sinker head for full fashioned knitting machines, comprising in combination, a series of reciprocable loop-forming elements, a plate secured to the sinker head for terminating the forward travel of the reciprocable elements, said plate including a preformed rearward edge for controlling the forward travel of said loop-forming elements, and a series of perforated areas in said plate, parallel to and spaced in overlapping relationship to said rearward edge, for cushioning the impact of the reciprocable loop-forming elements.

8. In a sinker head assembly for straight knitting machines, a series of reciprocable sinkers, a verge plate for limiting the forward travel of the sinkers, means for securing the verge plate to said sinker head, a longitudinal preformed edge construction on said verge plate for receiving and cushioning the impact of the sinkers, and a series of overlapping perforated areas in said verge plate spaced in parallel relationship with said edge construction between said edge and said securing means for supplementing the cushioning action of said preformed edge and preventing the transmission of said impact to the sinker head.

9. A verge plate for knitting machines comprising an elongated plate, an operating edge thereon, said plate having a series of perforated overlapping shock absorbing areas adjacent to and parallel with said operating edge and having a relieved portion in its bottom surface extending from said shock absorbing areas to said operating edge.

10. The combination in a full fashioned knitting machine comprising a sinker head, a series of sinkers reciprocably mounted in said sinker head, a plate member of substantially uniform thickness throughout having a rearward edge for limiting the forward travel of the sinkers, and anchorage means for securing the plate to the sinker head, of a perforated area in said plate spaced from the sinker head intermediate the rearward edge and said anchorage means for absorbing the impact of the sinkers on said plate and isolating said impact from the sinker head.

11. A sinker head for full fashioned knitting machines comprising the combination of a series of sinkers reciprocably mounted in said sinker head, a plate member of substantially uniform thickness throughout having a forward portion anchored to said sinker head and a rearward portion spaced from the sinker head in overlapping relationship thereto, said rearward portion comprising a sinker-abutting edge and a perforated area adjacent thereto for absorbing the impact of the sinkers on said edge and isolating said impact from the sinker head.

12. A verge plate for knitting machines comprising an elongated plate, an anchorage portion adjacent one longitudinal edge, an abutting surface adjacent the other longitudinal edge, said plate having a series of longitudinally extending slots arranged in overlapping relationship adjacent said abutting surface and having a relieved portion in its bottom surface adjacent said abutting surface and said slots.

13. A sinker head for full fashioned knitting machines comprising the combination of a series of sinkers reciprocably mounted in said sinker head, a plate member having a forward portion anchored to said sinker head and a rearward portion spaced from the sinker head in parallel overlapping relationship to the upper surface thereof, said rearward portion comprising a sinker-abutting edge, and a corrugated area adjacent thereto for absorbing the impact of the sinkers on said edge.

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