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Vogel

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[54] **KNITTING MACHINE WITH WEFT INSERTION**

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[51] **Int. Cl.** **D04b 23/12**

[58] **Field of Search** ..... 66/84 A, 84, 85, 66/86, 125

[56] **References Cited**

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[57] **ABSTRACT**

An improvement in a Raschel machine wherein pins or separate holding elements are provided with a drive mechanism which raises the butts about the continuously driven thread so that during the rocking motion of the thread guide, the pins or holding elements pass through beneath the presented thread such that the outlet orifice of the thread guide is arranged above the thread presenter during the racking motion.

4 Claims, 3 Drawing Figures

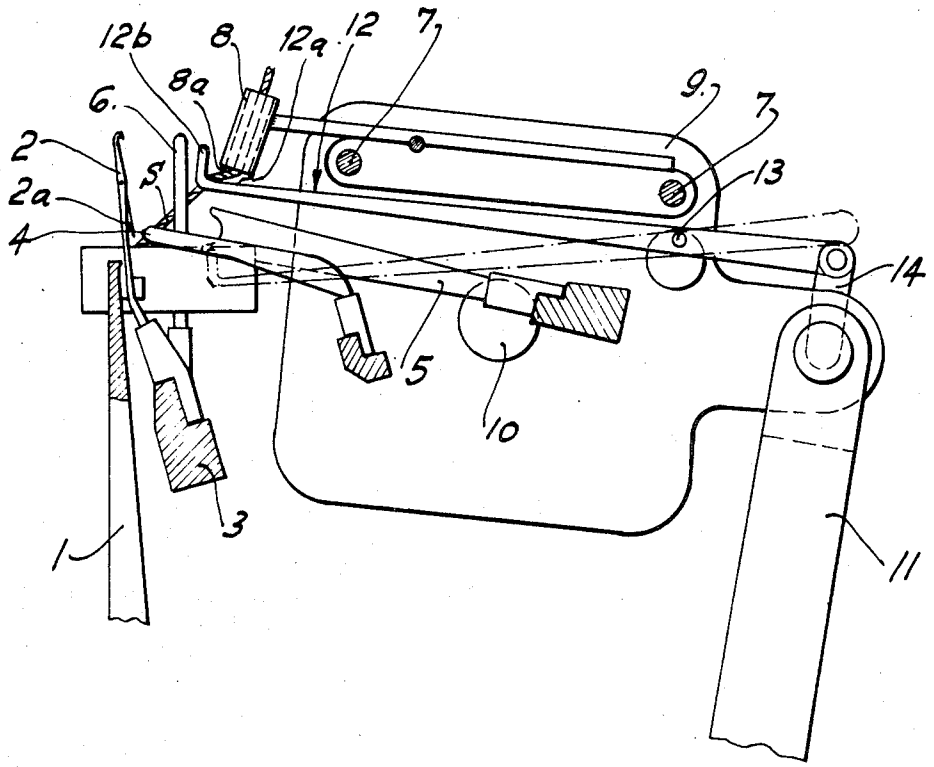


FIG. 1.

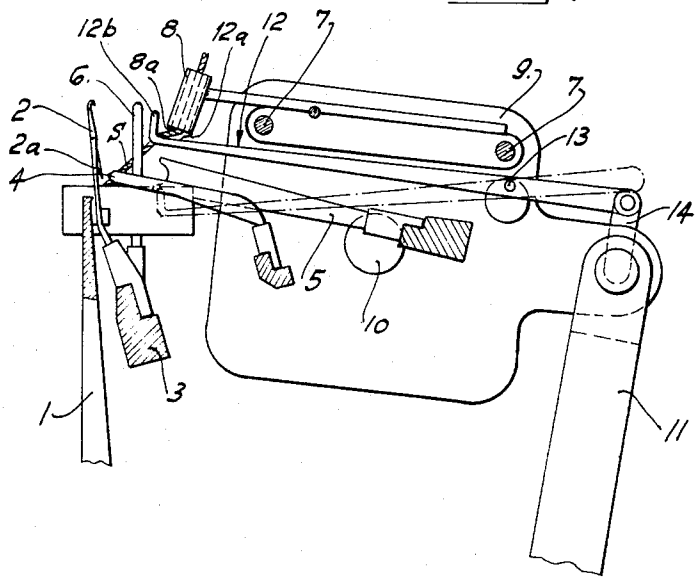


FIG. 2

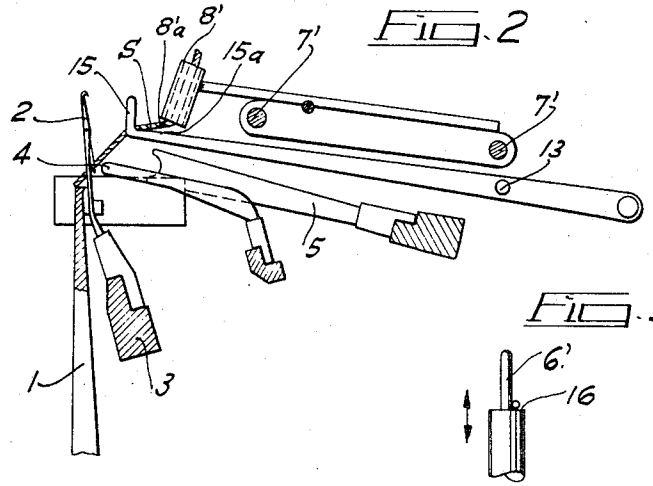


FIG. 3

KNITTING MACHINE WITH WEFT INSERTION

The invention relates to a knitting machine with weft insertion, for laying-in weft yarns in every second or more courses, on which pins are provided at each end of the needle bed, said pins being vertically traversable and which determine the required length of weft thread, and on which the racking motion of the thread guide extends over two or more courses, such that the presented weft thread, on completion of the racking motion, is laid by the thread presenter behind the knitting needles.

On a known knitting machine of this type (German Pat. OLS No. 1,952,810), the thread feeder or guide of the weft inlay mechanism, is linked with a continuously, uniformly operating, adjustable drive and the thread presenter is linked with an intermittent drive, with respect to several courses. This intermittent drive represents an additional, not inconsiderable expense. Moreover, since the thread presenters are frequently designed in the form of a sinker bar, it is essential that the sinker elements on said bar be designed especially long with such known machines, so that they engage with the knitting needles even when the presenter motion is not in use. These long sinker elements are particularly prone to damage and there is the further danger hazard involved.

The aim of the present invention is to devise a knitting machine of the aforementioned type but having a simpler design.

This aim is achieved according to the invention in that the pins or special holding or sinker elements are provided with a substantially horizontal butt to hold the presented weft thread, and a drive mechanism being envisaged for the pins or holding elements, the said drive lifting the butt so far above the continuously driven thread presenters that these pass through beneath the presented thread during the racking motion of the thread guide, while the outlet orifice of the thread guide is arranged above the thread presenter during the racking motion.

This means that with this new knitting machine, the thread presenters can be driven continuously as on previously known knitting machines. In the event of them being linked with the sinker bar, no special design for the bar sinker elements is necessary. Furthermore, these not be exceptionally long, thus obviating the potential hazard. A separate drive for the thread presenter is not needed. The drive for the pins or holding elements is required in any case, and needs merely to be designed such that the pins or holding elements carry out a traverse motion extending upwards beyond their normal stroke, such that the presented weft thread is lifted over the thread presenters, and that during the racking motion of the thread guide, depending on how many courses are to be without inlay yarn, these (presenters) can move forwards once or more times without gripping the presented weft thread. Only when the thread guide has reached its end position, or even beforehand, if its racking motion has proceeded to such an extent that during the next forward movement of the thread presenter, the presented weft thread is to be laid behind the knitting needles, the pins or holding (sinker) elements are lowered, so that they release the weft thread and this then comes to lie on the thread holder sinkers and hence within the working range of the thread presenter. Moreover, the knitting machine according to the invention has the advantage,

that during the formation of several courses, the weft thread can be presented relatively slowly, so that overall, an increase in the machine speed is made possible.

Further advantages and details of the invention are described in more detail below relating to a number of embodiments as illustrated in the drawings, where

FIG. 1 shows a section through a first embodiment;

FIG. 2 shows a section through a second embodiment;

FIG. 3 shows a part section through yet a further embodiment.

In FIG. 1, the knocking-over bar 1 is shown with the latch needles 2 being vertically traversable on it. These latch needles are linked with the needle bar 3. Thread holder sinkers 4 and thread presenters 5 are movably arranged perpendicular to the knocking-over bar 1, and at both sides of the needle bed, vertically displaceable pins are provided for determining the length of the weft thread. In the embodiment illustrated in FIG. 1, the pin 6 is positively linked with the needle bar 3. Parallel to the knocking-over bar 1, the thread guide 8 is traversable along the rails 7. In the embodiment illustrated, the rails or bars 7 are mounted in a frame 9, which can be pivoted about the axis of a shaft 10. The drive takes the form of a linkage 11, the movement of which is derived from the machine drive, through a suitable intermediary gearing. In this way, the lifting and lowering motion of the thread guide 8 is controlled such that its outlet orifice 8a is located about 5 – 7 mm above the thread presenter 5 during the racking motion runs parallel to the knocking-over bar 1.

In addition to the pins 6 at the two ends of the needle bed, each end is also provided with a vertically movable holding element 12 having a horizontal butt 12*a*. Said holding element 12 may be pivotable about the axis of a pin 13, such that the oscillation motion of the holding element 12 is actuated by the linkage 11 and an intermediate link 14. As can be seen in FIG. 1, the horizontal butt 12*a* is also approximately 5 – 7 mm above the thread presenter 5, during the racking motion of the thread guide 8.

The mode of operation of the knitting machine described here is as follows:

As soon as the thread guide 8 has reached its end position, the thread presenters move forward towards the knocking-over bar 1 and lay the weft thread, sliding along the thread holders 4, behind the knitting needles. Once this is completed, the needle bar 3 together with the pin 6 ascends. The thread guide 8 is swung upwards into the position shown in FIG. 1, via the linkage 11. (An apparatus of this type is described in USA Pat. No. 3,552,151). Simultaneously with the upwards motion of the thread guide, the holding element 12 is also pivoted upwards, but in this case, the front end with the butt 12*a* undertakes a longer stroke than the thread guide 8, because of the different transmission, which is achieved by the corresponding arrangement of the swivel axes 10 and 13 with differing lever lengths. Accordingly, the holding element 12 assumes the position indicated in FIG. 1. In the subsequent racking motion of the thread guide, parallel to the knocking-over bar 1, i.e., perpendicular to the drawing plane, the weft thread S is initially laid on to the butt 12*a* of the holding element 12, after which the thread guide 8 proceeds with its racking motion, this motion taking place above the thread presenters, which during the racking motion, move forwards and backwards once or more

times, according to how many courses are to be missed out from weft insertion.

Once the thread guide or feeder **8** has proceeded so far with its racking motion, that during the next forward motion of the thread presenter **5**, the thread is again to be laid behind the knitting needles, the linkage **11** moves upwards and hence the thread guide **8** moves down, so that its outlet orifice **8***a* is located close above the thread holder sinkers **4**. At the same time, the intermediate link **14** causes the holding element **12** to descend, to such an extent that its front end **12***b* comes to lie below the thread holder sinkers **4**. As a result, the weft thread is lifted from the butt **12***a* and released. Now the weft thread is held only by the pin **6**, so that it cannot be gripped by the latches **2***a* of the latch needles. Just before the thread guide **8** alters its racking motion, the latch needles together with the pins descend in the normal manner, so that now the pin **6** also releases the weft thread, and this can be laid behind the knitting needles by the thread presenters **5**.

In the embodiment illustrated in FIG. **2**, the weft thread guide or feeder **8'** is not designed to ascend and descend, but may nevertheless be envisaged so as to be capable of ascending and descending. The outlet orifice **8'***a* of the thread guide also lies above the thread presenter **5**. In this embodiment, the holding elements **15**, which may be mounted so as to be vertically pivotable or displaceable, simultaneously fulfill the function of the holding pins. During the racking motion, the holding elements **15** assume the position indicated in FIG. **2**. Just before the thread guide **8'** has altered its racking motion, the holding elements **15** are moved into their lower position, so that the weft threads are simultaneously lowered and released. The drive to the holding elements **15** is effected through a separate drive, which is independent of the motion of the needle bar **3**. By way of example, the drive may be a cam chain or cam disc, linked with the machine drive via a suitable gearing.

In the embodiment illustrated in FIG. **3**, the pin **6'** is mounted so as to be vertically movable, and is provided with a substantially horizontal butt **16**. Thus the pin **6'** fulfills the duties of the pin **6** and the holding element **12** of the embodiment illustrated in FIG. **1**. By means of a suitable drive, the traverse motion of the pin **6'** is controlled in such a manner that during the racking motion of the thread feeder or guide, the horizontal butt **16** lies above the thread presenter and on completion of the racking motion, the whole pin is lowered to such an extent that the weft thread is released.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a knitting machine having knitting needles and movable thread guide means for laying-in weft threads between first means provided at each end of a needle bed, said first means being vertically displaceable and determine the required length of a weft thread and second means for effecting a movement of said thread guide means which extends over at least two loop forming cycles, such that a presented weft thread, on completion of said movement of said thread guide means, is laid by a thread presenter behind the knitting needles, the improvement comprising:

support means defining substantially horizontally extending butts for supporting said presented weft threads and drive means therefor for raising and lowering said butts, said raising motion being above said thread presenter so that during said movement of said thread guide means, said thread presenter will simultaneously move beneath said presented thread supported on said horizontal butts of said support means and at least one loop formed while said weft thread is supported on said support means will not have a weft thread therein but during one or more subsequent cycles of operation forming a desired number of additional loops, said drive means for said support means will thereafter effect a lowering of said butts on said support means to position said weft thread supported thereon in the path of movement of said thread presenter to locate a weft thread in a desired one of said loops.

2. The improvement according to claim **1**, wherein said thread guide means includes drive means for raising and lowering same; and

including transmission means between said drive means for said thread guide means and said drive means for said support means so that upon a driving of said drive means for said thread guide means to lower same, said transmission means will effect a lowering of said support means below the lower level of said outlet orifice of said thread guide means to effect a removal of said weft thread from said support on said support means.

3. The improvement according to claim **1**, wherein said support means comprise holding elements having a horizontally and longitudinally extending butt adapted to support a transversely extending weft thread.

4. The improvement according to claim **1**, wherein said support means comprise vertically extending pin means adapted to support a transversely extending thread.

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