Feb. 25, 1930. A. L. ALDERFER ET AL 1,748,322

KNITTING MACHINE

Filed Dec. 24, 1925 2 Sheets-Sheet 1

Fig. 1.

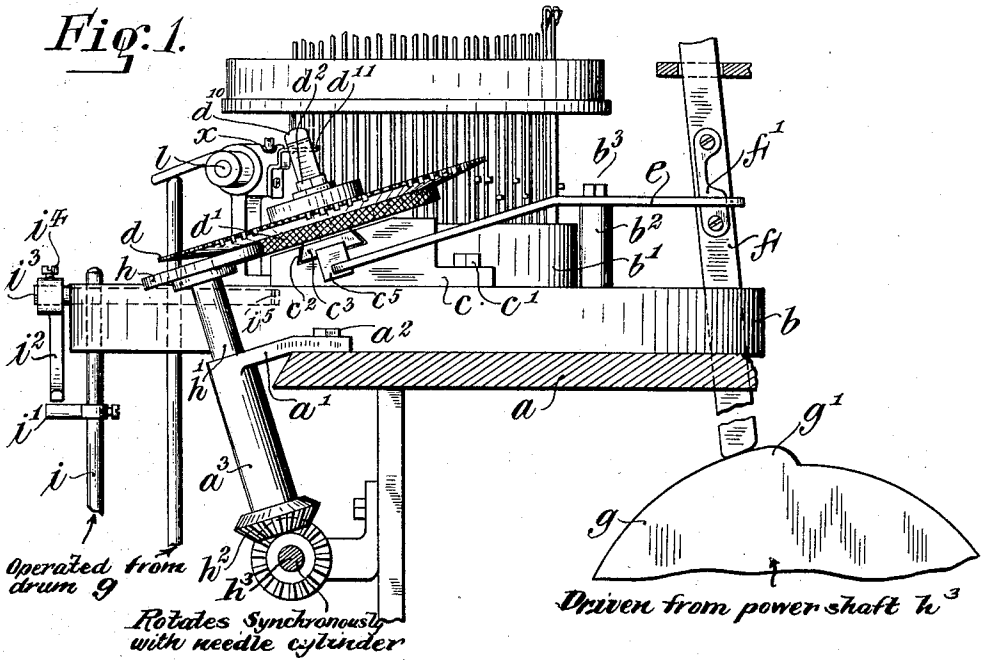


Fig. 4.

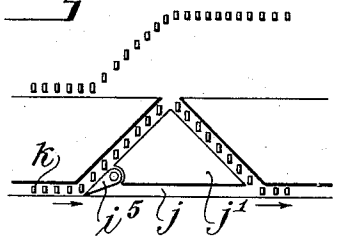


Fig. 5.

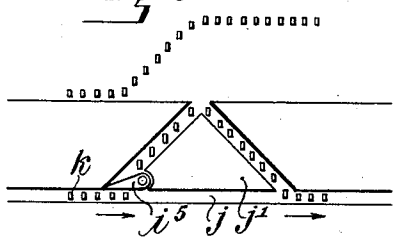
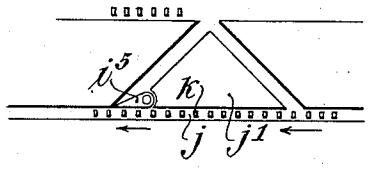


Fig. 6.



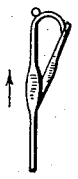
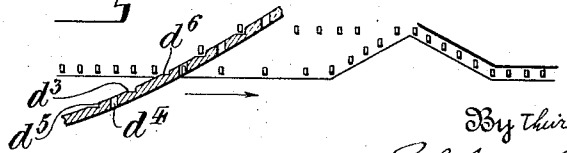


Fig. 8.

Fig. 7.



Inventors
Abram L. Alderfer and
Sylvester Stora

By their Attorneys
Redding, Gourley, Gilbert & Campbell.

Feb. 25, 1930. A. L. ALDERFER ET AL 1,748,322

KNITTING MACHINE

Filed Dec. 24, 1925 2 Sheets-Sheet 2

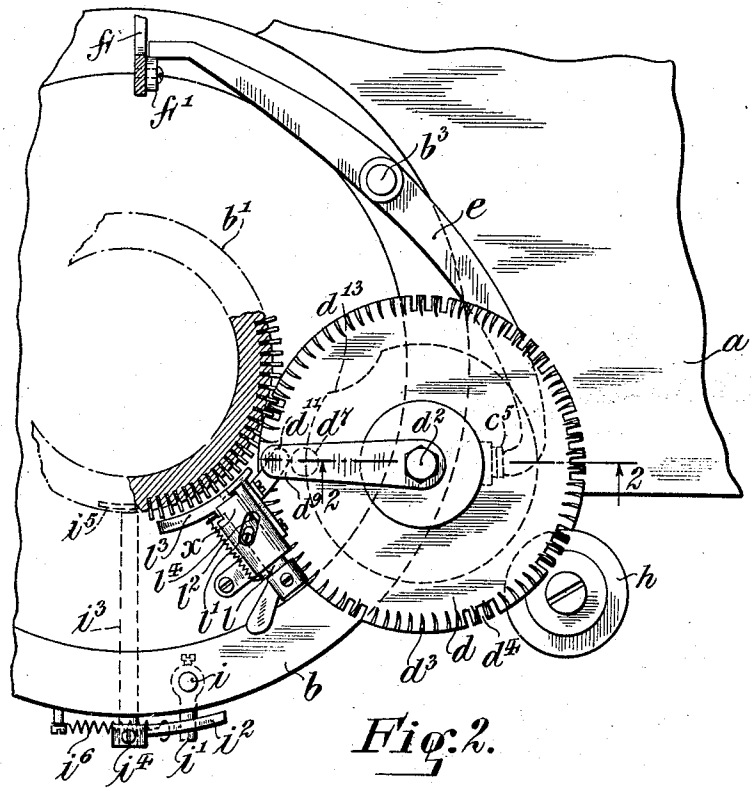


Fig. 2.

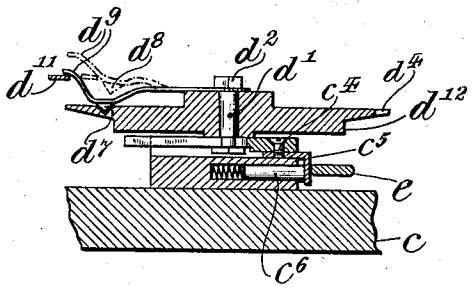


Fig. 3.

Inventors
Abram L. Alderfer and Sylvester Stora
By their Attorneys
Redding, Greeley, O'Shea & Campbell.

Patented Feb. 25, 1930 1,748,322

UNITED STATES PATENT OFFICE

ABRAM L. ALDERFER, OF JERSEY CITY, NEW JERSEY, AND SYLVESTER STORA, OF BROOKLYN, NEW YORK, ASSIGNORS TO DAVID GOOBICH, BENJAMIN GOOBICH, AND ELIAS DE VOS, COPARTNERS COMPRISING THE PARTNERSHIP OF GOOBICH & DE VOS, OF BROOKLYN, NEW YORK

KNITTING MACHINE

Application filed December 24, 1925. Serial No. 77,440.

This invention relates to knitting machines in which means is provided for knitting a continuous stocking where the separate sections constituting a complete article are cut off of the continuous product and finished off at the toe and upper between which the cutting was done.

In the common form of machine now used there are four cycles of operation through which the needles move. The first is the stocking operation in which the cylinder carrying the needles moves continuously at a constant speed and the needles knit the barred portion of the stocking. Driven with this cylinder is a suitable device to control the length of the upper and foot portions of the sock and a suitable mechanism is provided to cause a reciprocation of the cylinder in a manner to knit the toe and heel sections as the continuous stocking length is formed, the reciprocation being accompanied by other portions which perfect such knitting as the appropriate intervals are covered.

A machine of this character requires half of the needles of the cylinder to be provided with short butts which are lifted by suitable cam grooves into engaging position, and half to have long butts which, in addition to the above lifting, may also be lifted by an additional cam into inoperative position corresponding to the time when the reciprocating periods are taking place.

The type of machine outlined above is shown in the catalogue of Automatic Seamless Hosiery Machines published in 1923 by Scott and Williams at 366 Broadway, New York city and forms no part of this invention.

The present invention provides an improvement in the above machine whereby irregular designs may be knit in the sock and adapts the machine for a more wide and varied application.

In this invention, a pattern wheel is provided which is turned by the butt ends of the needles and which lifts certain of the needles to engage the design thread before reaching the point in the cam path where all the needles are lifted to engage the base thread. The wheel is provided with suitable notches to permit certain needle butts to pass along unmolested and only cause their respective needles to engage the base thread.

This invention further provides a means for lifting half of the needles into the disengaging position during the reciprocating period, which does not require long butts on the needles as in the old form of apparatus. This is particularly advantageous by reason of the fact that long butt needles cannot be used in connection with the pattern wheel.

Reference will now be had to the accompanying drawings for a more detailed description of the operation of the device, wherein:

Figure 1 is a view in elevation, partly in section, of the improved device.

Figure 2 is a plan view of the device shown in Figure 1.

Figure 3 is a section of the pattern wheel and the means for normally urging the same out of engaging position with respect to the needles.

Figure 4 shows diagrammatically the swivel pawl diverting the jacks into the detour.

Figure 5 shows the swivel pawl just after it has finished diverting the half of the jacks.

Figure 6 shows the reverse movement of the jacks.

Figure 7 shows the action of the pattern wheel on the needle butts.

Figure 8 shows how the design thread is prevented from being engaged by the needles which are not raised by the pattern wheel.

In the accompanying drawings no effort is made to illustrate every element of the machine on which this device is applied, but only so much thereof is shown as will serve to illustrate the present invention.

In the several figures a represents the mounting plate of the machine on which bracket a' is secured by suitable means such as studs a^2. Bracket a' has a downwardly projecting sleeve portion a^3 the function of which will be described hereinafter. Mounted on plate a is a circular plate b which houses, on its inner periphery, the cam race mounting b'.

Stud c' serves to secure to plate b, a mounting block c which is provided with a dove tailed groove c^2 in which slides the dove tailed tongue c^3 which constitutes a carriage on which the pattern wheel d is mounted. Pattern wheel d is rotatably mounted on tongue c^3 by means of an upwardly projecting stud d' secured by a suitable tap d^2. At the periphery of the pattern wheel and on the upper face thereof is provided a series of grooves d^3 or notches d^4, the same being spaced apart a distance equal to the distance between the needles on the needle cylinder, to be described hereinafter. The grooves are shaped so as to present a shoulder d^5 to the engaging face of a needle and thus compel the latter to move the wheel. It is to be noted that the wheel is slanted with respect to the plane in which the needle butts move and that the pitch circle of the grooves is tangential to the path of movement of the needle butts. The taper d^5 of the groove is equal to the degree of slant of the pattern wheel with respect to the plane of the path of movement of the needle butts so that the latter can ride over the taper and engage the shoulder. It will, therefore, readily be seen that the butts engaging the shoulder will turn the pattern wheel and that, as the latter turns, it will lift the needle, which is free to move in its slot in the vertical cylinder, until the butt leaves the groove in its continued movement. This lifting of the needle causes it to engage the design thread and work the latter in the stocking in a suitable fashion. This is readily seen in Figure 7.

Where a notch d^4 is provided in the pattern wheel, the butt, instead of being lifted, passes through the notch and serves only to engage one side thereof to turn the pattern wheel. This needle, therefore, does not engage the design thread.

On the upper face of the pattern wheel d is provided a notch d^7 which is adapted to be engaged by a pawl d^8 urged thereinto by leaf spring d^9 which is secured under the tap d^2. Leaf spring d^9 has an upwardly tapered outer end d^{10} which rides up on shoulder d^{11} mounted on bracket x when the carriage is moved inwardly as hereinafter more fully described. This raises the spring and disengages the pawl d^8 from the notch d^7 and permits the wheel to rotate. It will thus be seen that when the wheel is moved in to engage the needle butts to turn the same, the pawl is simultaneously disengaged from the notch and permits the turning to take place. The pattern wheel is further provided on its under side with a knurled drum d^{12}.

Mounted on the block c by means of screw c^4 is an arm c^5 which is engaged by a spring pressed plunger c^6 which is mounted with the tongue and carriage c^3 and which serves to force the same outwardly, away from the needle butts and against the crank arm e. This serves to remove the pattern wheel from the path of the butts when the crank arm moves outwardly.

Crank e is pivotally mounted on plate b by means of stud b^2 and tap b^3. The other end of the crank arm is engaged by cam f' mounted on riser f which is operated from the drum g.

Drum g is provided with circumferential cam surfaces g' which ride under riser f and lift the latter. This causes cam f' to force the adjacent portion of crank e outwardly which, in turn, forces the carriage c^3 inwardly and permits the pattern wheel to be engaged by the needle butts.

When the crank permits the carriage to move outwardly the knurled hub d^{12} under the face of the pattern wheel engages a disc h which is mounted on shaft h' which rotates in the sleeve portion a^3. This disc may be of fiber or other suitable material, and on the lower end of the shaft h' a bevel gear h^2 is provided which is driven from the power shaft h^3 so that the disk h moves synchronously with the needle cylinder. This is quite apparent since the latter moves synchronously with the shaft h^3.

The knurled portion d^{12} is provided with a depression d^{13} in which the disc h turns without turning the pattern wheel when the latter has been moved by the former to the point at which the pawl d^8 drops into the notch d^7. The disc h, moving with the needle cylinder, moves the pattern wheel around to a position in which it will continue the design where it left off after the reciprocating period has been finished. Thus the design will appear in continuous rows down the stocking.

The circumferential cam surface g' corresponds to the period in which the stocking is being knit and the end of the cam corresponds to the point at which reciprocation takes place to knit the heel.

At this point a corresponding cam on the drum opeartes the lift rod i which is provided with a lug i' engaging pawl i^2. Pawl i^2 is mounted on shaft i^3 by means of screw i^4. Shaft i^3 passes radially through the plate b and turns therein, terminating flush with the cam race j which is supported by the cam race mounting b'.

As seen in Figures 4, 5 and 6, the inverted V-cam j' of the old machine has had the lower left angle removed in order to accommodate the swivel cam i^5 which is mounted to turn with the shaft i^3. The point of this cam is normally held out of the horizontal path of the butts k on the jacks, by the spring i^6. When a suitable cam on the drum engages the leverage to lift rod i, however, the point of the swivel cam is moved down into such path and diverts certain of the jack

butts into the detour or inverted V cam, which lifts the corresponding needle into the disengaging position at which position the jack butts pass down the other face of the cam into the horizontal race. This is clearly seen in Figures 4, 5 and 6. The swivel cam is held down only long enough to lift half of the needles and the cam face on the drum is constructed to hold it down only so long. When half have been diverted the spring i^6 returns the swivel cam to the non-engaging position.

As previously noted, this action takes place at the beginning of each reciprocatory period and in the first reciprocation the jack butts pass back under the swivel cam which has been raised after diverting half of the butts up the incline, and reciprocation follows in the usual manner. As noted above, Figures 4, 5 and 6 illustrate the action of the needles and cam when the latter is diverting the former, when such action ceases in the continued movement of the cylinder, and when the reverse movement of the cylinder takes place. The needle butts, which have been lifted, remain in the non-engaging position until after the reciprocatory period, at which time they are moved to the engaging position by the usual cam means briefly described as follows:

Shaft l is suitably operated from drum g and serves to turn the shaft in a clockwise direction. Due to the pin and slot connection l', l^2, the shaft will be moved inwardly against the face of the cylinder and the cam l^3 mounted on the end of shaft l will be thrown up into the path of the needle butts to bring them down to the engaging position, when the shaft is permitted to return under the action of the spring l^4 by cam drum g. As this is no part of the present invention, no further description is necessary.

It will thus be seen that the swivel cam, lifting half of the needles, does away with the old type wherein half of the needle butts had to be long to be so lifted by suitable action of the other cam.

It will thus be seen that during the stocking operation or first and third cycles the pattern wheel lifts certain of the needles to engage the design thread (see Fig. 7) before they engage the base thread and thus the design is knit in as desired.

During the second and fourth cycles, when reciprocation takes place to knit the heel and toe, the pattern wheel is removed from operative position so that the needle butts, in reciprocating will not be damaged.

The remainder of the apparatus operates as described above to co-operate with the pattern wheel and enable a complete stocking with any desired design to be knit.

It will be noted that the design thread which is engaged by the needles lifted by the pattern wheel will not be engaged by the needles not so lifted when they are subsequently raised by the rising cam face of the race to engage the base thread, by reason of the fact that the noses of such needles not so lifted will push the design thread down the backs of their needles as they are raised. This is illustrated in Figure 8.

In the embodiment shown a specific type of machine on which the invention is used, has been illustrated. It is understood, however, that the device may be applied to any suitable machine and is not to be limited except as defined in the appended claims.

What we claim is:

1. In combination with the needle-containing cylinder of a knitting machine having means to rotate and reciprocate the same, of a pattern wheel, means causing the same to engage the needles, means to disengage the same from the needles during reciprocation of the latter, means to move the disengaged wheel to a subsequent pattern resuming position, and means for holding the wheel against motion after it has been moved to such position.

2. In combination with the needle-containing cylinder of a knitting machine having means to rotate and reciprocate the same, of a pattern wheel, means causing the same to engage the needles, means to disengage the same from the needles during reciprocation of the latter, and means to turn the pattern wheel when the same has been moved to a disengaging position into a position to cause it to resume the design as a continuation of the former when the pattern wheel is again moved into engaging position with respect to the needles.

3. In combination with the needle-containing cylinder of a knitting machine having means to rotate and reciprocate the same, of a pattern wheel and means causing the same to engage the needles, means to disengage the same from the needles during reciprocation of the latter, and means operated synchronously with the cylinder rotating means, to turn the pattern wheel, when the same has been moved to a disengaging position, to a position where it will resume the design in proper sequence as the wheel is moved to engaging position when rotation of the cylinder again takes place.

4. In combination with the needle containing cylinder of a knitting machine having means to rotate and reciprocate the same, of a pattern wheel and means causing the same to engage the needles, means to disengage the same from the needles during reciprocation of the latter, a hub on the wheel, a disc driven synchronously with the cylinder rotating means and so positioned that the hub will engage the disc when the wheel is moved to disengaging position, a depression in the hub in which the disc turns freely when it has moved the wheel into the proper re-en-

gaging position, and means to hold the wheel in such turned position.

5. In combination with the needle-containing cylinder of a knitting machine having means to rotate and reciprocate the same, of a pattern wheel, a carriage mounting the same, means to move the carriage to engaging position with respect to the needles, means carried by the carriage and moving the wheel to a disengaging position with respect to the needles during reciprocation of the cylinder, a hub on the wheel, a disc driven synchronously with the cylinder rotating means and so positioned that the hub will engage the disc when the wheel is moved to disengaging position, a depression in the hub in which the disc turns freely when it has moved the wheel into the proper re-engaging position, means mounted on the carriage for holding the wheel when moved to such position and means for releasing said holding means when the wheel is again moved into needle engaging position.

6. In an automatic knitting machine having a plurality of needles and needle jacks which abut the lower ends of the respective needles, a needle-containing cylinder, a pattern wheel, means to engage and disengage the pattern wheel with the needles, a detoured raceway for controlling the position of the jacks, a swivel pawl for diverting the jacks from the raceway into the detour, and means operable by the pattern wheel engaging means for moving the pawl into a diverting position when the pattern wheel is disengaged from the needles.

7. In an automatic knitting machine having a plurality of needles and needle jacks which abut the lower ends of the respective needles, a needle-containing cylinder, a pattern wheel, means to engage and disengage the pattern wheel with the needles, a detoured raceway for controlling the position of the jacks, a swivel pawl for diverting the jacks from the raceway into the detour, means normally urging the pawl into the non-diverting position and means operating the pawl simultaneously with the pattern wheel as the latter is moved to the disengaged position.

8. In an automatic knitting machine having a plurality of needles and needle jacks which abut the lower ends of the respective needles, a needle-containing cylinder, a pattern wheel, means to engage and disengage the pattern wheel with the needles, a detoured raceway for controlling the position of the jacks, a swivel pawl for diverting the jacks from the raceway into the detour, means normally urging the pawl into the non-diverting position, and means for moving the same into the diverting position when the pattern wheel is moved to disengaged position and permitting the pawl to be returned after half of the jacks have been diverted.

9. In an automatic knitting machine having a cylindrical needle housing carrying a plurality of needles and needle jacks which abut the lower ends of the respective needles and having a means to rotate and reciprocate the needle cylinder, a pattern wheel, means to engage and disengage the same with the needles during the rotating and reciprocating period, respectively, a detoured raceway for controlling the position of the jacks, a swivel pawl for diverting the jacks from the raceway into the detour, means normally urging the pawl into the non-diverting position and means operable by the pattern wheel operating means for moving the pawl to the diverting position at the beginning of each reciprocating period of the cylinder.

10. In an automatic knitting machine having a cylindrical needle housing carrying a plurality of needles and needle jacks which abut the lower ends of the respective needles and having a means to rotate and reciprocate the needle cylinder, a pattern wheel, means to engage and disengage the same with the needles during the rotating and reciprocating period, respectively, a detoured raceway for controlling the position of the jacks, a swivel pawl for diverting the jacks from the raceway into the detour, means normally urging the pawl into the non-diverting position and means operable by the pattern wheel operating means for moving the pawl to the diverting position at the beginning of each reciprocating period of the cylinder and permitting the same to be returned to the non-diverting position after one-half of the jacks have been diverted into the detour.

11. In an automatic knitting machine having a cylindrical needle housing carrying a plurality of needles and needle jacks which abut the lower ends of the respective needles and having a means to rotate and reciprocate the needle cylinder, a detoured raceway for controlling the position of the jacks, means operable for diverting certain of the jacks into the detour, a pattern wheel normally engaging the needles and movable away therefrom during the reciprocating period of the cylinder and means operable simultaneously with the movement of the pattern wheel into disengaging position, for moving the diverting means into operative position and permitting it to be returned to non-diverting position when one-half of the jacks have been diverted.

This specification signed this 21st day of December, A. D. 1925.

ABRAM L. ALDERFER.
SYLVESTER STORA.