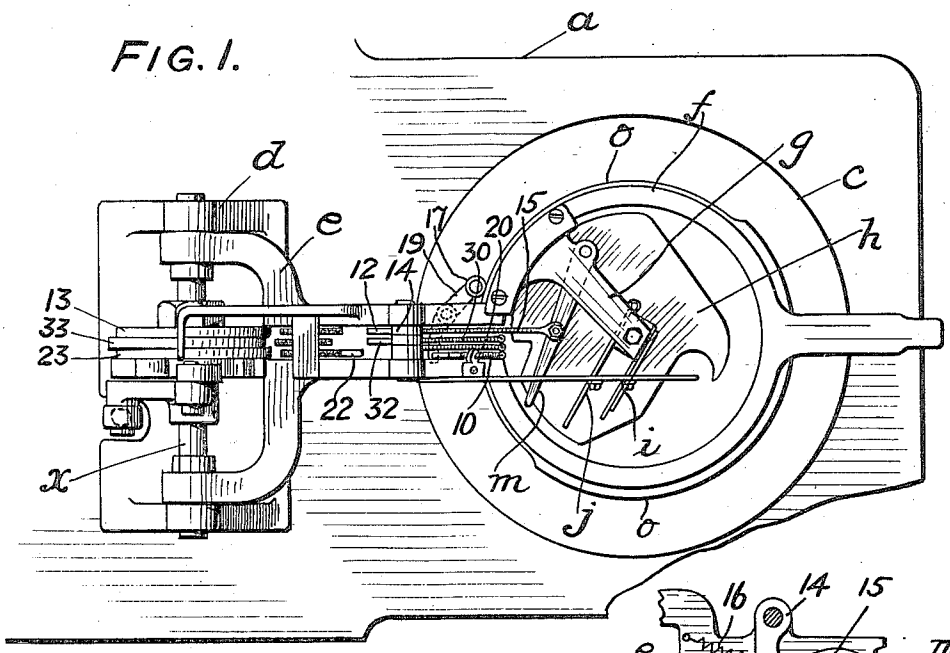
H. A. HOUSEMAN.

CIRCULAR KNITTING MACHINE.

APPLICATION FILED JUNE 16, 1913.

1,127,767. Patented Feb. 9, 1915.

FIG. 1.



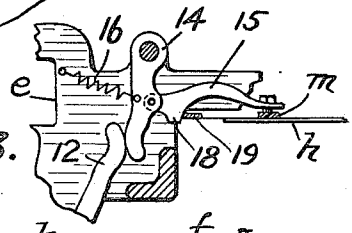


FIG. 3.

FIG. 4.

FIG. 2.

WITNESSES:

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HARRY A. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO STANDARD MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CIRCULAR-KNITTING MACHINE.

1,127,767. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed June 16, 1913. Serial No. 773,900.

To all whom it may concern:

Be it known that I, HARRY A. HOUSEMAN, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Circular-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In circular knitting machines it is old and well known to provide the machine with a plurality of yarn carriers and to move these yarn carriers into and out of action at different stages in the knitting of a complete article (as, for example, a stocking) so as to cause certain yarn to be knit into one part of the stocking and other yarn or yarns to be knit into other parts of the stocking. It is also well known to employ, in connection with the yarn carrier, a guide plate, and a clamp and a cutter, all located within the needle cylinder, which coöperate with the yarn carriers in the following manner: When a yarn carrier is moved up out of operative position so that the needles no longer knit the threads carried thereby, the last needle on which the thread is knit, as it is carried around with the rotary needle cylinder, draws the thread over the guide plate and between the jaws of a clamp and cutter, which cuts the thread and clamps the free end and holds it in such position that when the yarn carrier is again moved down into operative position the thread will reëngage the needles, the clamp and cutter being at the same time operated to release the thread and then operated to clamp and cut the thread from another carrier that may at the same time be moved up from operative to inoperative position. It is also old and well known to knit into a section of the stocking extending only part way around the circular fabric, as, for example, the rear of the ankle or the sole of the foot, a reinforcing thread. The insertion of this reinforcing thread necessitates the yarn carrier by which the same is carried being reciprocated, first down into action for half a rotation of the needle cylinder and then up out of action for the other half of the cylinder's rotation, and so on alternately until the knitting of this section of the stocking is completed. This would involve drawing the yarn around the clamp and cutter at each rotation of the needle cylinder, which would cause a great waste of yarn. Further, it would be impracticable to clamp and cut the reinforcing thread at each rotation of the needle cylinder.

The object of my invention is to provide means whereby when the yarn carrier for the reinforcing thread is moved up out of action once in each rotation of the needle cylinder, the thread will be carried under the guide plate just as if the yarn carrier remained in active relation with the needles during the complete rotation of the needle cylinder, thereby causing the thread, at each rotation of the needle cylinder to be carried across the diameter of the tubular fabric from the last needle of the semi-circumference of needles which has knitted the thread into the fabric on one course to the first needle of said semi-circumference of needles that knits the thread into the fabric on the next course.

In the accompanying drawings: Figure 1 is a plan view of a portion of a circular knitting machine embodying my invention. Fig. 2 is an elevation of same, partly in section. Figs. 3 and 4 are fragmentary views showing details of the mechanism.

In the drawings, and in the explanation thereof contained in the following description, there are shown and described such parts only of the complete machine as is necessary to a complete understanding of the invention; the connections from the driving shaft for actuating the needle cylinder, the thread carriers, the clamp and cutter, etc., except such immediate actuating means as is specified in the claims, forming no part of the present invention.

On the bed plate *a* is mounted the needle cylinder *b* and the cam cylinder *c*. There is also mounted on the bed plate a frame *d* in which rotates a shaft *x* to which are secured cam disks 13, 23 and 33, the function of which will be hereinafter described. Supported on the frame *d* in any suitable manner is a frame *e*, the same being shown as fulcrumed on a stud carried by the frame *d*. The frame *e* carries studs on which are pivoted a plurality of yarn carriers. Any desired number of yarn carriers will be provided, but for the purpose of illustrating the invention three yarn carriers, 10, 20 and 30 are shown, the first being pivoted on one stud and the other two on another stud. It

may be assumed that the yarn carrier 30 carries the thread 3 for knitting the heel and toe of the stocking; that the yarn carrier 20 carries a thread 2 which is knit into the foot of the stocking, that is, the tubular fabric between heel and toe; and that the yarn carrier 10 carries a thread 1 which is knit only into the sole of the foot. The yarn carriers are provided with end orifices through which the threads 1, 2 and 3 from the cops, pass to the needles.

Within the needle cylinder *b* is a yarn guiding plate *h*, supported from a bracket *g* secured to a ring *f* forming part of the frame *e*. This guide plate *h* performs, in general, the well known function of guiding any thread (except thread 1 as will be hereinafter described) that has been moved by its carrier up out of operative relation to the needles, from the thread engaging end of the yarn carrier into operative relation with a cutter *i* and clamp *j*, also supported from the bracket *g*, which clamp and cutter respectively cut said thread and clamp it. The thread of any given yarn carrier is thus so held that when the yarn carrier is again moved down it will bring the thread into operative relation with the needles and cause it to again knit into the fabric, the clamp being released at the proper time. It may be stated that thread 1 is also operated upon in the same way, but only at the end of the knitting of the reinforced part of the stocking, when it is desired to maintain the thread 1 out of action, as is clearly explained hereinafter.

The yarn carriers 20 and 30 are of bell crank shape, while the yarn carrier 10 is of T-shape. All the carriers are moved down into operative position by means of springs, each fastened at one end to one arm of the carrier and at the other end to the frame *e*. Similar springs *k* actuate the carriers 20 and 30 while a spring *k'* actuates the carrier 10. The carriers are moved up into inoperative position by means of levers 12, 22, 32, pivoted at their lower ends on a common stud. Each lever 22 and 32 so actuates its corresponding yarn carrier by directly engaging the depending arm of the carrier. The lever 12, however, actuates the yarn carrier 10 somewhat indirectly, by means of the following mechanism: On the same stud on which the yarn carriers 20 and 30 are pivoted is pivoted a lever 14, which is in line with lever 12 and normally held back by a spring 16. This lever is connected, by a bridge rod 15, with a yarn deflecting lever *m* pivoted on the bracket *g*. This yarn deflector is an important element of my invention, as is hereinafter explained. The bridge rod 15 has a projection 18 which extends back of a lever 19 pivoted between its ends. One arm of the lever 19 extends under the overhanging front arms of the carriers 20 and 30 back of the depending arm of the carrier 10. When the lever 12 is swung forward, it actuates the lever 14, which moves the bridge rod 15 forward in the direction of its length, causing the projection 18 to engage and swing the cross-lever 19, which in turn engages the carrier 10 and swings it up into inoperative position.

The cam disks 13, 23 and 33, hereinbefore mentioned, actuate the carrier-actuating levers 12, 22 and 32 respectively. Each cam disk is provided with one or more cut away or depressed portions in its periphery. The cams are turned step by step in unison and may be integral with each other. The cams work against projections on the several levers 12, 22 and 32. When the high face of a given cam engages its corresponding lever, the latter is held forward, thus holding the corresponding yarn carrier up out of operative position. When the cam is turned so as to bring the low or depressed part of its periphery opposite its corresponding lever, the corresponding yarn carrier springs down into operative position, moving the projection of the corresponding actuating lever into said depressed section of the cam.

It will be understood that by giving the shaft *x* a step-by-step rotation and by providing appropriately located depressions in the periphery of the cam disks, any given yarn carriers, at any step in the rotation of the shaft *x*, may be moved into or out of operative position.

The mechanism for actuating the shaft *x*, and the mechanism for operating the cutter *i* and clamp *j* coördinately therewith, are not shown in the drawings, as they form no part of the present invention. Reference, however, is made to a joint application filed jointly by Harold A. Houseman and myself on April 15, 1913 Serial No. 761,199, in which such mechanism is fully disclosed. It may be further stated that, so far as concerns the broader embodiment of my invention, any appropriate known means for actuating the thread carriers and clamp and cutter may be employed. It may be also stated that in the description herein contained, certain mechanism is described which is in part the joint invention of the said Harold A. Houseman and myself, but said mechanism is not herein separately claimed, although included as elements in the combination constituting the present invention.

It has been hereinbefore stated that the yarn 1 is knit into only the rear of the circular fabric, say into the sole of the foot. It has been described how the lever 12 actuates the yarn carrier 10 to move it, through lever 14, bridge rod 15 and lever 19, into inoperative position, and how the bridge rod actuates the deflecting lever *m*. It will be understood that when the carrier 10 is

released and allowed to move into operative position, it must remain in operative position during only a half rotation of the needle cylinder and must then be moved out of operative position during the next half rotation and must then again be moved into operative position during the next half rotation, and so on. This is accomplished by the following means: When the cam disk 13 is moved to allow the lever 12 to swing back, thereby permitting the carrier 10 to swing into operative position, the lever 19 is swung into such position that a roller 17 on the end thereof is brought into operative relation with a cam *o* rotating with and extending entirely around the needle cylinder. While the roller 17 rides on the low part of the cam *o*, which it does during one half a revolution of the needle cylinder, the carrier 10 remains in operative position; but when the roller 17 rides on the high face of the cam *o*, which it does during the other half of the needle cylinder's rotation, the lever 19 is swung to lift the carrier 10 out of operative position. Thus the thread 1 is brought into operative relation with only those needles that knit the rear half of the stocking. It will be understood that when the lever 12 is swung forward by the cam disk 13 so as to actuate the lever 14 to push forward the bridge rod 15, the lever 19 is moved out of operative relation with the cam *o* as well as into position to withdraw the carrier 10 from operative position. During the time that the bridge rod 15 is thus held forward and the carrier 10 out of action, the deflecting lever *m* is held in such position that its free extremity entirely overlies the guide plate *h* and it is therefore functionless; but when the bridge rod 15 is retracted to allow the lever 19 to move into operative relation with the cam *o* and permit the carrier 10 to be moved alternately into and out of active position, the deflecting lever *m* is moved to such position that its free extremity extends over the edge of the guide plate *h* into such position that, as soon as the carrier 10 is moved up, the thread extending from the same engages the deflecting lever *m* and is thereby carried under the guide plate *h*. It will therefore be understood that so long as the yarn carrier 10 is being moved alternately into and out of action at each rotation of the needle cylinder, the thread 1, at each movement into inactive position of the carrier 10, will be drawn down under the guide plate *h* by the deflector *m*, and thus escape engagement with the clamp and cutter, the thread being carried across the stocking from the last needle that it engages on one course to the first needle that it engages on the next course. But when the reinforced part of the tubular fabric is completed and the bridge lever 15 is advanced to withdraw the deflector *m* the thread 1, after the thread carrier 10 moves up into inactive position, will be drawn over the guide plate and be cut and clamped in the same manner that threads 2 and 3 are drawn over the guide plate and cut and clamped when their respective carriers 20 and 30 are moved up into active position.

Having described the construction and operation of my invention, it may be well to give a brief résumé of the operation of the several thread carriers.

Assume that the machine is knitting the heel and that the heel is formed by the thread 3. At this time the projection on lever 32 is engaging a depression in cam disk 33 and the levers 12 and 22 engage the high faces of their respective cam disks 13 and 23. The carrier 30 is therefore in operative position and the carriers 10 and 20 are out of operative position. When the heel is completed, the cam disks are given a turn, bringing depressions in cam disks 13 and 23 opposite the projections on levers 12 and 22, allowing the spring *k* attached to carrier 20 to move it down into operative position and the spring 16 to move back the bridge rod 15 and allow the spring *k'* attached to carrier 10 to move it down into operative position and swing the arm 19 to cause its roller 17 to be brought into operative relation with the cam *o*. At the same time, the cam disk 33 is turned to cause the projection on lever 32 to ride onto the high face of the cam 33, thus moving the carrier 30 up into inoperative position. The thread 3 passing therefrom is drawn over the guide plate *h* into operative engagement with the clamp and cutter, which are then operated to cut and clamp said thread. The above backward movement of the bridge rod 15 is effected in two steps, dictated by the peculiar shape of the cut-away portion of the disk 13, which is two-stepped in shape, as shown in Fig. 4, so as to allow an initial relatively lengthy movement of the bridge rod and then a relatively short movement of the bridge rod. The first movement of the bridge rod suffices to allow the carrier 10 to move down into operative position but does not suffice to move the deflecting lever *m* beyond the edge of the guide-plate *h*. Thus the deflecting lever is not initially moved into position to prevent the thread 3 from being drawn over the guide plate *h* and clamped and cut as described; but immediately after this operation, the second movement of the bridge rod is effected, which moves the deflecting lever *m* beyond the edge of the guide plate into its operative position, so that when, as the needle cylinder revolves, the cam *o* through lever 19, moves up the carrier 10 into inactive position, the thread 1 passing therefrom will engage the deflecting lever and be drawn

down under the guide plate, as hereinbefore described. This occurs once in each rotation of the needle cylinder until the foot of the stocking is completed. The thread carrier 20 remains continuously in action, so that a circular fabric is knit having a thread 2 extending throughout and a thread 1 knit into only the lower half of the fabric. The cam disks are then given another turn, bringing a depression in cam disk 33 opposite the projection on lever 32, allowing the spring *k* attached to carrier 30 to move it down into operative position. At the same time, the cam disks 13 and 23 are turned to cause the projections on levers 12 and 22 to ride onto the high faces of cam disks 13 and 23. Thereby the lever 22 is swung to move into inoperative position the thread carrier 20; and the lever 12 is swung to move forward the bridge rod 15, thus withdrawing lever 19 from operative relation with the cam *o* moving into inoperative position the thread carrier 10, and causing the deflecting lever to be moved so that its extremity entirely overlies the guide plate *h*. Hence the thread 1, as well as the thread 2, will be drawn over the guide plate *h* into operative engagement with the clamp and cutter, which are then operated to cut and clamp said threads. The machine then proceeds to knit the toe of the stocking with the thread 3.

It will be understood that in the knitting of a complete stocking, more than three thread carriers will probably be employed, and that the yarn carrier 10 may be caused to move into operative position for the purpose of reinforcing some other part of the stocking than the sole of the foot, as, for example, the rear of the ankle. My invention is of course not limited in its application to a machine having any particular number of yarn carriers in addition to the one feeding the reinforcing thread, as one of any number of such additional yarn carriers may be employed.

While I have assumed, in the foregoing description, that the needle cylinder is the rotatable element and the cam cylinder the stationary element, it will be understood that the invention is not limited in its application to a machine of this type.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, means to move said yarn carrier alternately into and out of operative relation with the needles, a clamp and a cutter arranged to cut and clamp an undeflected thread carried by the yarn carrier when the latter is moved out of operative position, and a deflector adapted to engage the thread when the yarn carrier is so moved out of operative position and deflect it out of operative relation with the clamp and cutter.

2. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, means to move said yarn carrier alternately into and out of operative relation with the needles, a clamp and a cutter arranged to cut and clamp an undeflected thread carried by the yarn carrier when the latter is moved out of operative position, a deflector adapted when in operative position to engage the thread when the yarn carrier is so moved out of operative position and deflect it out of operative relation with the clamp and cutter, and means to move the deflector out of operative position, thereby permitting the clamp and cutter to operate.

3. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, means to move the yarn carrier alternately into and out of operative relation with the needles, a clamp and cutter arranged to cut and clamp an undeflected thread carried by the yarn carrier when the latter is moved out of operative position, a deflector adapted when in operative position to engage the thread when the yarn carrier is moved out of operative position by said means and deflect it out of operative relation with the clamp and cutter, and other means adapted to withdraw the yarn carrier out of operative position and also to move the deflector out of operative position, thereby permitting the clamp and cutter to operate.

4. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, means to move the yarn carrier alternately into and out of operative relation with the needles for a number of successive revolutions and to then withdraw the yarn carrier from operative position during a number of successive revolutions, a clamp and cutter, a deflector adapted when in operative position to engage the thread when the yarn carrier is moved out of operative position and deflect it out of operative relation with the clamp and cutter, and means to maintain the deflector operative during the first named series of revolutions and to render it inoperative in the immediately following withdrawal of the yarn carrier from operative position, whereby the clamp and cutter are operative only in the last named withdrawal of the yarn carrier from operative position.

5. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, means to move said yarn carrier alternately into and out of operative relation with the needles, a clamp and a cutter, a guide plate under the clamp and cutter and normally

adapted to permit a thread carried by the yarn carrier when the same is moved out of operative position to be moved into operative relation with the clamp and cutter, a deflector adapted to engage the thread when the yarn carrier is so moved out of operative position by said means and deflect it under the guide plate, and other means adapted to move and hold the yarn carrier out of operative position and connected with and adapted to withdraw the deflector from operative position, thereby permitting the thread to be drawn over the guide plate into operative relation with the clamp and cutter.

6. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, a spring tending to hold the yarn carrier in operative position, a cam turning with the needle cylinder and adapted during a part only of each rotation thereof to withdraw the yarn carrier from operative position, a clamp and a cutter normally adapted to engage a thread carried by the yarn carrier when the same is moved out of operative position and cut and clamp it, a deflector adapted to engage the thread when the yarn carrier is so moved out of operative position by said cam and deflect it out of operative relation with the clamp and cutter, and other means adapted to render said cam inoperative and withdraw and hold the yarn carrier out of operative position and connected with and adapted to withdraw the deflector from operative position, thereby permitting the thread to be moved into operative relation with the clamp and cutter.

7. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, a spring tending to hold the yarn carrier in operative position, a cam turning with the needle cylinder and adapted during a part only of each rotation thereof to withdraw the yarn carrier from operative position, a clamp and a cutter, a guide plate under the clamp and cutter and normally adapted to permit a thread carried by the yarn carrier when the same is moved out of operative position to be moved into operative relation with the clamp and cutter, a deflector adapted to engage the thread when the yarn carrier is moved out of operative position by said cam and deflect it under the guide plate out of operative relation with the clamp and cutter, and other means adapted to render said cam inoperative and withdraw and hold the yarn carrier out of operative position and connected with and adapted to withdraw the deflector from operative position, thereby permitting the thread to be drawn over the guide plate into operative relation with the clamp and cutter.

8. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, a spring tending to move the yarn carrier into operative relation with the needles, a lever adapted to move the yarn carrier out of operative relation with the needles, means turning with the needle cylinder adapted to so actuate said lever during a part of each rotation of the needle cylinder, other means adapted, in one movement, to move said lever to withdraw it from operative relation with the first means and hold the yarn carrier out of operative position and, in the other movement, to allow said lever to move into operative relation with the first means and permit the spring to operate the carrier except during the part of each rotation that the first means is operative, a clamp and a cutter adapted to engage the thread and cut and clamp it when, in the first movement of the second named means, the yarn carrier is moved out of operative position, and a deflector connected with the second named means and adapted, in the second movement thereof, to be moved into position to engage the thread, when the yarn carrier is moved out of operative position by the first-named means, and deflect it out of operative relation with the clamp and cutter.

9. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, a spring tending to move the yarn carrier into operative relation with the needles, a lever adapted to move the yarn carrier out of operative relation with the needles, means turning with the needle cylinder adapted to so actuate said lever during a part of each rotation of the needle cylinder, other means adapted, in one movement, to move said lever to withdraw it from operative relation with the first means and hold the yarn carrier out of operative position and, in the other movement, to allow said lever to move into operative relation with the first means and permit the spring to operate the carrier except during the part of each rotation that the first means is operative, a clamp and a cutter, a guide plate under the clamp and cutter adapted to permit a thread carried by the yarn carrier to be moved into operative relation with the clamp and cutter when, in the first movement of the second named means, the yarn carrier is moved out of operative position, and a deflector connected with the second named means and adapted, in the second movement thereof, to be moved into position to engage the thread, when the yarn carrier is moved out of operative position by the first named means, and deflect it under the guide plate out of operative relation with the clamp and cutter.

10. In a circular knitting machine, in

combination, a rotatable needle cylinder, a yarn carrier, a spring tending to hold the yarn carrier in operative position, a cam turning with the needle cylinder and adapted during a part of each rotation thereof to withdraw the yarn carrier from operative position, a clamp and a cutter, a deflecting lever adapted to engage the yarn fed from the carrier after the same is withdrawn from operative position and deflect it out of operative relation with the clamp and cutter, and means connected with the yarn carrier and the deflecting lever adapted to withdraw the yarn carrier out of operative relation with said cam and the deflecting lever out of operative relation with the yarn.

11. In a circular knitting machine, in combination, a rotatable needle cylinder and driving means therefor, a clamp and cutter, a cam turning with the needle cylinder, a yarn carrier, a lever engaging the yarn carrier and adapted to be advanced thereby into engagement with said cam whereby the yarn carrier is alternatively moved into and out of operative position in each rotation of the cylinder, a deflector adapted to engage the yarn fed from the carrier when the same is moved by the cam out of operative relation with the needles and deflect the yarn out of operative relation with the clamp and cutter, a rod connected with said deflector and engaging the lever, and means to advance the rod and simultaneously render the deflector inoperative and retract the lever out of engagement with said cam and thereby withdraw the yarn carrier from operative relation with the needles.

12. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a relatively non-rotatable yarn carrier, a spring tending to move the yarn carrier into operative relation with the needles, a lever adapted to move the yarn carrier out of operative relation with the needles, a cam turning with the needle cylinder adapted to so actuate said lever during a part of each rotation of the needle cylinder, a rod adapted, when advanced, to withdraw said lever from operative relation with the cam and hold the yarn carrier out of operative position, and adapted, when retracted, to allow said lever to move into operative relation with the cam and permit the spring to move the carrier into operative position except during the part of each rotation that it is operated by the cam, a clamp and a cutter, a guide plate under the clamp and cutter adapted to permit a thread carried by the yarn carrier to be moved into operative relation with the clamp and cutter when, in the advance movement of the rod, the yarn carrier is moved out of operative position, and a deflector connected with the rod adapted, in the retraction thereof, to be moved into position to engage the thread, when the yarn carrier is moved out of operative position by the cam, and deflect it under the guide plate out of operative relation with the clamp and cutter.

13. In a circular knitting machine, in combination, a rotatable needle cylinder and driving means therefor, one or more yarn carriers, a clamp and a cutter, a guide plate adapted to permit the yarn to move into operative relation with the clamp and cutter when a carrier is moved out of operative position, an additional yarn carrier, a cam turning with the needle cylinder adapted to move the last named carrier alternately into and out of operative position in each rotation thereof, a deflecting lever adapted to advance beyond the guide plate and thereby engage the yarn fed from the last named carrier when moved to inoperative position by the cam and deflect the yarn under the guide plate out of operative relation with the clamp and cutter, and means to simultaneously retract the deflecting lever and move the last named yarn carrier out of operative position and out of operative relation with said cam whereby the yarn from the last named carrier is then allowed to be moved into operative relation with the clamp and cutter.

14. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a plurality of relatively non-rotatable yarn carriers, means to move each yarn carrier out of operative relation with the needles, a clamp and cutter adapted to engage a thread carried by a yarn carrier when the same is moved out of operative position and clamp and cut it, means to move one of said yarn carriers into inoperative position during a part only of each revolution, a deflector arranged to engage the thread from the last named carrier when the same is moved into inoperative position by the last named means and guide it out of operative relation with the clamp and cutter, and means to withdraw the deflector from operative position, to permit the clamp and cutter to operate in the other movements of the yarn carriers out of operative position.

15. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a plurality of relatively non-rotatable yarn carriers, means to move each yarn carrier out of operative relation with the needles, a clamp and a cutter normally adapted to engage a thread carried by a yarn carrier when the same is moved out of operative position and cut and clamp it, means adapted to move one of said yarn carriers into inoperative position during a part only of each revolution, a deflector adapted to engage the thread from the last named yarn carrier when the same is moved into

inoperative position by the last named means and guide it out of operative relation with the clamp and cutter, said deflector being connected with the first named means for actuating the last named yarn carrier and adapted, when the first named means is operated to move the last named yarn carrier out of operative position, to be withdrawn thereby out of operative position.

16. In a circular knitting machine, in combination, a relatively rotatable needle cylinder, a plurality of relatively non-rotatable yarn carriers, one of which is adapted to carry a reinforcing thread, each of said yarn carriers comprising a pivoted arm extending toward the needle cylinder and adapted when lowered to permit the corresponding thread to be engaged by the needles and when raised to withdraw the corresponding thread from the needles, a spring tending to lower the thread carrying arm of each carrier, a pivoted lever extending transversely under the arm or arms of all the carriers except the reinforcing thread carrier and engaging the last named carrier and adapted to be actuated to raise its thread carrying arm, means adapted to so actuate said lever during a part of each rotation of the needle cylinder, a rod adapted, in its advance movement to withdraw said lever from operative relation with said means and move it to raise the thread carrying arm of the reinforcing thread carrier, said rod adapted, in its return movement, to permit the reinforcing thread carrier to be operated by its spring and the lever to move into operative relation with said means, mechanism to operate each of the other carriers to raise its thread carrying arms, a clamp and a cutter adapted to engage the corresponding threads and cut them when the arms of the last named carriers are raised and when the arm of the reinforcing thread carrier is raised by the advance of said rod, and a deflector connected with said rod and operated by it in its return movement to be moved into position to engage the reinforcing thread and deflect it out of operative relation with the clamp and cutter.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 12th day of June, 1913.

HARRY A. HOUSEMAN.

Witnesses:
W. P. BROCKERMANN,
RAYMOND FUHRER.