ATTACHMENT FOR KNITTING MACHINES

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Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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To all whom it may concern:

Be it known that we, ISRAEL LACK and HARRY KAISTRINSKY, citizens of the United States, and residents of Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in an Attachment for Knitting Machines, of which the following is a specification.

This invention relates to knitting machines and more particularly to a device for attachment to a knitting machine for executing designs of various characters by introducing a yarn of different color in the material during the course of knitting.

The object of the invention is to provide a device of this character which can readily be attached to any make of knitting machine.

Another object of this invention is to provide a device of this character having a design control element to control the shape of design desired.

Still another object of this invention is to provide a device of this character by which design controls of different kinds can be substituted to produce designs of various characters.

Still another object of the invention is to provide a device of this character having a reciprocating yarn carrier, suitable stops to limit the movement of the said yarn carrier, and means to govern the spread of the said stops.

A further object of the invention is to provide a device of this character adapted to execute designs of various characters in the material, while being knitted, which shall be positive in operation and practically rigid in its construction, to reduce the movements of the operative parts to a minimum and produce a knitting device that is simple and effective and capable of accurate and efficient operation.

Other objects will appear as the disclosure progresses. The drawings are merely intended to indicate a possible embodiment of the invention. It is obvious that the actual needs of manufacture may necessitate certain mechanical changes. It is, therefore, not intended to limit the invention to the embodiment illustrated, but rather to define such limits in the appended claims.

In general the device consists of a reciprocating yarn carrier, a pair of stops to limit its movement, a pair of threaded rods on which the stops ride, and means to accom-
clamp 12 attached to the shaft 13 and connected to the lever 6 by link 11. This will swing the lower end of the lever 6 to the left and the upper end to the right, as shown in dotted lines on Fig. 3. On the upward revolution of the shaft 13, the lever 6 will take the position as shown in full lines.

Swingingly attached to the oscillating lever 6 is a pawl 14 having one end weight 15 and at the other end, a cam engaging lug 16.

Engaging the master gear 17 is another gear 18 fixed on one end of the shaft 13 and having bearings 19 and 20. At the other end of the shaft is a bevel gear 21 which meshes with another bevel gear 22. The shaft of this gear is integral with a threaded rod 23. Mounted on the shaft and adjacent to gear 23 is a spur gear 24, meshing with another spur gear 25. The shaft of this gear is integral with another threaded rod 26.

Sidably attached to the bed 27 of the knitting machine is a yarn holder 28. The yarn holder consists of a dovetailed base 29 on which an arm 30 is fastened at 31. The curved end 32 has an adjustable yarn guide 33 attached thereto.

Sidably fastened to the bed 27 of the knitting machine are two stops 34 and 35 at either side of the yarn holder 28. Mechanism is provided in the stops to engage and disengage the threaded rods 23 and 26, which consists of a slotted element 36 pressed downwardly by a spring 37. A knob 38 and stem 39 is attached to the slotted element to raise same. When the slotted element is in the downward position, the slot 40 will engage one of the threads in the rod and move the stop in either direction, depending upon the direction of rotation. When it is desired to move the stops independently of the revolution of the rods 23 and 26, the knobs 38 are pulled upward and swung around, thereby disengaging the pin 41 from the slot 42, as will be noted in Figure 11.

Tightening means are also provided to keep the stops in any fixed position on the bed of the knitting machine when the stops are disengaged from the threaded rods 23 and 26. The base of the stops as will be noticed in Figure 10 has an adjustable movable element 43 which grips the bed of the knitting machine. Numerical 44 represents an adjusting screw and 45 supports for the movable element 43. As noticed in Figures 7 and 10, the supports 45 consist of threaded bolts loosely fitting into the downward bent portion of the stops 34 and 35, and screwed tightly into the movable element 43. The function of the supports 45 is to prevent lateral movement of the element 43 when the stops 34 and 35 are moved. The adjusting screws 44 do not screw into the element 43 but press against the same for the purpose of wedging the element 43 against the bed 27 of the knitting machine.

The operation of this knitting attachment, particularly for a machine known in the art as a straight knitting machine as follows: A yarn 46 of a different color than the stock being knitted is introduced at the knitting line 47 and the machine is started. A machine of this character has a rod or finger 48 reciprocating the full length of the machine during its operation. This finger corresponds with a plunger marked X described in a publication "Flat Machine Knitting & Fabrics" by H. D. Buck. See page 64 second paragraph, page 71 third paragraph, and page 76 second paragraph. The screw 44 on the stops 34 and 35 are loosened and the knobs 38 on the stops are then dropped thereby engaging the threaded rods 23 and 26. As mentioned heretofore, the function of the shaft 13 is to revolve through an arc of about 45 degrees. The revolution of this shaft as noted in Figure 8 will oscillate the lever 6. The pawl 14, cam 9, and ratchet 10, being attached to the lever, will oscillate with it; the master gear 3 is non-oscillating.

Forming part of bearing 5 and extending upward is an extension 49 having a pawl 50 pivoted thereto. A stop 51 is provided to limit the downward swing of the pawl. When the upper part of the lever 6 moves to the right, the pawl engaging the teeth of the master gear 3 to the right of its bearing, will revolve the said gear a certain distance depending upon the throw of the lever 6. The throw can be regulated by adjusting the link at several points of the lever, as at 52. At the same time the ratchet and cam will swing towards the pawl 50 and hence be turned anti-clockwise a certain number of degrees. It will thus be seen that as the cam is turned, the faces 53, 54 and 55, being at different distances from the center, will push the projection 16 of the pawl 14 downward. The weight 15 normally overbalances and keeps the projection upward against the faces of the cam. When the face 54 is contacting with the pawl 14, the direction of revolution of the master gear 3 will be clockwise as noted in Figure 3. When the face 53 comes in contact with the pawl, the pawl will swing to the left engaging the teeth of the gear 3 and the revolution of the gear 3 will be anti-clockwise. When the face 55 is contacting with the pawl, the ends of the pawl will clear the teeth of the master gear, thereby making same non-rotating.

As noted in Figures 1 and 5, when the master gear 3 turns clockwise, the threaded rods 23 and 26 will revolve in opposite...
direction from each other and when the gear turns anti-clockwise, the rods 23 and 26 will revolve in opposite direction towards each other. In other words, the revolution of the rods is always in opposite direction to each other due to the gear 24 being the driver and the gear 25 the driven.

As noted in Figure 1, the design 56 worked out in the knitted material 57 depends on the reciprocating movement of the yarn carrier 28. When the cam 9 causes the master gear to turn clockwise, the rods 23 and 26 revolving away from each other, will gradually bring the stop together.

When the master gear turns anti-clockwise, the stop which limits the movement of the yarn carrier, will move away from each other. When the pawl is disengaged from the master gear, there will therefore be no movement of the rods, and the stops 34 and 35 will remain stationary.

In Figure 13 a hexagonal shaped design 58 is worked out in the material 57. The sides 59 represent the stops moving away from each other; the sides 60 are formed when the stops are stationary, and the sides 60, when the stops are moving towards each other.

The design controlling cam shown in Figures 2 and 3 will execute the series of designs shown in Figure 13. An innumerable number of designs can be executed by simply changing the design control cam 9.

As the rod or finger 48 reciprocates the entire length of the machine and as the yarn carrier moves at different lengths, means are provided to disengage the finger 48 from the yarn carrier so that the finger will be free to move its entire length. The finger 48 fits into a recess 61 of the base of the yarn carrier. When the finger moves the yarn carrier until it strikes the stop 35, the curved portion 62 of the projection 64 will urge the finger outward as noted in Figure 6, thereby disengaging the finger from the yarn carrier. On the backward stroke, the finger will hit the slide 63 and move along until it jumps into the recess 61, and thence bring the yarn carrier against the other stop.

In Figure 15, a diagrammatic view of the knitting is shown. Numeral 57 represents the yarn of the material being knitted, and numeral 56 the yarn introduced by this device.

The structure and operation of this novel knitting attachment has now been fully set forth. The operation is entirely automatic and designs of various shapes can be executed. This device can be mounted on any style of straight knitting machines.

What I desire to secure by Letters Patent is:

1. In a device of the class described in combination, a reciprocating yarn holder, stops to regulate the movement of the said yarn holder, means for threadedly engaging and disengaging the said stops with threaded rods, the said means including a spring pressed slotted element, a stem, a knob and a disengaging pin, the said threaded rods adapted to guide the said stops and revolve in opposite direction to each other.

2. In a device of the class described in combination, a reciprocating yarn holder, stops for regulating the movement of the said yarn holder a pair of threaded rods parallel to each other, the said rods passing through the said stops, a slotted spring pressed element within the said stops, for threadedly engaging the said rods, and a disengaging pin for breaking the said engagement.

3. In a device of the class described in combination, a reciprocating yarn holder, stops for regulating the movement of the said yarn holder, a pair of threaded rods adapted to move the said stops, the said threaded rods passing through the said stops, a slotted spring pressed element within the said stops for making a contact between the said stops and the said rods, a disengaging pin for breaking the said contact and means to revolve the said threaded rods at predetermined intervals.

4. In a device of the class described in combination, a slidable reciprocating yarn holder including a base, a recess in said base, a finger adapted to fit in said recess, slides on both sides of the said base, stops to regulate the movement of the said yarn holder, threaded rods for moving the said stops, the said threaded rods passing through the said stops, a threaded spring pressed element within the said stops for making a contact between the said stops and the said rods, a disengaging pin for keeping the said threaded element out of engagement with the said rods, slides on the inner sides of the said stops, the last mentioned slides adapted to disengage the said finger from the said recess.

5. In a device of the class described in combination, a support, bearings in said support, a shaft in said bearings, a master gear fixed on said shaft, a pair of threaded rods, a train of gears to transmit the motion of the master gear to the said threaded rods, stops adapted to move by the revolution of the said threaded rods, means to threadedly engage and disengage the said stops from the said threaded rods, the said means including a spring pressed slotted element, a stem, a knob and a disengaging pin.

6. In a device of the class described in combination, a bracket, bearings in said bracket, a shaft in said bearings, a master gear mounted on said shaft, another gear meshing with the said master gear, a shaft,
beveled gears, one of the bevel gears mounted on the end of a threaded rod, a spur gear adjacent the said bevel gear, another gear meshing with the said spur gear another threaded rod parallel to the first mentioned rod, the said rods revolving in opposite direction to each other, and stops adapted to move by the revolution of the said threaded rods.

7. In a device of the class described in combination, a support, a shaft, an oscillating lever on said shaft, a link pivoted at the lower end of the said lever, a clamp pivoted to the said link, the said clamp being clamped to a shaft, a pawl at the top of a stationary arm, a ratchet engaged by said pawl, a cam, a master gear, a pair of threaded rods, the said rods connected to the said master gear by a train of gears, all arranged to revolve the said rods at predetermined intervals.

8. In a device of the class described in combination, a clamp, a link, an oscillating lever, a stationary arm, a pawl at the top of the said stationary arm, a ratchet engaged by said pawl, a cam, another pawl actuated by said cam, a master gear turned by the last mentioned pawl, a pair of threaded rods, the said rods revolving in opposite direction to each other, stops moved by the revolution of the said rods, and a reciprocating yarn holder whose limit of movement is regulated by the said stops.

9. In a device of the class described in combination, a master gear, a pawl, means to oscillate the said pawl at predetermined intervals, a pair of threaded rods, a train of gears connecting the said master gear with the said threaded rods, a pair of stops moved by the rotation of the said threaded rods, and a movable yarn holder adapted to move between the said stops.

10. In a device of the class described in combination, a master gear, a pawl engaged in the said master gear, a cam, means to revolve the said cam for oscillating the said pawl, a pair of threaded rods, the said rods operably connected to the said master gear by a train of gears, a movable yarn holder operated by the said threaded rods, stops on both sides of the said yarn holder, and means to engage the said stops with the said threaded rods.

11. In a device of the class described, in combination, a support, an extension on said support, a pawl pivoted to the upper part of said extension and a ratchet, cam arranged to revolve when oscillated, another pawl, the said cam operating the last mentioned pawl, a master gear, the last mentioned pawl contacting with the said master gear at predetermined intervals, and a train of gears transmitting the motion of the said master gear to a pair of threaded rods.

12. In a device of the class described in combination, a stationary lever, a pawl pivoted to said lever, means for oscillating the said lever, means for operating the said pawl, a master gear, the said pawl contacting with the said master gear, a train of gears operably connected to a pair of threaded rods, the said rods adapted to revolve when the said master gear is turned.

13. In a device of the class described, an oscillating lever, an extension, a pawl on said extension, another pawl being weighted on one end and a projection on the other, this pawl being pivoted on said lever, a ratchet actuated by the first mentioned pawl, a cam revolving with the said ratchet, a pair of threaded shafts, a train of gears transmitting the motion of the said master gear to said pair of threaded shafts, stops arranged to move when the said shafts are turned, a yarn carrier movably mounted between the said stops and means to move the said yarn carrier to the left and right.

14. The combination of a master gear, an oscillating lever, an extension, a pawl on said extension, another pawl being weighted on one end and a projection on the other, this pawl being pivoted on said lever, a ratchet actuated by the first mentioned pawl, a cam revolving with the said ratchet, a pair of threaded shafts, a train of gears transmitting the motion of the said master gear to said pair of threaded shafts, stops arranged to move when the said shafts are turned, a yarn carrier movably mounted between the said stops and means to move the said yarn carrier to the left and right.

15. In a device of the class described in combination, a reciprocating yarn holder, stops to regulate the movement of the said yarn holder, the said stops being adjustable, a pair of threaded rods for guiding the said stops, the said threaded rods being parallel to each other, and gears at the ends of the said rods meshing with each other to give the said rods a reverse movement with respect to each other.

16. In a device of the class described in combination, stops, the said stops consisting of a body, a hole within the said body for a threaded rod to pass through, a slotted element, a stem, a knob, a spring for urging the said slotted element against the thread of the said threaded rod and a pin to keep the said slotted element out of engagement with the said threaded rod.

17. In a device of the character described, a yarn holder including a base, a recess in the said base, a finger adapted to fit into the said recess, stops on both sides of the yarn holder, the said stops moved by the revolution of threaded rods, the said threaded rods passing through the said stops, a threaded spring pressed element within the
said stops for making a contact between the said stops and the said rods, and a disengaging pin for keeping the said threaded element out of engagement with the said rods.

18. In a device of the character described, a reciprocating yarn holder, a recess in the base of the said yarn holder, a finger adapted to loosely fit into the said recess, a pair of threaded rods, stops on both sides of the said yarn holder, the said stops adapted to move by the revolution of the said rods, a threaded spring pressed element within the said stops for making a contact between the said stops and the said rods, a disengaging pin for keeping the said threaded element out of engagement with the said rods, slides on the said stops, the said slides adapted to disengage the said finger from the said recess when the said slides and said stops contact.

In testimony whereof we affix our signatures.

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