Aug. 27, 1935. H. E. HOUSEMAN 2,012,309

KNITTING MACHINE

Filed May 2, 1933 3 Sheets-Sheet 1

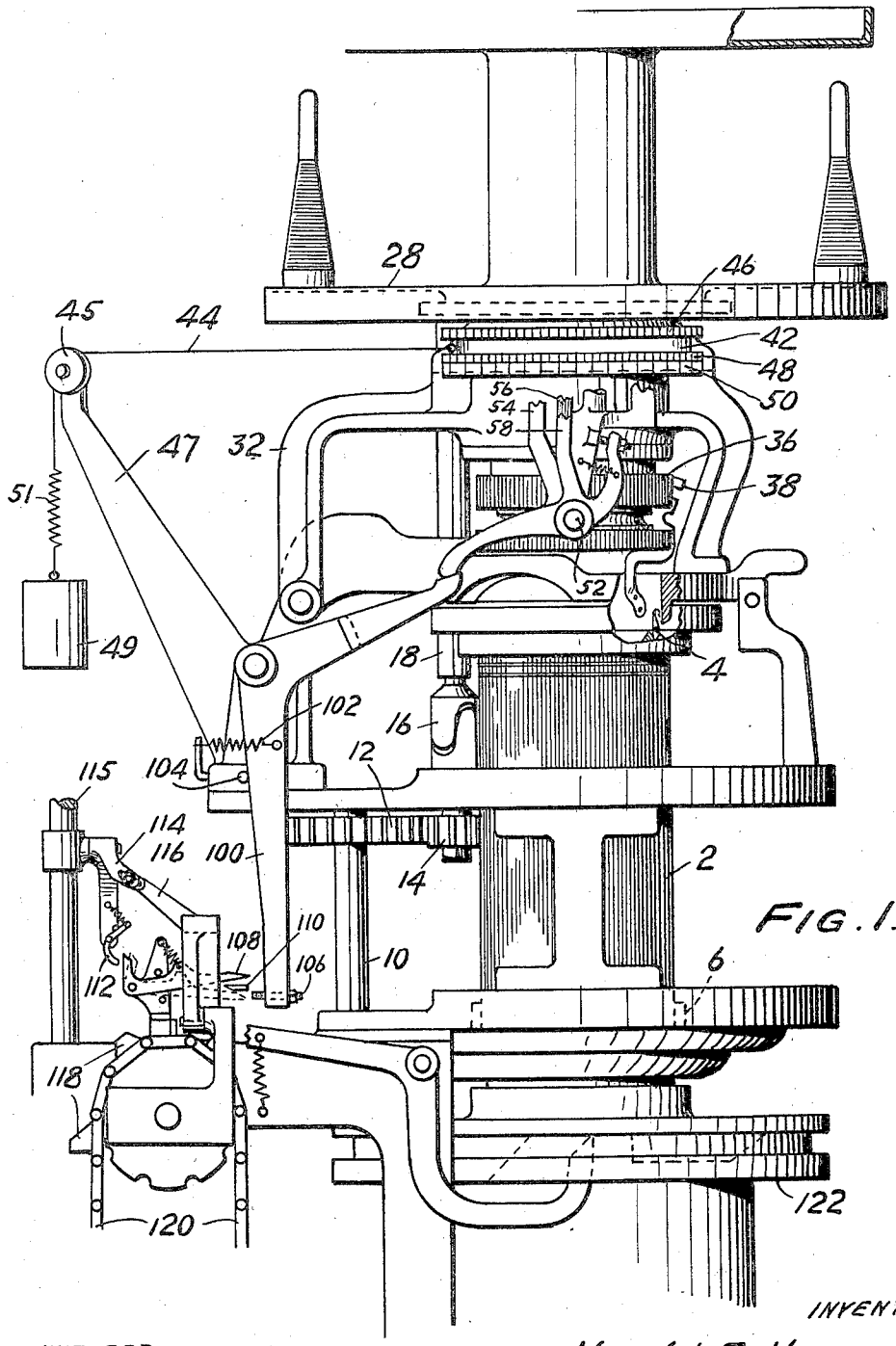

FIG. 1.

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KNITTING MACHINE

Filed May 2, 1933 3 Sheets-Sheet 2

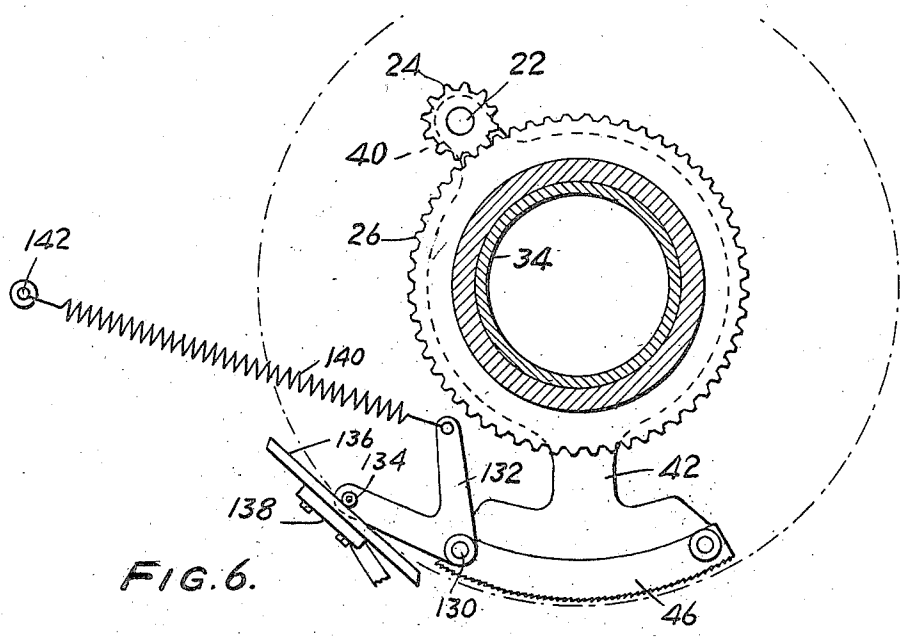

FIG. 6.

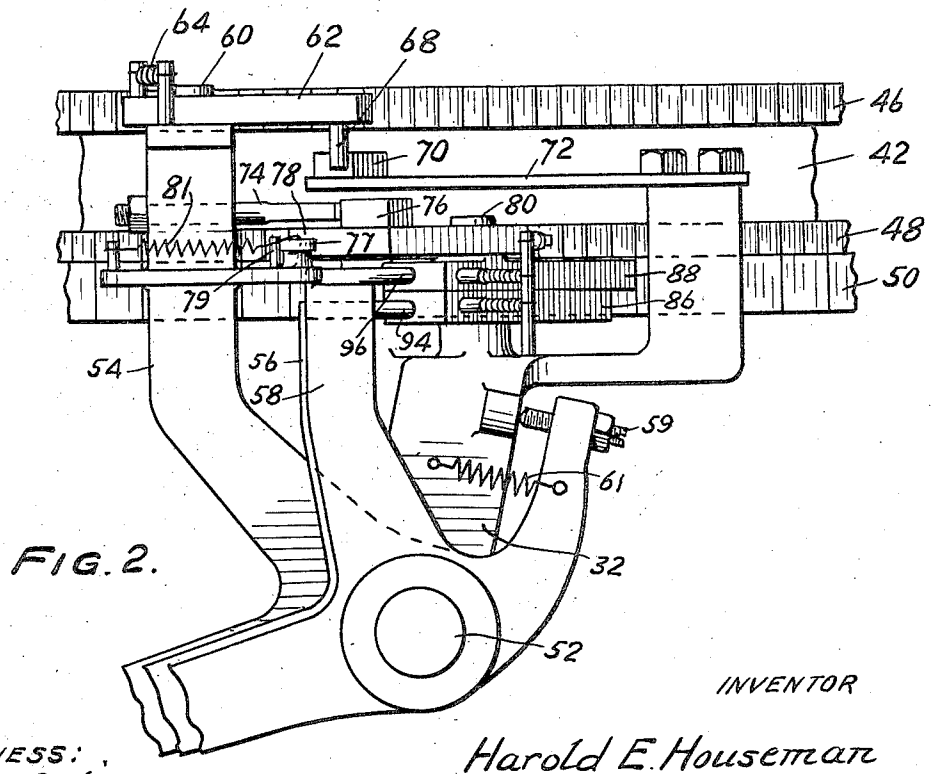

FIG. 2.

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Aug. 27, 1935. H. E. HOUSEMAN 2,012,309

KNITTING MACHINE

Filed May 2, 1933 3 Sheets-Sheet 3

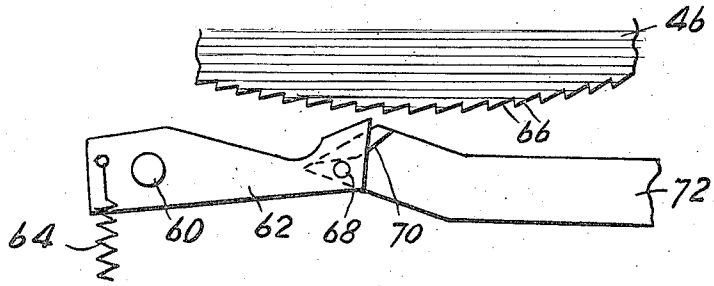

FIG. 3.

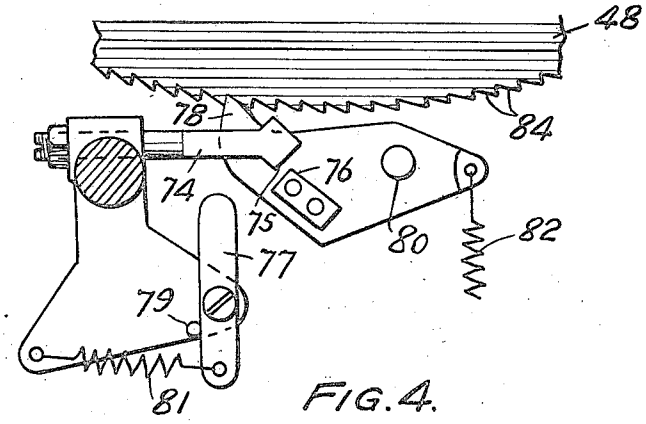

FIG. 4.

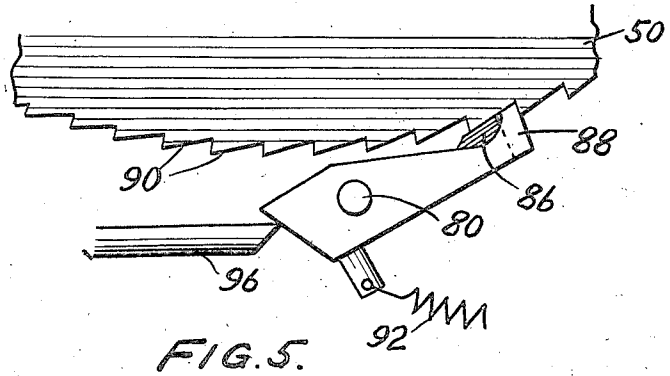

FIG. 5.

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Patented Aug. 27, 1935 2,012,309

UNITED STATES PATENT OFFICE

2,012,309

KNITTING MACHINE

Harold E. Houseman, Edge Moor, Del., assignor to Standard-Trump Bros. Machine Company, Wilmington, Del., a corporation of Delaware

Application May 2, 1933, Serial No. 668,924

22 Claims. (Cl. 66—135)

This invention relates to a knitting machine and specifically a machine of the rotary needle type in which patterns are produced by wrapping of the needles by yarn carrying fingers which may be shogged relatively to the needles. The invention is also applicable for the shogging of wrap fingers in a stationary needle machine.

In my application, Serial No. 653,229, filed January 24, 1933, there is described an arrangement whereby shogging movements may be imparted to wrap fingers while the fingers are rotating with the rotating needle cylinder so as to produce an advance or lag of the fingers to cause each of them to wrap various needles. In this machine gearing in the form of an epicyclic train connects the needle cylinder with the wrap finger supporting head so that they are rotated in unison so long as the arm of the epicyclic gear train is fixed in positon, this arm comprising a carrier mounted concentrically with the wrap finger head. To produce shogging this carrier is given intermittent step movements in one direction positively under the action of a pawl and in the other direction by a tensioned spring operating upon release of the carrier by detents engaging ratchet teeth thereon. The ratchet teeth of the carrier are so indexed that when they are properly engaged by the detents the wrap fingers are in positions to cooperate with needles. Whenever the carrier is intermediate the positions determined by the engagement of the detents with ratchet teeth the wrap fingers are out of alignment with needles and at such times dare not be moved through the needle circle. During the shogging movements, namely, when the carrier is being either advanced by the pawl or retracted by the spring, no wrapping may take place and accordingly in a stocking produced by such machine there is necessarily an unwrapped panel whose width depends upon the time necessary for the production of the shogging movements.

In the machine as disclosed in my prior application the movements of the carrier under the action of the spring take place very rapidly so that when shogging takes place in the corresponding direction there is no need for any prolonged interruption of the wrapping operations. For example, in a 240 needle machine having a 3½ inch cylinder it is found that the panel required by the reverse movements of the carrier need be no more than about twenty needles in width.

The machine of my prior application, however, requires considerably larger unwrapped panels to take care of the forward shogging if this is to take place in a reliable fashion. The pawl which serves to drive the carrier forwardly is actuated through a system of levers by a pattern mechanism located at a relatively remote position, this arrangement being adopted for convenience in design. There is considerable lost motion, therefore, between the pattern mechanism and the driving pawl due to clearances and deflections of the connecting parts. Furthermore, the quicker the movement imparted to the carrier the more likelihood there is that its inertia will carry it to some extent beyond the proper position for alignment of a wrap finger with a needle. To secure reliability of operation the adjustment in my prior mechanism was made such that the driving pawl imparting forward movements to the carrier was given a stroke in excess of that which would be required to secure the cooperation of a wrap finger with another needle; that is, the pawl was given a stroke substantially in excess of the spacing between the ratchet teeth with which it is engaged, the stroke being greater than the distance between adjacent teeth but less than twice this distance. Inasmuch as the return stroke of the pawl occurred necessarily fairly leisurely, there was a period during which wrapping could not take place corresponding in length from the time the pawl first engaged a ratchet tooth to the time when on its retracting stroke it disengaged such tooth by reason of the holding of the carrier in its properly advanced position by a detent. This action in my prior machine corresponded to a movement of a cylinder of the type indicated above through the angular distance of about forty needles. The panel which had to be free from wrapping was therefore approximately twice the width required by the retracting operation.

It is the object of the present invention to provide a shogging mechanism applicable to a machine of this character in which the period of advance of the wrap fingers relative to the needles is substantially shortened and corresponds to the short period required for reverse movements. The invention is also applicable to the production of shogging in machines of the stationary needle cylinder type in which the same problems arise though to a smaller degree.

In my prior machine reverse movements of a carrier were imparted by means of a spring secured directly between the carrier and a fixed part of the machine. To secure proper operation it is necessary that the tension exerted by the carrier upon the detents and driving pawl should be of a proper amount. By the use of a spring, as in my prior mechanism, the tension was so increased and decreased from a mean

value during movements of the carrier from one extreme to the other of its arc that proper operation would not at times take place at the extremes of its movement. It is a further object of the invention to provide means for tensioning the carrier which will cause it to exert a substantially uniform pressure upon the detents throughout its entire range of movement.

The above objects and more specific ones relating to details of construction will be apparent from the following description read in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevation of a portion of a knitting machine constructed in accordance with the invention, the various parts not directly related to the invention being omitted for the sake of clearness;

Fig. 2 is an enlarged fragmentary elevation showing the parts associated with the ratchets controlling the carrier for the intermediate gearing;

Figs. 3, 4 and 5 are enlarged fragmentary views showing details of the pawl and ratchet controlling mechanism; and

Fig. 6 is a horizontal sectional view illustrating the driving gearing for the wrap finger supporting head and a modified arrangement for tensioning the carrier.

The machine which is illustrated is similar to that disclosed in my said prior application and to that illustrated in the application of Stanley R. Shelmire, Serial No. 623,057, filed July 18, 1932, so far as the various controlling and operating parts relating directly to the manipulation of needles and wrap fingers and their yarns are concerned. For clearness, these mechanisms have been omitted from the present disclosure. Briefly stated, in its preferred form the machine is designed to produce a double sole in a stocking by the addition of a yarn in the sole of the foot portion, wrapping of the leg and instep being carried out in the manner described in said Shelmire application, the only addition to the wrapping operation involving the shogging of the wrap fingers relatively to the needles to produce zigzag designs. This shogging is carried out in a manner generally resembling that of my prior application. The machine as illustrated comprises a needle cylinder 2 which carries needles 4 arranged in the usual fashion and provided with different length butts so that proper selection can be made for the usual variations in knitting common to the formation of the parts of stockings. At its lower end the cylinder which is especially elongated to carry jacks for controlling the movements of the needles for selective wrapping is provided with a ring gear 6 which is driven through an intermediate gear by the usual driving gear carried by the shaft 10, the driving gear being driven by the usual mechanism designed to produce both rotation and reciprocation thereof. The shaft 10 carries at its upper end a gear 12 driving a pinion 14 carried by a shaft journalled in a bracket of the frame. The shaft carrying the pinion 14 is provided with a lower member of a universal joint 16, the upper member of which is connected with one section of a two-part splined shaft 18 which at its upper end is connected through a universal joint similar to 16 with a shaft 22 which carries a pinion 24 meshing with a ring gear 26. The universal joints are of the conventional type which will maintain the pinions 14 and 24 in a definite angular relationship irrespective of movements of translation of the pinion 24 so long as its axis remains parallel with the axis of the pinion 14. It will be noted that the universal joints together with the splined arrangement permit the axes to remain parallel in spite of the movements of the axis of the gear 24 about the axis of rotation of the needle cylinder as will be hereafter evident.

The ring gear 26 is carried by the bobbin plate 28 which carries a bearing ring rotating on the top of the bracket 32 which when in operative position forms an integral part of the machine frame, although it may be tilted as described in the Shelmire application when the latch ring is raised or independently of said latch ring, the shaft 18 by its splined construction permitting this to occur. Secured to the bobbin plate is a tubular member 34 extending inside an opening in the bracket 32 which provides a bearing for it. The lower end of member 34 carries the wrap finger supporting head 36 which is slotted and formed to provide a pivotal support for wrap fingers 38 held therein in the usual fashion by a spring band. These wrap fingers are actuated as described in the Shelmire application by means of suitable character to cause the lower ends to move outwardly and inwardly between the needles 4 of the needle circle to produce wrapping, patterning being obtained by the selection of needles.

The bracket 32 is provided with an external bearing surface concentric with the axis of the wrap finger head and the needle cylinder on which is journalled a carrier 40. A lateral extension of the carrier 40 provides a journal for the shaft 22 and the pinion 24. By reason of the concentric mounting of the carrier 40 and the gear 26 it will be seen that the pinion 24 will remain in mesh with said gear irrespective of the position of the carrier.

At the side of the machine illustrated in Fig. 1, the carrier is provided with an extension 42 to which are secured ratchet plates 46, 48 and 50 illustrated in elevation in Fig. 2 and in plan in Figs. 3, 4, and 5. From the latter it will be seen that the teeth 66 and 90 of the plates 46 and 50 are directed in one direction while the teeth 84 of the plate 48 are directed in the opposite direction. The carrier 40 is urged clockwise as viewed in plan by a weight 49 connected to the carrier through a spring 51 by a cord 44 passing over a pulley 45 carried by a bracket 47.

An extension of the bracket 32 carries a stud 52 on which are journalled three levers 54, 56 and 58, these levers being provided with extensions carrying stop screws 59 urged into contact with an extension of the frame by individual springs 61 which urge the levers 54, 56 and 58 counterclockwise in opposition to actuating mechanism. At its upper end the first of these levers carries a stud 60 on which is journalled a pawl 62, the nose of which is urged towards the teeth 66 of the ratchet plate 46 by means of a spring 64 connected between the pawl and a post carried by the lever 54. A pin 68 carried by the pawl is arranged to engage a cam 70 carried by a fixed bracket 72 so that the pawl is held out of contact with the teeth when in its retracted position to which it is urged by its spring 61. As the lever 54 is moved clockwise as viewed in Fig. 2 the pawl 62 will move to the right as shown in Fig. 3 so that it will engage a tooth of the ratchet 46 as the pin 68 rides off the cam 70. The cam 70 is provided primarily to normally hold the pawl 62 away from the teeth to permit reverse movements of the carrier 40.

A rod 74 carried by the lever 54 is provided with a spear-head 75 adapted to engage a cam 76 carried by a detent 78 mounted on a fixed stud 80 carried by the bracket 32 and urged by a spring 82 to bring its nose into engagement with teeth 84 of the ratchet plate 48. A lateral extension of the arm 54 pivotally supports a lever 77 which is urged by a strong spring 81 into engagement with a stop pin 79 carried by the extension. The lever 77 is in horizontal alignment with the sloping lefthand surface of the pawl 78 as viewed in Fig. 4. The arrangement of the parts is such that as the rod 74 advances during forward movements of the pawl 62 the spear-head 75 engages the cam 76 to disengage the detent 78 from a tooth 84 just prior to the engagement of the pawl 62 with a tooth 66. As the spear-head moves further its point passes over the inward point of the cam 76 thereby releasing the detent 78 permitting it to again move between the teeth 84 as soon as the pawl 62 has advanced the carrier 40 to such extent as to move the last engaged tooth 84 beyond the nose of the pawl 78. To insure that the pawl 78 moves inwardly the lever 77 is arranged to engage it to provide a force in addition to that exerted by the spring 82. The pawl is accordingly in position to engage the next tooth 84 before the pawl 62 reaches its extreme forward position. The timing of these parts will be described in more detail hereafter. The detent 78 is not only provided for the purpose of properly aligning the wrap fingers with the needles but additionally to hold the carrier in position during reciprocation at which time the weight 49 might be insufficient to hold it sufficiently rigidly to prevent objectionable vibration. The pawl 78 in the present instance has this function of the corresponding pawl in my prior application in addition to its more important function which will be brought out hereafter.

Also journalled upon the stud 80 are detents 86 and 88 of different lengths as will be evident from Fig. 5. These detents are arranged to alternately engage teeth 90 of the ratchet plate 50 to hold the same in opposition to the effort of the weight 49. The detents 86 and 88 are yieldingly held in operative engagement with the teeth 90 by means of springs 92 reacting between them and a fixed pin on the machine frame. It is to be noted that the angular spacing of the teeth 50 is double the spacing of the teeth 66. The lengths of pawls 86 and 88 are such that as they are alternately tripped the carrier 40 may move backwardly in steps under the action of weight 49 through the angular spacing of teeth 66.

Members 94 and 96 carried by the upper ends of levers 56 and 58 respectively are designed to engage the pawls 86 and 88 respectively to trip them out of engagement with the teeth 90. The operation is such that the members 94 and 96 are alternately moved so that backward steps of proper angular amount are produced by the alternate freeing of the detents 86 and 88 from the teeth 90.

The levers 54, 56 and 58 are controlled in the same manner as the corresponding levers illustrated in my prior application. They are engaged respectively by three levers indicated at 100 pivoted on a common stud and urged in a clockwise direction as viewed in Fig. 1 by springs 102 to bring them into engagement with a stop post 104. At their lower ends the respective levers 100 are provided with adjustable contact screws 106 engageable by the ends of respective levers 108 which are selectively positioned to move either above or below a guard 110 by the action of a pivoted member 112 on their upwardly extending rear ends during their retracting strokes. The member 112 may be positioned in line with any selected one of the levers 108 by the rocking of its carrier lever 114 pivoted on the post 115 and engageable by the member 116 controlled by lugs 118 on a pattern chain 120 which is intermittently advanced in the usual fashion by a pawl and ratchet mechanism driven by the main driving mechanism and controlled by suitable cams carried by the main cam disc 122.

The operation of forwardly shogging the wrap fingers relatively to the needles is effected by a stroke of the lever 54 under the action of the corresponding lever 108 selected by a lug of proper height on the pattern chain. The stroke imparted to the corresponding lever 100 is such that if there were no interruption to the forward movement of the pawl 62 the pawl would advance to carry the plate 46 through an angular distance greater than the angular spacing between adjacent teeth 66. As will be pointed out, such movement is prevented, the excess movement imparted to 100 being taken up in a slight springing of the levers 100 and 54. As the lever 54 begins its forward movement and before the pawl 62 engages a tooth 66 the detent 78 is released from the tooth 84 in front of which it lies by the action of the spear-head 75 upon the cam 76. In general, the detent 78 would not engage a tooth at this time but would have a very slight clearance therewith, the carrier being positioned by engagement of one of the detents 86 or 88 with a tooth 90. As soon as the detent 78 is moved out of the path of the tooth 84 the pawl 62 engages a tooth 66 and advances the carrier against the action of the weight 49. As soon as the tooth 84 previously lying substantially against the pawl 78 moves therebeyond the pawl 78 is released and positively forced into the path of the next tooth 84 by the actions of the spring 82 and the spring tensioned lever 77. Thereafter the pawl 62 continues to advance the carrier, this advance stopping when the next tooth 84 engages the pawl 78. The excess movement imparted to the lever 100 is then taken up by springing of the parts. By providing for this there is definite assurance that a tooth 84 will be engaged with the detent 78. As engagement of a tooth 84 with the detent 78 takes place one of the pawls 86 or 88 will drop in front of the next tooth 90 so that when the pawl 62 is withdrawn one of these detents will hold the carrier in its advanced position. In view of the action of snubbing pawl or detent 78 which substantially tends to hold the carrier in the same position as the detents 86 and 88, the wrap fingers are positioned relatively to the needles for wrapping even before the forward effort applied to the pawl 62 has ceased and, of course, considerably before it is permitted to move in its retracting stroke. The period of advance of the carrier is thus cut down to such extent that wrapping is interrupted for only a relatively short time which in practice is found to be of the same order as the time during which wrapping must be interrupted to permit reverse movements of the carrier. Reversing of the carrier takes place by the alternate tripping of the pawls 86 and 88 and the effort of the weight 49. The pawl or detent 78 will yield to permit the

teeth 84 to pass during such reverse shogging movements while the pawl 62 is held out of the path of teeth 66 by the cam 70. The use of the weight 49 insures an even tension being exerted upon the detents and pawl 62 in all positions of movement of the carrier. Its action in this respect is very superior to that of the spring used in my prior arrangement because the tension of this spring changes very substantially during the movements of the carrier. The spring 51 interposed in the cable 44 serves to smooth out the intermittent movements of the weight 49 which then, by reason of its inertia, relatively slowly follows the movements of the carrier. Swinging movements are thus minimized.

In Fig. 6 there is illustrated an arrangement in which a spring is used as the equivalent of the weight 49 to insure a uniform effort tending to retract the carrier 40. In this arrangement a bell crank 132 is pivoted at 130 to the extension 42 of the carrier 40. This bell crank carries a roller 134 engaging a cam 136 carried by a fixed bracket 138 which may be connected to the bracket 32. A spring 140 reacts between the end of the other arm of the bell crank 132 and a fixed post 142 carried by a bracket secured to the standard 115 which may be used to support the main yarn bobbins. The cam 136 is suitably laid out so that in all positions of movement of the carrier 40 the effort exerted upon the detents will be the same. The surface of the cam 136 engaging the roller 134 in the design shown very closely approaches a straight line being theoretically only slightly curved at its ends. By the use of other levers the same result may be effected but the corresponding cams in such cases may depart very considerably from straight lines. By the use of either the weight or the spring arrangement of Fig. 6 the tension may be maintained constant to thus secure proper operation.

It will be clear that numerous changes may be made in the embodiment of the invention without departing from the scope thereof as defined in the following claims. For example, the shogging mechanism is applicable to a stationary needle cylinder machine in place of the shogging mechanism described in my Patent 1,892,702 dated January 3, 1933.

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

1. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, means for shogging the carrier relatively to the needle cylinder in steps corresponding to the angular spacing of adjacent needles, and mutually abutting means for positively arresting relative shogging movements in both directions.

2. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, means for shogging the carrier relatively to the needle cylinder in steps corresponding to the angular spacing of adjacent needles, and mutually abutting means for positively arresting relative shogging movements in both directions when the wrap fingers are registered with the needles.

3. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, means for positively shogging the carrier relatively to the needle cylinder in one direction, and mutually abutting means for positively arresting the relative shogging movements in that direction.

4. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member, a pawl engageable with the ratchet member to advance the same, and means for positively arresting the ratchet member while the pawl still tends to advance said member.

5. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member, a pawl engageable with the ratchet member to advance the same, and means for positively arresting the ratchet member while the pawl still tends to advance said member, said arresting means being released from the ratchet member prior to the beginning of the advance movement of the ratchet and being then rendered active prior to the attainment by the ratchet of its final position.

6. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member provided with two ratchet plates having teeth facing in opposite directions, a pawl engageable with teeth of one ratchet plate to advance the ratchet member, and a detent arranged to engage the teeth of the other ratchet plate to positively arrest the movements of the ratchet member under the action of the pawl.

7. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member provided with two ratchet plates having teeth facing in opposite directions, a pawl engageable with teeth of one ratchet plate to advance the ratchet member, and a detent arranged to engage the teeth of the other ratchet plate to positively arrest the movements of the ratchet member under the action of the pawl while the pawl still tends to advance said member.

8. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member provided with two ratchet plates having teeth facing in opposite directions, a pawl engageable with teeth of one ratchet plate to advance the ratchet member, and a detent arranged to engage the teeth of the other ratchet plate to positively arrest the movements of the ratchet member under the action of the pawl when the ratchet member has been advanced a sufficient distance to accurately register the wrap fingers with needles to be wrapped.

9. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fin-

gers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member, a pawl for imparting forward movements to the ratchet member, a detent arranged to positively limit forward movements of said member, and means for controlling the detent whereby it disengages the ratchet member prior to engagement of the pawl therewith and whereby the detent moves into position to arrest the ratchet member while the pawl still tends to advance said member.

10. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed warp yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including a ratchet member, a pawl for imparting forward movements to the ratchet member, a detent arranged to positively limit forward movements of said member, and means for controlling the detent whereby it disengages the ratchet member prior to engagement of the pawl therewith and whereby the detent moves into position to arrest the ratchet member while the pawl still tends to advance said member, the detent being normally in position to arrest forward movements of the ratchet member when shogging is not occurring.

11. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including detent means serving to stop and register the wrap fingers with needles when shogging occurs in one direction and detent means serving to stop and register the wrap fingers with needles when shogging occurs in the opposite direction, said detent means normally preventing movement of the carrier in either direction.

12. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including detent means serving to stop and register the wrap fingers with needles when shogging occurs in one direction and detent means serving to stop and register the wrap fingers with needles when shogging occurs in the opposite direction, both detent means including detents having fixed pivots.

13. A knitting machine including a needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers, and means for shogging the carrier relatively to the needle cylinder, said means including means for yieldingly urging the carrier in one direction relatively to the needle cylinder, means for shogging the carrier against the action of the yielding means, and means for arresting the last named shogging movements, the positively arresting means serving to additionally prevent the carrier from moving in opposition to the yielding means when shogging is not taking place.

14. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, and means for positively arresting movements of the element in both directions.

15. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, said last means including means for yieldingly urging said element in one direction, means for advancing the element against the action of the yielding means, and means for positively arresting advancing movements of the element.

16. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, said last means including means for yieldingly urging said element in one direction, means for advancing the element against the action of the yielding means, means for positively arresting advancing movements of the element, and means for holding said element in definite positions against the action of the yielding means.

17. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate toether, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, said last means including means for yieldingly urging said element in one direction, means for advancing the element against the action of the yielding means, and means for arresting advancing movements of the element, the arresting means serving to additionally prevent the element from moving in opposition to the yielding means when shogging is not taking place.

18. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, said last means including means for yieldingly urging said element in one direction, means for advancing the element against the action of the yielding means, and means for arresting advancing movements of the element, said last means comprising a ratchet carried by the element and a detent engaging teeth thereof.

19. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with

the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, and means for yieldingly urging said element in one direction with substantially the same effort independently of its position within its range of movement.

20. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, and means for yieldingly urging said element in one direction with substantially the same effort independently of its position within its range of movement, said last means including a weight.

21. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, means for yieldingly urging said element in one direction with substantially the same effort independently of its position within its range of movement, said last means including a weight, and a spring connected between the weight and element.

22. A knitting machine including a rotating needle cylinder, needles carried by the cylinder, wrap fingers arranged to feed wrap yarns to needles, a carrier for the fingers rotating with the needle cylinder, an epicyclic gear train between the cylinder and carrier whereby they rotate together, means for imparting limited step by step movements to an element of said epicyclic gear train whereby the carrier is shogged relatively to the needle cylinder, and means for yieldingly urging said element in one direction with substantially the same effort independently of its position within its range of movement, said last means including a spring and means for controlling the effort exerted by the spring on the element.

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