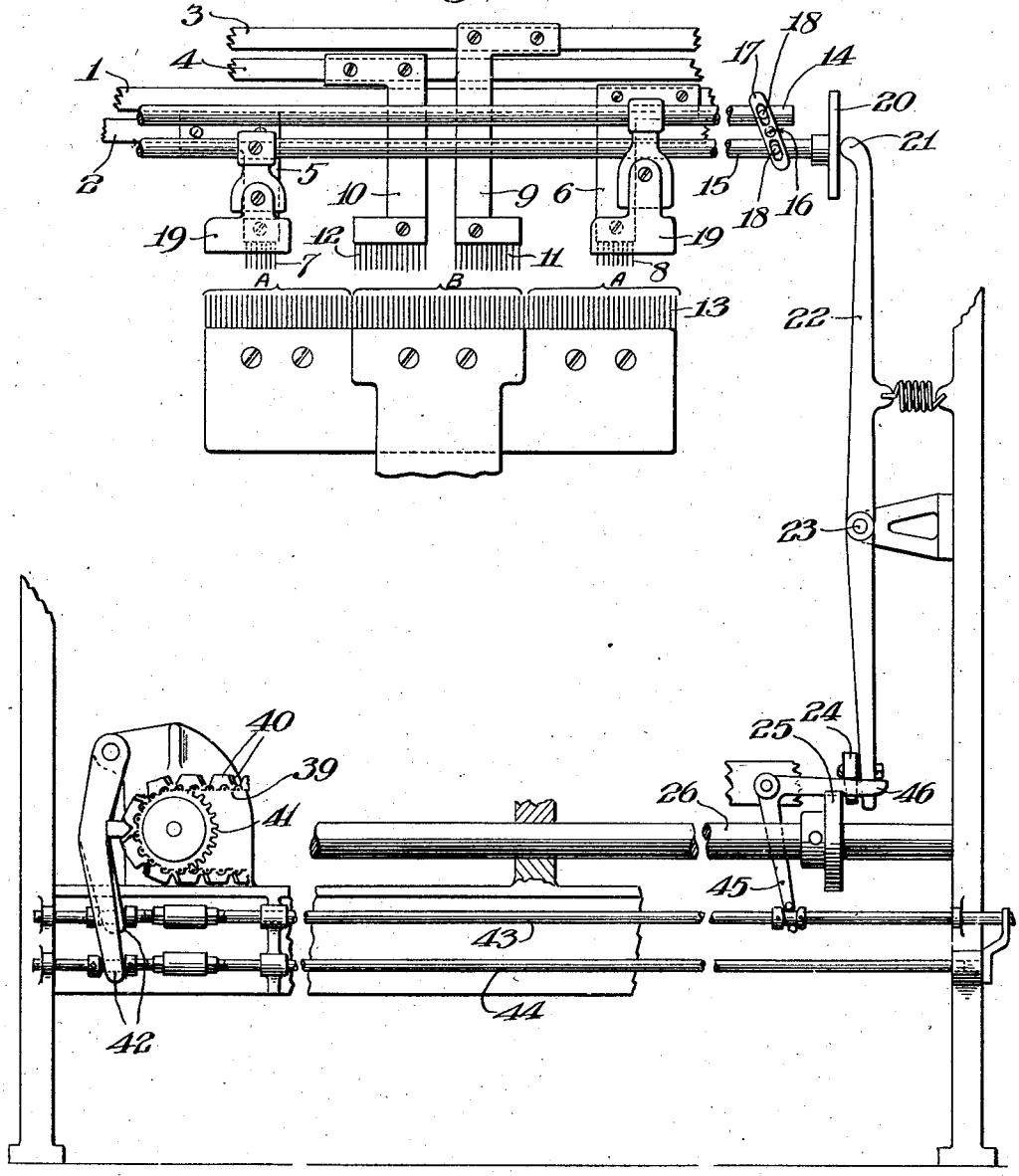
Feb. 17, 1942. A. F. VERBEEK 2,273,675

CONTROL ATTACHMENT FOR NARROWING MECHANISM

Filed March 27, 1939 3 Sheets-Sheet 1

Fig. 1.



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CONTROL ATTACHMENT FOR NARROWING MECHANISM

Filed March 27, 1939 3 Sheets-Sheet 2

Fig. 2.

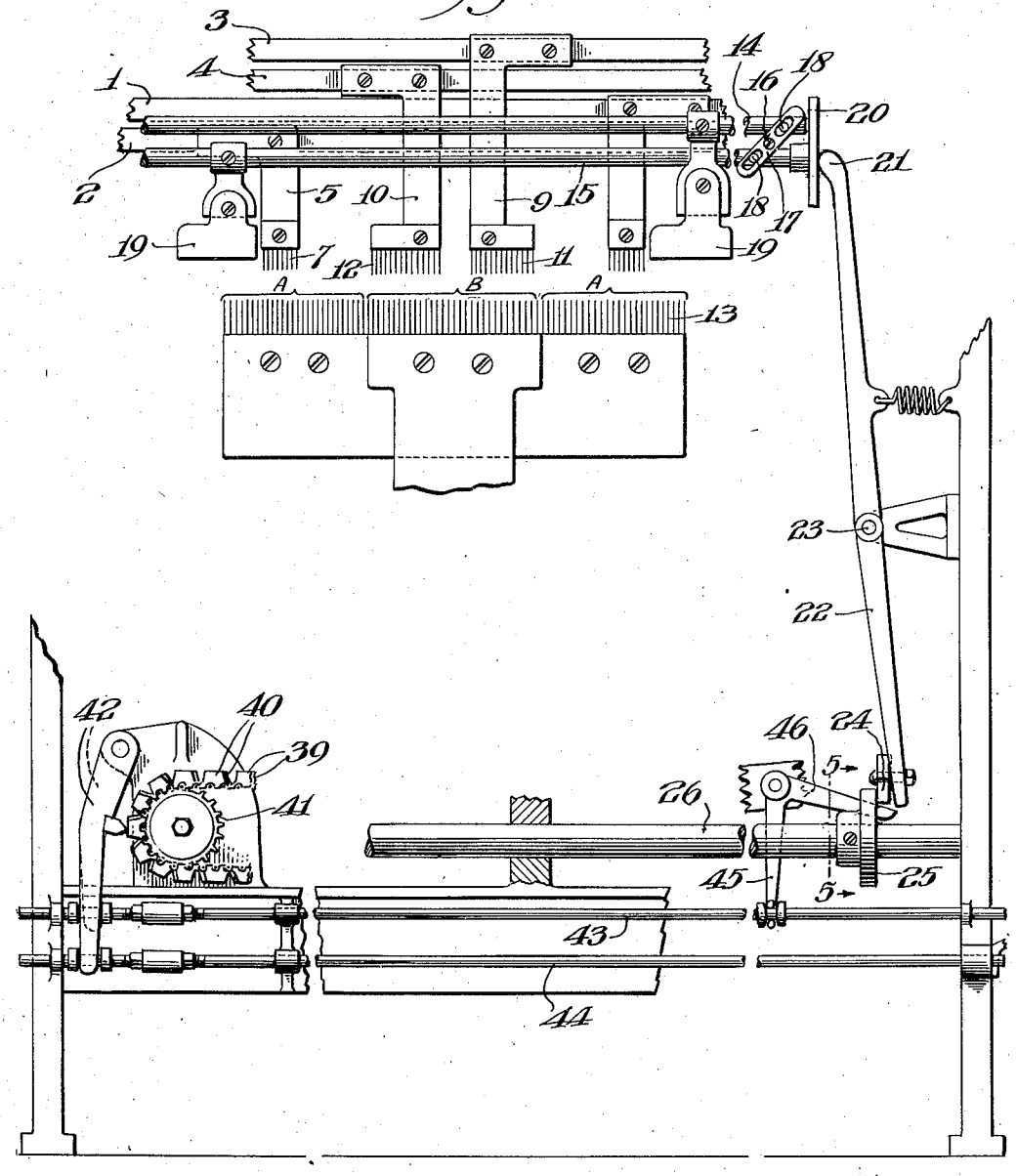
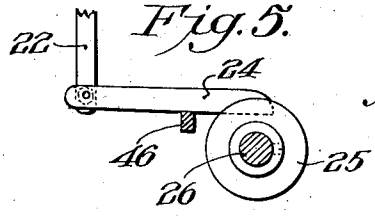


Fig. 5.



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Filed March 27, 1939 3 Sheets-Sheet 3

Fig. 5.

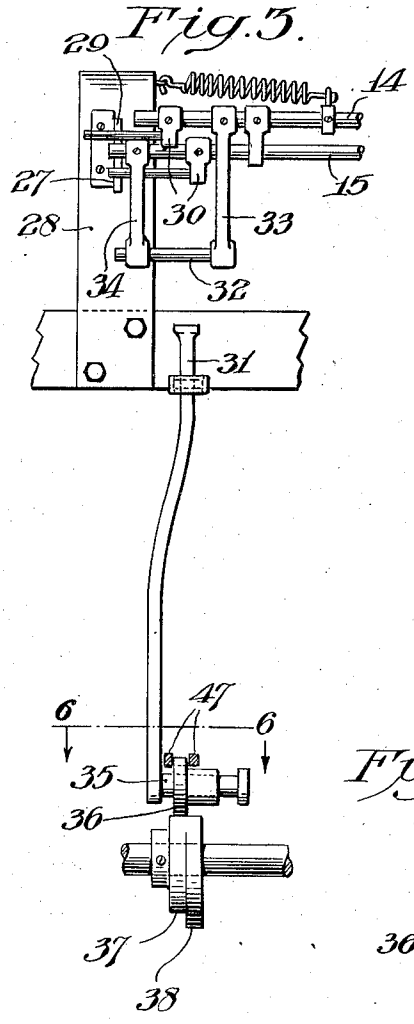


Fig. 4.

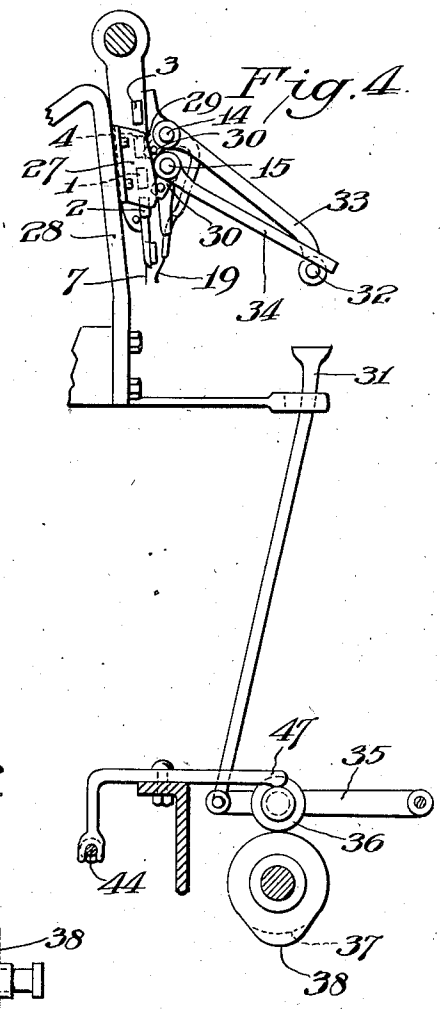
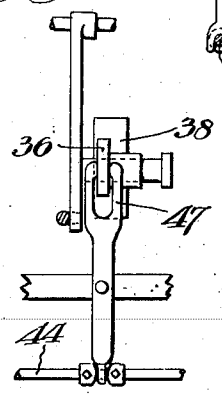


Fig. 6.



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UNITED STATES PATENT OFFICE

2,273,675

CONTROL ATTACHMENT FOR NARROWING MECHANISM

Arnold Friedrich Verbeek, Saxony, Germany, assignor to Kalio, Inc., New York, N. Y., a corporation of New York

Application March 27, 1939, Serial No. 264,441
In Germany March 29, 1938

10 Claims. (Cl. 66—89)

The present invention relates to an attachment for flat knitting machines whereby the operative association of the combs of the narrowing mechanism with the row of needles of the knitting machine may be selectively and automatically controlled.

An object of the invention resides in the provision of a control attachment for the narrowing mechanism of a full-fashioned hosiery knitting machine, whereby a set of transfer combs may co-function with the row of needles independent of, or jointly with, one or more narrowing combs.

Another object of the invention resides in the novel design, construction, and association of the various devices or mechanisms whereby the operative or inoperative association of a plurality of combs with the needle bar of the knitting machine may be automatically controlled from the main cam shaft.

A feature of the invention resides in a new combination of mechanisms co-functioning to selectively control the operative association of a group of combs with the row of needles of the knitting machine through the action of the main cam shaft and pattern chain control mechanism of the knitting machine.

Besides the above, the invention is distinguished in a construction of attachment that will enable the production, in a very efficient manner, of the knitting, transferring, and narrowing operations necessary in the manufacture of the novel type of heel structure disclosed in my co-pending application, Serial Number 99,830, filed September 8, 1936.

The invention will be better understood from the following detailed description, taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a front elevation of the right end portion of the control attachment, with the parts adjusted to prevent active engagement of one set of combs with the row of needles;

Figure 2 is a similar view, with the parts adjusted to allow active engagement of all of the combs with the row of needles;

Figure 3 is a front elevation of the left end portion of the control attachment;

Figure 4 is an end elevation of the left end portion of the control attachment;

Figure 5 is a sectional view on line 5—5 of Figure 2;

Figure 6 is a sectional view of line 6—6 of Figure 3.

In the drawings, the numerals 1, 2, 3, and 4 designate the usual narrowing bars of the narrowing mechanism of a flat knitting machine, such as a full-fashioned hosiery knitting machine. These bars are reciprocated back and forth in the usual manner by the narrowing attachment and lace attachment of the full-fashioned hosiery machine. These mechanisms may be of any well known design—for example, they may be the types of mechanism illustrated in United States Patents No. 1,935,406 and No. 2,002,116.

Attached to the bars 1 and 2 are brackets 5 and 6 to which are attached a set of narrowing combs 7 and 8. Attached to the bars 3 and 4 are brackets 9 and 10 to which are attached the sets of transfer combs 11 and 12. Thus there are provided pairs of loop transfer point combs, each pair including an outer comb 7 or 8 and an inner comb 12 or 11. These sets of combs may be operated to ornament a knitted fabric and to narrow the same, but they are preferably utilized to produce the novel type of heel structure set forth in my co-pending application Serial Number 99,830 hereinbefore identified, and for that purpose, as disclosed in said co-pending application, the combs 7 and 8 are adapted to cooperate with knitting needles to transfer loops thereon and function to narrow the fabric being knitted thereby, whereas the combs 9 and 10 are adapted to cooperate with non-knitting needles and function to transfer fabric loops supported thereon for engagement with certain of said knitting needles. Associated with the sets of narrowing combs is a novel type of control mechanism whereby the sets of combs may function together in transferring loops supported upon the row of needles 13 of the knitting machine, or function independently of each other to transfer loops supported upon the row of needles 13 which, as disclosed in my copending application aforesaid, is preferably divided into outer sets A of knitting needles and an intermediate set B of non-knitting needles, the outer combs 7 and 8 being associated with groups of said sets of knitting needles, and the inner combs 12 and 11 being associated with groups of said set of non-knitting needles. This mechanism, in one of its forms, consists of a pair of shafts 14 and 15 interconnected, as indicated at 16, by a swingingly mounted link 17 that is pivotally supported on a stationary part of the machine and pivotally connected to both of the shafts, as indicated at 18.

To each of the shafts is attached an actuator 19 known in the knitting art as a knife or covering plate, and these actuators are operatively

associated with the set of narrowing combs, but I wish it to be understood that the same may be just as readily associated with the set of transfer combs, depending entirely upon the particular result to be accomplished.

These actuators are provided for the purpose of flexing the points of the narrowing combs out of alignment with the needles 13 under certain predetermined conditions and to allow the same to align with such needles under other conditions. These actuators are operated by a novel type of control mechanism now to be described.

Secured to one of the shafts is an enlarged disc 20, having an abutting relation with the curved end 21 of a lever 22 that has an intermediate portion pivotally connected to a stationary part of the knitting machine, as indicated at 23.

The lower end of the lever has pivotally connected thereto a second lever 24 which is adapted to be moved into the path of travel of a collar fixed to the main cam shaft 26 in the manner to be hereinafter described.

In the shifting of the main cam shaft, which takes place when a narrowing operation is to be performed, the collar 25 will give movement to the lever 22 provided the lever 24 has been moved into the path of travel of the collar 25. Thus the lever 22 is shifted about its pivot and forces the shaft longitudinally in one direction and, through the link 16, forces the associated shaft in the opposite direction. This movement of the two shafts in opposite directions moves the actuators into actuating relationship with the set of narrowing combs 7 and 8. Due to the fact that the shafts are also mounted upon the knitting machine for partial rotation, the gravitational pressure of the actuators against the points of the set of narrowing combs will flex the same out of alignment with the needles 13. This gravitational pressure may be increased by any suitable arrangement of springs or weights.

Associated with the mechanism just described is a cam plate 27 fixed to the frame 28 of the knitting machine and having its cam surface 29 disposed to engage crank arms 30 secured to the shafts when the narrowing mechanism is in its uppermost inactive position. The relationship of the crank arms and cam surface 29 is such that the cam surface will swing the crank arms and thereby partially turn the shaft for relieving the narrowing combs from the pressure of the actuators.

In the use of my attachment with certain types of flat knitting machines and under certain operating conditions, it is advisable to lift the actuators a certain distance when the combs are reaching their lowermost position in the function of the narrowing mechanism, so as to avoid interference between the sinkers and the actuators. For this purpose, I have illustrated in Figures 3 and 4 a manipulating mechanism consisting of a movably mounted manipulator 31 supported on the machine for upward movements so as to engage and disengage a pin 32 projecting from a rod 33 that is secured to the end of one of the shafts and this pin 32 underlies a second rod 34 fixed to the other shaft. Thus in the upward movement of the manipulator the rods 33 and 34 will be contacted and, through these rods, the shafts 14 and 15 are partially turned. This partial rotation of the shafts 14 and 15 lifts the actuators 19 to a position where they will not contact the sinkers.

The manipulator is pivotally connected to a pivoted lever 35 that carries a roller 36 co-functioning with an idle cam 37 and an active cam 38 mounted on the main cam shaft. Of course, it is to be understood that this manipulator may be actuated every time the main cam shaft 26 shifts for performing a narrowing operation but, if advisable in practice, this may be selectively actuated in the manner hereinafter set forth.

Any suitable type of pattern chain control mechanism known in the trade may be utilized to periodically and selectively set into operation the control mechanism and the manipulating mechanism. For the purpose of illustration, only a part of such mechanism is shown in the drawings, consisting of the narrowing chain 39, buttons on the chain, drive gear 41, pivoted levers 42 actively associated with the buttons 40, and control rods 43 and 44. The control rod 43 is connected to one arm of the bell crank lever 45, the other of its arms 46 underlying the lever 24 which is arranged for positioning in or out of the path of travel of the collar 25.

If found advisable in practicing the invention, the movement of the roller 36 into and out of engagement with the actuating cam 38 may selectively be controlled by the pattern chain mechanism just described and, for this purpose, I have illustrated the rod 44 connected to a centrally pivoted fork 47 that is in engagement with the roller 36 to shift the same on its stub shaft into and out of engagement with the actuating cam 38.

Having described my invention, what I claim is:

1. A control attachment for the narrowing mechanism of a flat knitting machine including a set of narrowing combs, comprising: an actuator for each comb for flexing the points thereof out of alignment with the needles of the knitting machine; a pair of slidably and rotatably mounted shafts connected to said actuators; mechanism actuated by a movable part of the knitting machine for the operation of said shafts to manipulate said actuators; a second mechanism actuated from a movable part of the knitting machine and operatively associated with said shafts for moving said actuators out of operative engagement with the narrowing combs.

2. A control attachment for the narrowing mechanism of a flat knitting machine including a set of narrowing combs, comprising: an actuator for each comb for flexing the points thereof out of alignment with the needles of the knitting machine; a pair of slidably and rotatably mounted shafts connected to said actuators; mechanism actuated by a movable part of the knitting machine for the operation of said shafts to manipulate said actuators; a second mechanism actuated by a movable part of the knitting machine and operatively associated with said shafts for moving said actuators out of operative engagement with the narrowing combs; and a device acting independent of said second mechanism for moving said actuators out of operative relation with the narrowing combs when the narrowing mechanism is raised to an inactive position.

3. A control attachment for the narrowing mechanism of a flat knitting machine including a set of narrowing combs, comprising: an actuator for each comb for flexing the points thereof out of alignment with the needles of the knitting machine; a pair of slidably and rotatably mounted shafts connected to said actuators; mechanism for the operation of said shafts to manipulate said actuators; a second mechanism operatively associated with said shafts for moving said actuators out of operative engagement

with the narrowing combs; a device acting independent of said second mechanism for moving said actuators out of operative relation with the narrowing combs when the narrowing mechanism is raised to an inactive position; and a main cam shaft having means thereon for operating said mechanisms.

4. A control attachment for the narrowing mechanism of a flat knitting machine including a set of narrowing combs, comprising: an actuator for each comb for flexing the points thereof out of alignment with the needles of the knitting machine; a pair of slidably and rotatably mounted shafts connected to said actuators; mechanism for the operation of said shafts to manipulate said actuators; a second mechanism operatively associated with said shafts for moving said actuators out of operative engagement with the narrowing combs; a device acting independent of said second mechanism for moving said actuators out of operative relation with the narrowing combs when the narrowing mechanism is raised to an inactive position; a main cam shaft having means thereon for operating said mechanisms; and pattern control mechanism selectively controlling the operation of said two mechanisms by said cam shaft.

5. In a flat knitting machine: a bank of needles; pairs of loop transferring combs, each pair including an outer comb and an inner comb, and each comb consisting of transfer points associated with a group of said needles and movable first to engage certain needles of the group for removing loops from said certain needles, and then to engage certain other needles of the group for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all of the combs; and means periodically operable to prevent all the transfer points of one comb of each pair from engaging the needles of the associated group during certain spaced operations of said movement imparting mechanism.

6. In a flat knitting machine: a bank of needles; pairs of loop transferring combs, each pair including an outer comb and an inner comb, and each comb consisting of transfer points associated with a group of said needles and movable first to engage certain needles of the group for removing loops from said certain needles, and then to engage certain other needles of the group for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all of the combs; and means periodically operable to prevent all the transfer points of the outer comb of each pair from engaging the needles of the associated group during certain spaced operations of said movement imparting mechanism.

7. In a flat knitting machine having a pattern mechanism and a main cam shaft; a bank of needles; pairs of loop transferring combs, each pair including an outer comb and an inner comb, and each comb consisting of transfer points associated with a group of said needles and movable first to engage certain needles of the group for removing loops from said certain needles, and then to engage certain other needles of the group for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all of the combs; and periodically operable means controlled by the pattern mechanism and operated through the main cam shaft of the machine to prevent all the transfer points of one comb of each pair from engaging the needles of the associated group during certain spaced operations of said movement imparting mechanism.

8. In a flat knitting machine having a pattern mechanism and a main cam shaft: a bank of needles; pairs of loop transferring combs, each pair including an outer comb and an inner comb, and each comb consisting of transfer points associated with a group of said needles and movable first to engage certain needles of the group for removing loops from said certain needles, and then to engage certain other needles of the group for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all of the combs; and periodically operable means controlled by the pattern mechanism and operated through the main cam shaft of the machine to prevent all the transfer points of the outer comb of each pair from engaging the needles of the associated group during certain spaced operations of said movement imparting mechanism.

9. In a flat knitting machine: a bank of needles divided into sets of knitting and non-knitting needles; pairs of loop transfer point combs, each pair including a comb associated with a group of knitting needles and a comb associated with a group of non-knitting needles, each comb being movable first to engage certain needles of the associated group for removing loops from said certain needles and then to engage certain other needles for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all the combs; and means periodically operable to prevent the transfer points of the combs of each pair associated with knitting needles from engaging the latter during the certain spaced operations of said movement imparting mechanism.

10. In a flat knitting machine having a pattern mechanism and a main cam shaft: a bank of needles divided into sets of knitting and non-knitting needles; pairs of loop transfer point combs, each pair including a comb associated with a group of knitting needles and a comb associated with a group of non-knitting needles, each comb being movable first to engage certain needles of the associated group for removing loops from said certain needles and then to engage certain other needles for depositing said loops onto said other needles; mechanism operable to impart such movement in unison to all the combs; and periodically operable means controlled by the pattern mechanism and operated through the main cam shaft of the machine to prevent the transfer points of the combs of each pair associated with knitting needles from engaging the latter during certain spaced operations of said movement imparting mechanism.

ARNOLD FRIEDRICH VERBEEK.