June 18, 1929. M. HAGIHARA 1,718,140

KNITTING DEVICE

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Fig. 1.

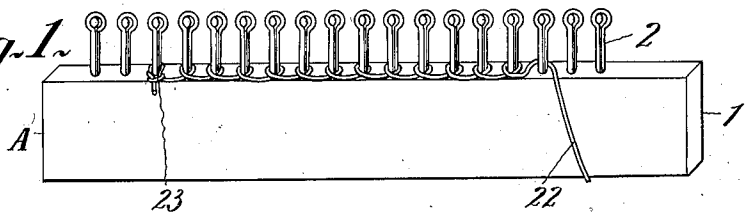


Fig. 2.

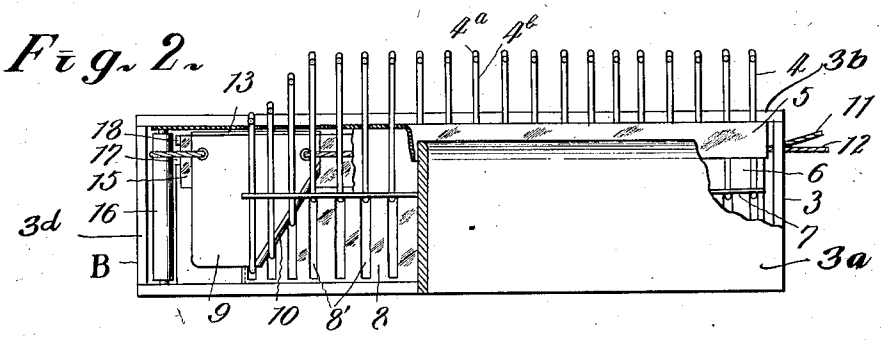


Fig. 3.

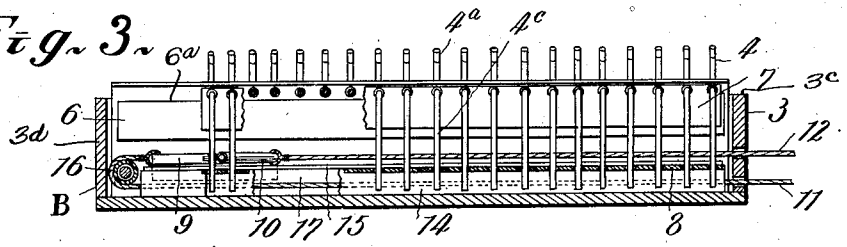


Fig. 4.

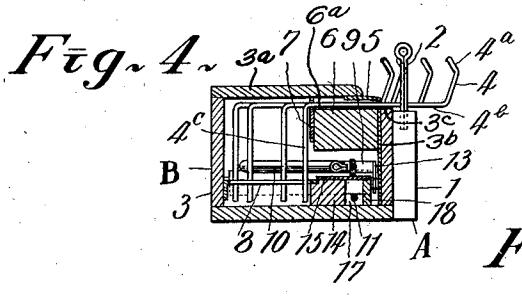
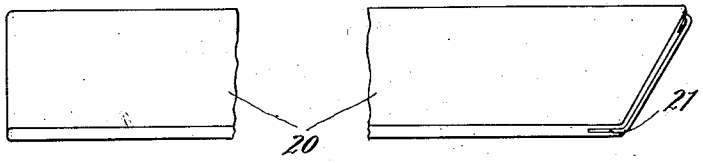


Fig. 5.



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Fig. 6.

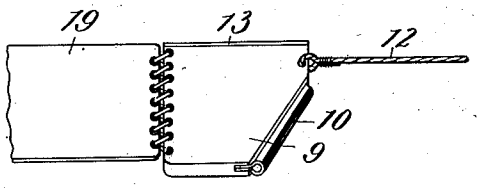


Fig. 7.

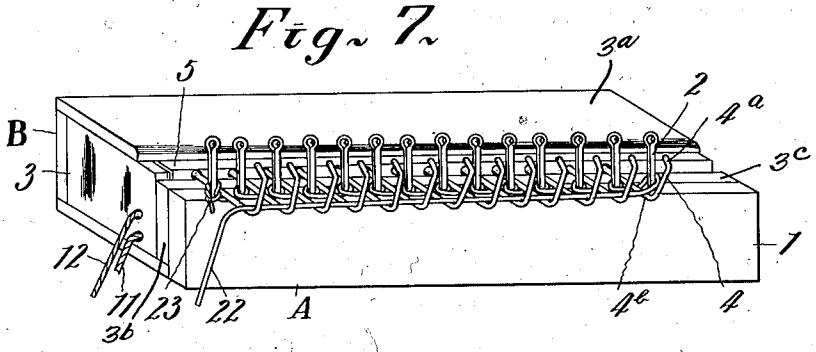


Fig. 8.

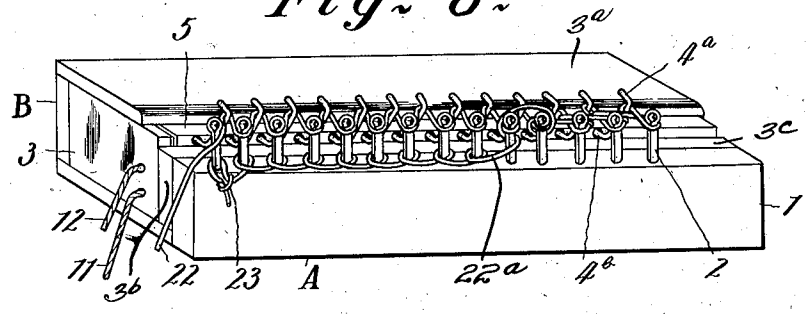
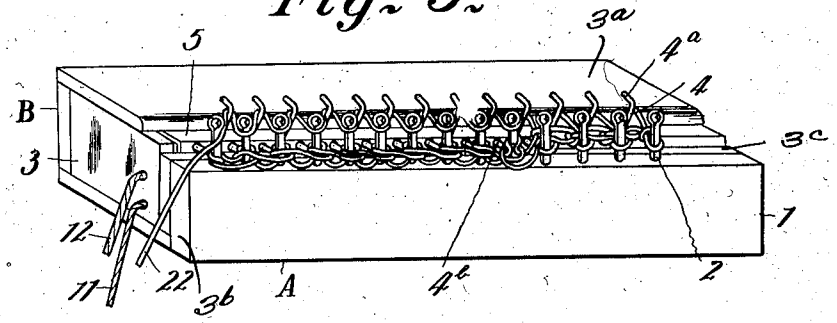


Fig. 9.



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UNITED STATES PATENT OFFICE.

MASA HAGIHARA, OF TOCHIGI-KEN, JAPAN.

KNITTING DEVICE.

Application filed December 27, 1927, Serial No. 242,854, and in Japan February 2, 1927.

This invention relates to improvements in knitting device adapted particularly for manual use and has for its object to provide means of improved form adapted to facilitate greater speed and convenience in knitting flat fabrics.

Embodiments of this invention are shown in the accompanying drawings, in which:

Fig. 1 is a perspective view of the knitting holder with a yarn wound around the pins to show the first steps for knitting operation.

Fig. 2 is a plan view of the hooking device, partly in section.

Fig. 3 is a vertical sectional view of the hooking device.

Fig. 4 is a cross sectional view of knitting device, the knitting holder and the hooking device being assembled in use for knitting and hook members being shown in various position.

Fig. 5 illustrates a modification of the plow cam.

Fig. 6 illustrates a plow cam connected to a leather strip.

Figs. 7, 8 and 9 illustrate various steps of knitting operation.

Referring to the accompanying drawings, the embodiment of my device therein shown comprises a knitting holder A and a hooking device B. The knitting holder A comprises a bar 1 of any desired length corresponding with the width of the fabric to be knitted, which may be wood or any other material, and a series of pin-like members 2 uprightly secured by suitable means equally spaced suitable distance apart on one longitudinal edge of the said bar throughout its length, as shown in Fig. 1. The heads of the said pin-like members are suitably formed, for example to ring-shape as shown in Fig. 1, so as to prevent accidental removal of the meshes supported by the said pins and provide a smooth working face free from sharp edge, such as might injure the meshes when in use.

The hooking device B comprises a rectangular case 3 of the same length as said knitting holder, which may be of wood or any other suitable material, a series of hook members 4 horizontally movably supported in the said case so as to extend upwardly thereon at the same pitch as that of the pins 2 of the knitting holder throughout its length and means for retracting the hooks hooking yarn from their laterally extended position as hereinafter will be described.

The top plate 3^a and a side plate 3^b of the said case 3 are somewhat cut away at an upper corner thereof through their length, whereby a longitudinal opening is formed, to inside of which is attached a thin angle metal plate member 5, placing its shorter and longer legs underside of the top plate 3^a and inside of the side plate 3^b respectively, as clearly seen in Figs. 4, 7, 8 and 9. A support member 6 is attached to the inside of the longer leg of the metal plate member 5 with the upper face 6^a flush with the upper edge 3^c of the side plate 3^b as clearly seen in Figs. 3 and 4. A thin metal plate member 7 is attached to the side of the support member 6 opposite to its side attached to the inside of the angle metal plate member 5 with its upper end extending to underside of the top plate 3^a of the case 3 as clearly seen in Figs. 3 and 4. The metal plate members 5 and 7 are provided with a series of perforations immediately above the said support member, through which perforation the hook members 4 are arranged. The hook members, indicated as a whole by the numeral 4 comprise a hook 4^a, horizontal arm 4^b and vertical leg 4^c. Said hooks are preferably inclined outwardly and curved inwardly near their tips as clearly shown in Fig. 4, in order that the same may hook yarn, but may be easily removed from the meshes produced. The hook members are mounted on the support member 6 with the horizontal arms laying thereon through the perforations of the metal plate members 5 and 7, the hooks being upwardly extended from the perforations of said metal plate members 5 and the legs downwardly extended through the slots 8′ of a plate 8 with a number of slots formed crosswise and parallel, provided near the bottom in the case 3, so that the hooks may be laterally extended or retracted to their retracted position by tilting the case 3 by hand.

As to means for retracting the hooks from their laterally extended position hooking yarn for knitting into their retracted position, we employ means of a plow cam member of suitable width, which is pushed in the case from its one end with the plow cam engaging with the legs of the hooks, thereby the legs of the hooks successively are forced laterally along the slots of the slotted plate 8 from the leading edge of the plow cam toward its following edge until the said legs leave the plow cam at the retracted position of the hooks, causing the hooks to successively re-

tract. The plow cam may be made of an angle so as not to engage with the legs above two or three in number and to cause the said legs to slide well thereon by providing any suitable antifriction means, so that the plow cam member may be easily pushed in by hand without applying any excessive force to retract the hooks hooking yarn for knitting. In Figs. 2 and 3 I have shown a form of the said means for retracting the hooks by way of an example, in which the plow cam piece 9 is provided with a slide 10 made of suitable metal attached to the plow cam, cords 11 and 12 connected thereto and a guide plate 13 attached thereto as shown in Figs. 2, 3 and 4. This plow cam piece 9 is mounted on a plate 15 fixed to top of the guide bars 14 and 18 provided in the case, the projection of the guide plate being inserted in the narrow space provided between the side of the case 3 and said guide bar 18 for that purpose. The cords 11 and 12 connected to the said plow cam piece are led out of the case 3 through the holes provided at the end of the said case, the former cord being extended around the roller 16 provided in said case and the longitudinal groove 17 provided between the guide bars 14 and 18. In this case, the hook members are partly omitted toward the end of the case 3 where the roller 16 and plow cam 9 are located in order to provide the necessary space for disposing of the same as shown in Figs. 2 and 3.

As a modification, a leather strip 19 of some thickness and a width slightly less than that of the plow cam piece may be substituted for the cord 11 connected to said plow cam piece with slight suitable alteration of the device to an advantage that the hook members retracted inwardly by said plow cam piece may be retained in that position, the lower ends of the said hook members being in engagement with one side edge of the said leather strip as shown in Fig. 6. The leather strip 19 is connected to the plow cam 9 in such a manner that its one side edge engaging the lower ends of the hook members, when the same is in retracted position, is made to fall short of the corresponding side edge of the plow cam 9 as clearly seen in Fig. 6, so that the movement of the said plow cam to successively retract the said hook members can be effected without application of excessive force, on account of the loose engagement of retracted hook members with the side edge of the said leather.

As another modification, the plow cam may be formed at one end of a strip plate 20 having suitable length greater than the length of the case 3 and adapted to be inserted into the said case through a slot (not shown) formed at lower end of the end plate 3^a of the said case. In this case, it will be seen that the cord 11 or leather 19, cord 12 and roller 16 are of no need.

The device is operated as follows:—

A small loop is formed in a yarn 22 by a single bow-knot 23 and slipped over a pin of the knitting holder A, then the yarn is wound around the successive pins through any desired length corresponding with the width of the fabric, as shown in Fig. 1. Then the knitting holder A and the hooking device B are disposed in juxtaposition with the outwardly extended horizontal arms 4^b of the hook members 4 placed over the wound part of the yarn between the pins 2 of the knitting holder A and unwound part of the yarn running on the horizontal arms 4^b of the hook member outwardly extended beyond the pins 2 of the said knitting holder, the plow cam being at the fallen back extreme position, as shown in Fig. 7. Then the hook members 4 are brought in the position withdrawn from the drawn out position by forwardly moving the plow cam 9 from its fallen back position by pulling the cord 12, the part of the yarn laid on the horizontal arms 4^b of the hook member being hooked on the pins 2 of the knitting holder A and the hook members 4 of the hooking device B in the form shown in Fig. 8. Then the loops of first wound yarn on the pins of the knitting holder such as indicated at 22^a in Fig. 8 are one by one turned over the pins as partly shown in Fig. 8 and finally the single bow-knot 4 is also turned over the last pin, leaving the yarn hooked on the pins 2 on the retraction of the hook members 4 in its position. Then the hook members of the hooking device are unhooked from the mesh formed on the knitting holder and the plow cam is returned to its original position by pulling the cord 11, and said hook members are outwardly extended by tilting the case 3. The knitting holder is then turned through 180 degrees and is disposed in juxta-position to the hooking device as before, the horizontal arms of the hooks being laid between the pins over the mesh formed on the knitting holder, and the free yarn is led on the horizontal arms of the hook members extended outwardly beyond the pins of the knitting holder, and then the plow cam piece is forwardly moved by pulling the cord 12, subsequently the hooks are retracted in hooking the yarn, and then the meshes are turned over the pins, the last laid yarn being left hooked on the pins, in the same manner as described above as partly shown in Fig. 9. The operation is to be repeated as desired. The operation of turning the meshes is preferably effected by aid of a needle at first, but after two or three operations it is easily effected by fingers.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. A knitting device of the character described, comprising a knitting holder having upstanding pin-like members with ring shaped heads disposed in a series along an

edge thereof adapted for supporting knitting loops, so as to prevent accidental removal of the loops from said pin-like members, and a hooking device having a series of hook members adapted to extend outwardly for hooking the yarn for knitting and means for retracting said hook members from their extended position to the retracted position to effect knitting, said means consisting of a cam piece provided with a slide, substantially as set forth.

2. A knitting device as described in claim 1, in which the cam piece is connected to a leather strip, substantially as set forth.

In testimony whereof I affix my signature.

MASA HAGIHARA.