Nov. 9, 1943. J. S. MOSS 2,333,667

KNITTING MECHANISM

Filed Sept. 29, 1942 2 Sheets-Sheet 1

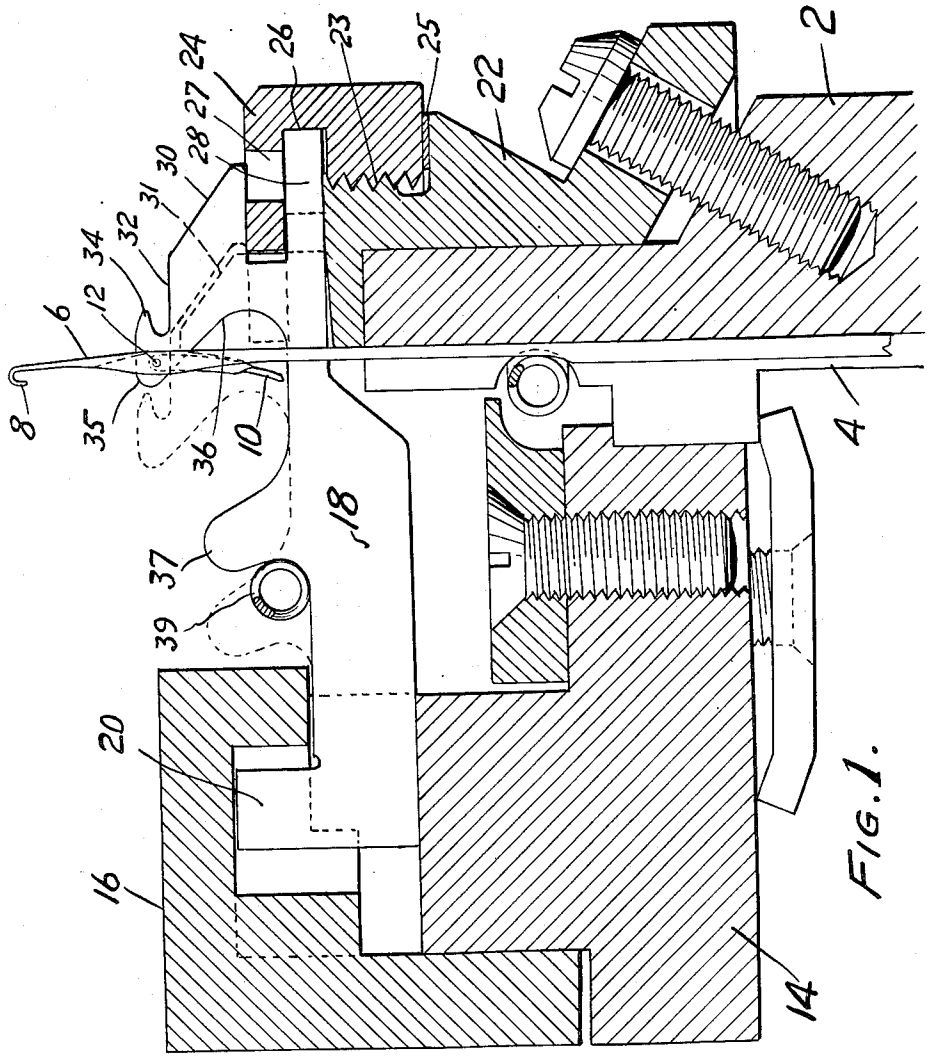


FIG. 1.

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KNITTING MECHANISM

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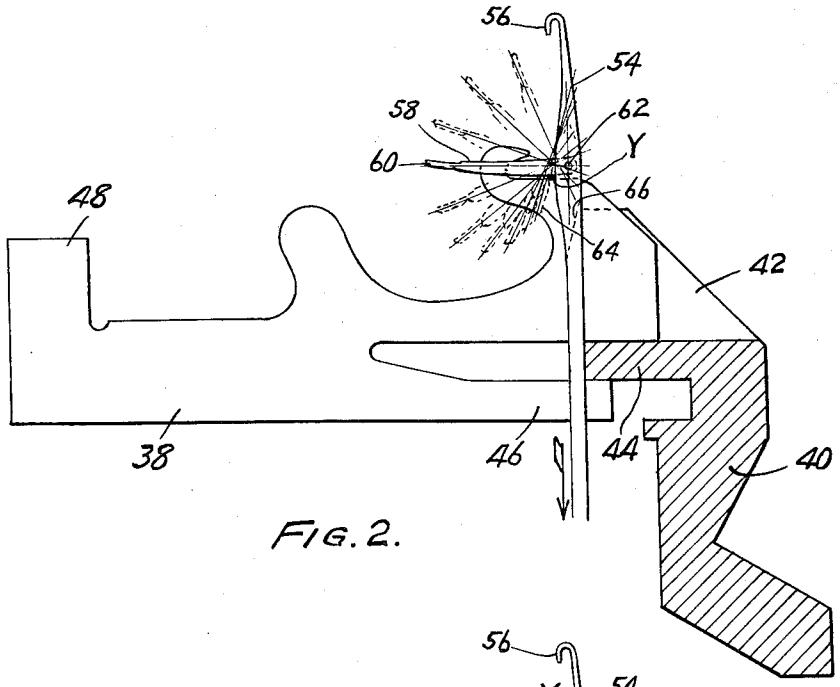


FIG. 2.

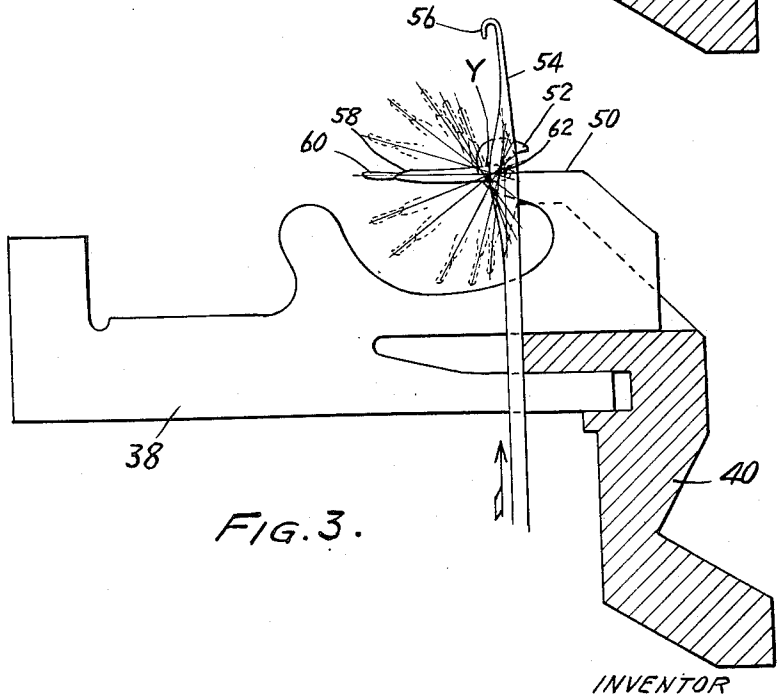


FIG. 3.

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UNITED STATES PATENT OFFICE

2,333,667

KNITTING MECHANISM

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Application September 29, 1942, Serial No. 460,076

12 Claims. (Cl. 66—107)

This invention relates to knitting mechanism, and has particular reference to an improved type of sinker.

When sinkers of conventional shape, suitably reduced in gauge, are used in fine gauge knitting machines provided with latch needles, difficulties arise, which are not particularly apparent in coarser gauge machines, due to the rubbing of the spoons of the needle latches on the sinkers. This rubbing does no harm to the sinkers, but has two detrimental effects on the needles and their action. First, in fine gauge machines, the spoons of the needles are very small and continuous rubbing which generally occurs consistently on one side of the latch will rapidly wear away the side of a spoon, leaving a sharp edge which will cause a fraying of the yarn. This fraying is minor from a quantitative standpoint and is not at all likely to effect any complete severance of the yarn, but the slight fuzz which is raised by this action, being repeated in the loops of a particular wale, will, in a quite sheer stocking, produce the appearance of a flaw in the form of a vertical line.

Secondly, the slight friction resulting from the rubbing applied at the outer end of the latch will result in the drawing of slightly larger loops, which will also give the appearance of a vertical line running along the stocking.

While theoretically the latches in a latch needle machine will swing freely in the space between the adjacent sinkers, and this result can be achieved in coarser gauge machines, it becomes very difficult in fine gauge machines to achieve a sufficient accuracy of construction of the various parts to insure that rubbing does not occur, particularly in view of the slight lateral flexure of the needles arising due to the strains thereon imposed during the handling of the yarn. If the cylinder slots are not precisely radial, or there is some play of a needle in its slot, or because the slot in the needle within which the latch pivots is not radial, a sufficient lateral displacement of the spoon of the latch during opening and closing operations may occur to produce the wear and friction referred to.

In accordance with the present invention, the sinkers are so constructed as to avoid the possibility of contact of the latch spoons therewith during substantially the complete critical periods when swinging of the latches is taking place.

This object of the invention, as well as others particularly relating to details, will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Figure 1 is an enlarged sectional view of the upper portion of one side of the needle cylinder and its associated parts, showing the features of the invention, the section being taken axially;

Figure 2 is a somewhat similar view of a modification particularly designed to illustrate the relative movements of a needle latch and sinker during lowering of the needle; and

Figure 3 is a view similar to Figure 2 but showing conditions during the raising of a needle.

Referring first to Figure 1, which shows certain details of construction of a preferred embodiment of the invention, there is indicated at 2 the cylinder of a circular knitting machine of conventional type, provided with axially extending external slots 4 within which there reciprocate needles 6, each of which is provided with a hook 8 and a latch 10 pivoted at 12, within a slot in the needle. This needle is of conventional form, the latch being provided at its outer end with the usual spoon adapted to overlap the hook 8, which enters a slight depression in the spoon.

The conventional sinker dial carried by the needle cylinder is indicated at 14, being associated with a sinker cap 16 carrying conventional cams for acting upon the butts 20 of sinkers 18, sliding in radial slots in the sinker dial and being also guided in radial slots in the inside sinker ring 22 which, in the present instance, carries an auxiliary ring 24 to provide a groove 26 for the reception of portion 28 of each sinker 18, the inwardly extending flange of the ring 24 being received within slots provided between portions 28 and 30 of the sinkers. The slotted walls of the sinker ring 22 are indicated at 31 and serve to provide firm support for the inner ends of the sinkers and backing for the needles 6. The auxiliary ring 24 is preferably threaded to the ring 22 as indicated at 23, its final position being accurately fixed by the use of a washer 25 of a proper thickness against which it is tightened by the use of a spanner wrench entering holes 27.

Each of the sinkers is provided with a conventional ledge 32 arranged to arrest the yarn during the drawing of loops and a hook 34 which provides a throat within which the yarn is held during upward movements of the needles to cast loops off their latches. In sinkers of conventional type, the sinker behind, or outwardly of, the hook, is of substantial vertical height, its upper edge extending approximately as high as the ledge 32.

In accordance with the present invention, the portion of the sinker behind the hook 34 is cut away as illustrated in Figure 1 along the lines 35 and 36, leaving a hump 37 about which is placed a spring band 39 as is conventional in Scott and Williams' machines, for example as shown in Scott Patent 1,467,691. Briefly stated, the cut away portion of the sinker comprises that region which would normally be opposite the spoon of the needle latch during its opening and closing movements. The particular shape of this cut

away portion is not important so long as it includes substantial parts of the arcs of swing of the latch spoon, which means that it includes a region approximately concentric with a point in the throat of the hook and extending forwardly beyond the rearmost portion of the hook. The region which is absent corresponds to that which will be described more fully following a brief reference to the construction involved in the modification of Figures 2 and 3.

In this second modification, a somewhat different shape of sinker is indicated at **38** associated with the same type of sinker dial and sinker cap as has been described in connection with Figure 1, but cooperating with a somewhat different type of inner sinker ring **40** secured in conventional fashion to the upper end of the needle cylinder. The inner sinker ring **40** is slotted as indicated at **42** for the guidance of the inner ends of the sinkers, and serves to hold them against vertical movement by reason of the projection of its flange **44** within the slots provided above portions **46** of the sinkers. The sinkers are provided in conventional fashion with butts **48** adapted to be acted upon by cams carried by the sinker cap.

In this modification, the sinker is provided with the ledge **50** for engagement by the yarn and the hook **52**. A needle is illustrated in its intermediate position in each of Figures 2 and 3 at **54**, being provided with a hook **56** and a latch **58** carrying a spoon **60**, the latch being pivoted at **62**.

In Figure 2 there is illustrated the successive positions occupied by the latch of the needle as the needle is being drawn down relative to the sinker and the yarn Y supported on the ledge **50**. The sinker may have slight radial movement during this movement of the needle, but since the completion of the swing of the latch is very rapid compared to any movement which may be imparted to the sinker, it will suffice to regard the sinker as stationary during the flipping up of the latch by the yarn loop as the needle descends. When the needle is in its highest position which is of interest in this connection, the latch will occupy a position such as illustrated at **64**. At this time, it will be between existing portions of the adjacent sinkers, so that if laterally moved it might engage one of them. It will be noted, however, that when in the position **64**, not only is the spoon quite close to the shank of the needle about which angular deflection might occur in the case of inaccuracy of construction, but also a substantial portion of the latch between its pivot and spoon is sunk into the slot **66** in the needle, with the result that it is restrained against lateral movement. As a consequence, under these conditions it is very unlikely that in a carefully constructed machine with proper needles there would be sufficient angular deflection of the needle about its shank, or freedom of movement of the latch within the needle slot, to permit the spoon to engage the sinker.

As the needle drops from this position, it will be noted that almost immediately, and before substantial angular movement can take place, the spoon of the latch will move opposite the cut away portion of the sinker, and during its subsequent movements will move through a path which will not bring it opposite any remaining portion of the sinker. Of course, when the latch ultimately reaches closed position and the needle descends, the spoon of the latch will be drawn past the portion of the sinker below the ledge **50**, but at this time, no swinging of the latch is occurring, and again the spoon is very close to the axis of the needle shank and the latch is well supported laterally in the needle slot, with the result that engagement of the spoon with the sinker is very unlikely.

In the reverse movement of the needle illustrated in Figure 3, the latch will again swing as illustrated in that figure, the sinker now being in an inner position and again undergoing, if any movement, only a movement of negligible extent during the short interval within which flipping of the needle latch takes place. It will again be evident that the spoon of the latch moves in a path opposite cut away portions of the sinker. It is because of the difference in position of the sinker during the upward and downward movements of the needle that the region which is cut away to clear the spoon must have substantial radial extent.

It will be understood that where reference is made to a portion of the sinker being cut away, it is not to be implied that a sinker of conventional form is first manufactured and then subjected to an operation removing a portion thereof, the term being used to indicate the absence of material from a portion of a sinker which is conventionally present in prior types. The sinker is, of course, formed in conventional fashion by a single stamping operation from sheet stock followed by conventional polishing operations. The inner portion of the sinkers may be thinner than the outer body portions in correspondence with conventional practice.

What I claim and desire to protect by Letters Patent is:

1. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a butt located rearwardly of said hook for cam actuation of said sinker, said sinker behind said hook being cut away throughout substantially the region adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof under the action of yarn extending across the needle at approximately the level of said throat.

2. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinker being cut away throughout substantially the region adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof under the action of yarn extending across the needle at approximately the level of said throat.

3. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn

may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinkers being cut away throughout substantially the region adjacent to the path of the outer portion of a needle latch during its opening movements under the action of yarn extending across the needle at approximately the level of said throat.

4. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinkers being cut away throughout substantially the region adjacent to the path of the outer portion of a needle latch during its closing movements under the action of yarn extending across the needle at approximately the level of said throat.

5. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, and a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, said sinker being cut away throughout substantially the region adjacent to the path of the outer portion of a needle latch during its closing movements under the action of yarn extending across the needle at approximately the level of said throat.

6. In a knitting machine, independently movable latch needles, and independently movable sinkers cooperating with the needles for the formation of stitches, each of said sinkers comprising a ledge arranged to hold yarn during the drawing of loops, and a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, said sinker being cut away throughout substantially the region adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof under the action of yarn extending across the needle at approximately the level of said throat.

7. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a butt located rearwardly of said hook for cam actuation of said sinker, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof.

8. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof.

9. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the path of the outer portion of a needle latch during its opening movements.

10. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, and a portion extending rearwardly of said hook and serving for actuation of the sinker, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the path of the outer portion of a needle latch during its closing movements.

11. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, and a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the path of the outer portion of a needle latch during its closing movements.

12. A sinker adapted for use in a knitting machine in association with latch needles comprising a ledge arranged to hold yarn during the drawing of loops, and a hook located rearwardly of said ledge providing a throat within which yarn may be held during movements of needles to free their latches of loops, said sinker being cut away behind said hook throughout a region approximately concentric with a point in the throat of said hook and extending forwardly beyond the rearmost portion of said hook, the region being that adjacent to the paths of the outer portion of a needle latch during opening and closing movements thereof.

JACOB S. MOSS.