Oct. 4, 1955 TSUTOMU YAMADA 2,719,418

HAND KNITTING MACHINE

Filed Nov. 24, 1954

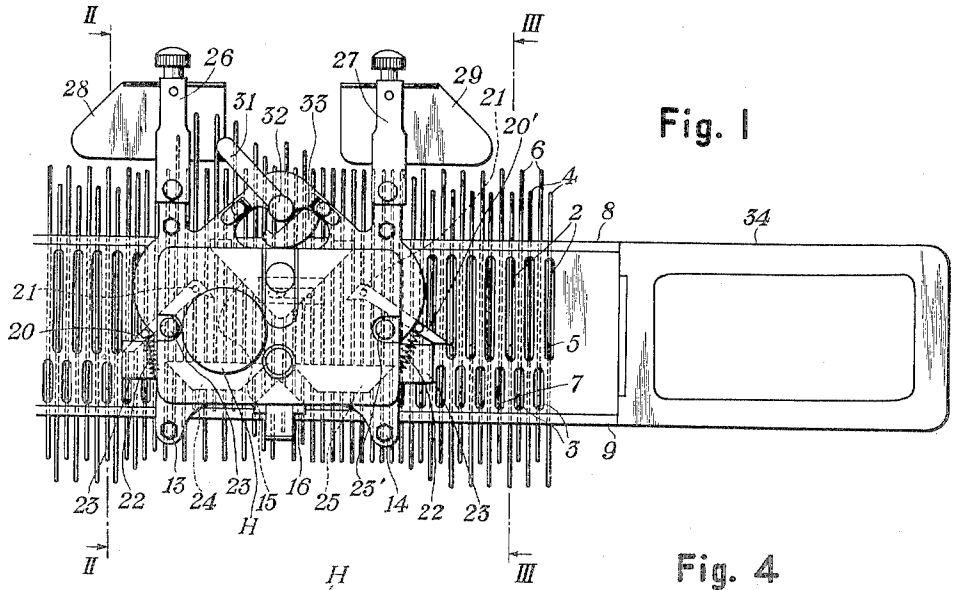

Fig. 1

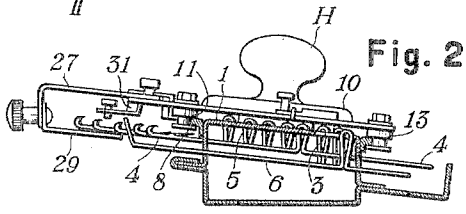

Fig. 2

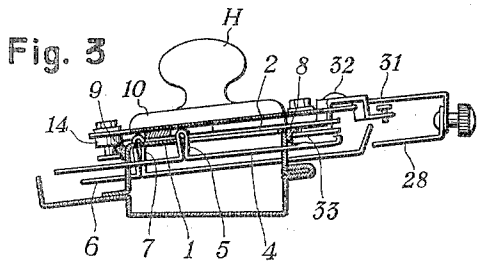

Fig. 3

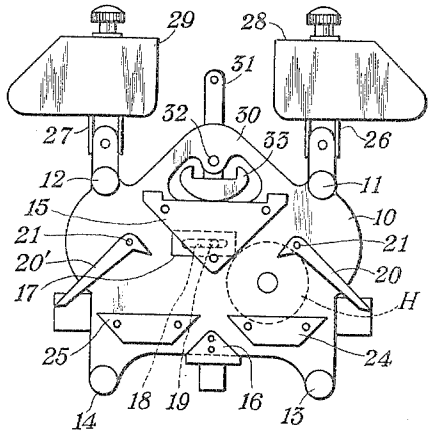

Fig. 4

Inventor

By

Attorney

United States Patent Office

2,719,418

Patented Oct. 4, 1955

2,719,418

HAND KNITTING MACHINE

Tsutomu Yamada, Tokushima, Japan

Application November 24, 1954, Serial No. 471,006

5 Claims. (Cl. 66—60)

This invention relates to a hand knitting machine of the type comprising a needle bed having needle slots in which the butts of the knitting needles are received, and a carriage adapted to be manually shifted along the needle bed and having the center cam and side cams adapted to control the movement of said knitting needles during the movement of said carriage.

The object of the invention is to provide a new hand knitting machine which is compact and simple in construction, operated very smoothly by easy manipulation, and is capable of manufacturing a variety of excellent knitted fabrics.

In the accompanying drawings, in which a preferred form of the present invention is illustrated:

Figure 1 is a plan view of the essential part of the hand knitting machine constructed according to this invention,

Figure 2 is a cross sectional view taken along line II—II of Figure 1,

Figure 3 is a cross sectional view taken along line III—III of Figure 1, and

Figure 4 is a reversed plan view of the carriage.

Referring now to the drawings, 1 denotes a needle bed having two rows of needle slots 2 and 3, the needle slots 2 in the upper row being arranged in staggered or offset position with respect to the needle slots 3 in the lower row. Each of the latch needles 4 has a butt 5 which engages with one of said needle slots 2 in the upper row, and each of the bent needles 6 has a butt 7 which engages with one of said needle slots 3 in the lower row. The needle bed 1 is provided in the upper and lower edges with guide rails 8 and 9, respectively. 10 is a carriage having rollers 11, 12, and 13, 14 engaging with and guided by said rails 8 and 9, respectively. On the inner side of the carriage 10, there are provided an upper center cam 15 and a lower center cam 16, the apex of each of the cams being arranged opposite to each other. Beneath the center cam 15 near the apex thereof, there is provided a barrier member 17 having a slot 18 in which is inserted a pin 19 protruding from the cam 15. 20 and 20′ are rockable side cams of the bell-crank form pivoted as at 21 and arranged apart from the center cam 15. Each of said rockable cams 20 and 20′ is pulled by a spring 22 connected to adjusting elements 23. The inclination of each rockable cam is adjusted by means of the adjusting element 23 which is adjustably pivoted on a screw 23′. Opposite to the inclined faces of the lower center cam 16, there are arranged side cams 24 and 25. The spaces left between the upper center cam 15 and the rockable cams 20, 20′ form the passages for the butts of the latch needles 4, and the spaces between the lower center cam 16 and the side cams 24, 25 form the passages for the butts of the bent needles 6.

Pivoted on the upper corners of the carriage 10 there are arms 26 and 27, which are provided on their free ends with plates 28 and 29 respectively, arranged adjacent to the heads of the needles 4 and 6. Between said corners there is a supporting frame 30, on which a thread carrier 31 is pivoted at 32. The lower arm of said thread carrier

31 is formed as sliding shoes 33 which embrace the upper guide rail 8 as shown in Figure 3. At both ends of the needle bed 1, there are rail extensions, of which only one 34 is shown in Figure 1. H is a handle for manipulating the carriage 10.

The operation of the invention is as follows:

In view of the fact that, according to this invention, the needle slots 2 and 3 in the needle bed 1 for receiving the butts 5 and 7 of the latch needles 4 and the bent needles 6, respectively, are arranged in staggered or offset positions to each other, being divided into the upper and lower sections or rows, and that on the rear side of the carriage the passages for the butts of the needles 4 and 6 are formed between the upper center cam 15 and the rockable cams 20, 20′ and between the lower center cam 16 and the side cams 24, 25, respectively, it will be noted that as the carriage 10 is shifted for instance to the left, the latch needles 4 are lifted upwardly by the rockable cam 20. Then, the said latch needles are lowered by being engaged by the left hand inclined face of the upper center cam 15 and, after passing the lowermost position of the cam 15, they are yieldingly pressed downwardly by the lower face of the opposite rockable cam 20′. On the other hand, the butts 7 of the latch needles 6 are guided along the lower face of the side cam 24, and upon engaging with the left hand inclined face of the center cam 16 they are pressed upwardly. After passing the apex of the triangle of said center cam 16, the bent needles are engaged by the left hand inclined face of the opposite side cam 25, and are thereby pushed downwardly. Then the needles remain at their lowermost position by being guided along the lower horizontal face of the cam 25. By the above mentioned steps, the latch needles 4 and the bent needles 6 perform the desired knitting operation in usual manner.

The rockable cams 20 and 20′ which act as side cams for the upper center cam 15 are pivoted as at 21, and are adapted to be set in desired inclination by means of the adjusting member 23. When said rockable cam 20 or 20′ is set in such inclination that the butts of the latch needles 4 are in their lowermost positions in the needle slots 2 out of path of the lower end of the cam 20 or 20′, the latch needles 4 would not be operated by said cams 20 and 20′. By such means, the rockable cams 20 and 20′ may be held inoperable when desired, for instance, in the event that it is desired to shift the carriage 10 freely without being subjected to the control from said cams.

The plates 28 and 29 are rigidly mounted on the arms 26 and 27, respectively, and protrude from the upper part of the carriage 10. The inner edges of these rigid plates are normally held adjacent to the heads of the needles during the movement of the carriage. These plates act as a guide for the knitted fabric, by which guide the knitted fabric is successively guided downwardly, so that the knitted portion is held in a stable condition and the downward movement of the knitted fabric is facilitated. By such means, the use of the weight may be dispensed with or simplified.

The thread carrier 31 pivoted as at 32 carries on opposite end the sliding shoes 33 which move in sliding contact with the guide rail 8 when the carriage 10 is shifted, so that said shoes 33 serve to normally hold the thread carrier 31 oscillated toward the direction of movement of the carriage. By such means, the thread carrier is always held in the vicinity of the heads of the operating needles by the shifting movement of the carriage itself, so that it is not necessary to provide special means for the purpose, and the knitting operation may be efficiently effected.

The barrier member 17 which is slidably mounted between the carriage 10 and the upper center cam 15 will be held protruded beyond one of the inclined faces of the cam 15, which inclined face being faced reversely to

the direction of movement of the carriage. The latch needles **4** which have been moved downwardly under the control of the center cam and going to be held in their lowermost position may frequently tend to be moved upwardly as the shifting of the carriage is continued. The barrier member **17** which is held projected from the tailing inclined face of the center cam will serve to prevent such accidental upward movement of the needles, attaining the straight movement of the butts relative to the carriage.

From the foregoing description, it will be seen that the hand knitting machine according to this invention is very compact compared with the heretofore known hand knitting machine, due to the inclusion of two rows of needle slots in one needle bed, the carriage being provided with the upper center cam cooperating with the rockable side cams and with the lower center cam cooperating with the side cams, controlling the latch needles and bent needles, respectively; that the carriage may be operated very smoothly with the most reliability; that the machine operates in the most efficient manner; and that the excellent knitted fabrics can be obtained by utilizing the present hand knitting machine.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What I claim is:

1. A hand knitting machine comprising a needle bed having upper and lower rows of needle slots, each slot in one row being arranged in staggered or offset position with respect to the slot in the other row, latch needles having their butts received in the needle slots in the upper row, bent needles having their butts received in the needle slots in the lower row, a carriage adapted to be shifted along said needle bed, an upper center cam having two inclined faces and mounted on the inner side of said carriage, two rockable side cams pivoted on the carriage opposite to the inclined faces of the said upper center cam springs acting on said side cams, adjusting elements for varying the inclination of said rockable side cams, a lower center cam having two inclined faces and mounted on the inner side of said carriage, and two side cams arranged opposite to the inclined faces of said lower center cam, the arrangement being such that the butts of said latch needles and the butts of said bent needles are operated by said center cams and side cams during the movement of said carriage.

2. A hand knitting machine according to claim 1, further comprising arms pivoted on said carriage rigid plates carried by said arms, the inner edges of said plates being held near the heads of the needles.

3. A hand knitting machine according to claim 1, wherein a thread carrier is pivoted near the upper edge of the carriage, which thread carrier having sliding shoes engaging with a guide rail of the needle bed.

4. A hand knitting machine according to claim 3, wherein the sliding shoes consist of two plates embracing the guide rail of the needle bed.

5. A hand knitting machine according to claim 1, wherein a barrier is slidably mounted between the carriage and the upper center cam.

No references cited.