Dec. 7, 1926. 1,609,325

A. STRELZ

KNITTING MACHINE

Filed May 29, 1923 3 Sheets-Sheet 1

FIG. 1

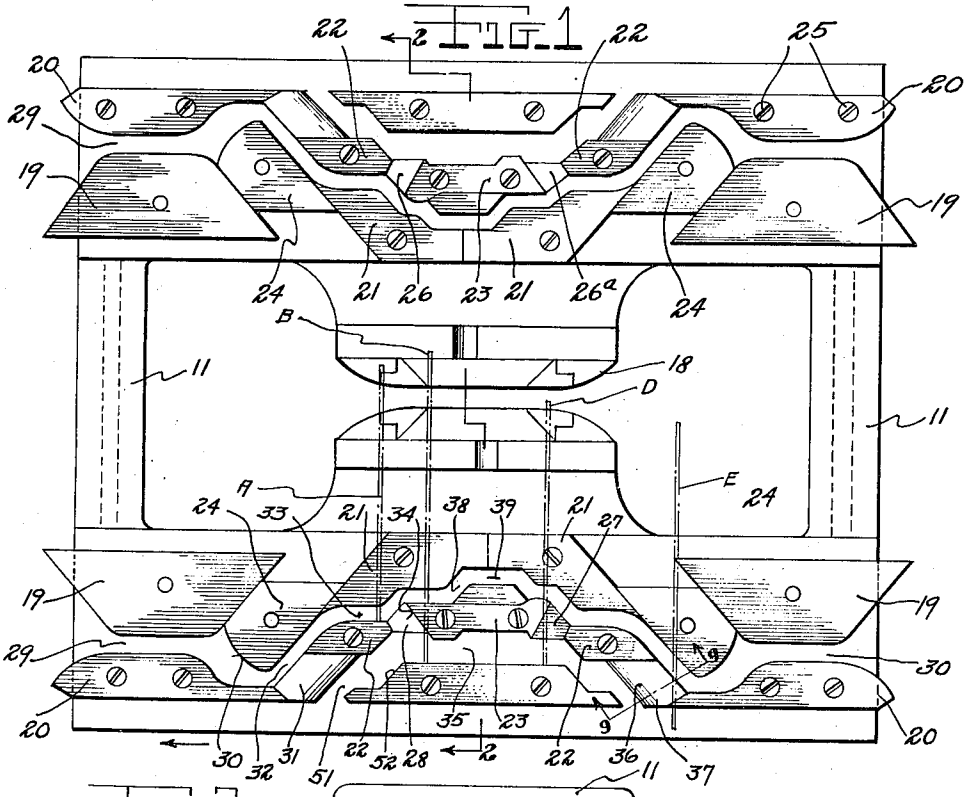
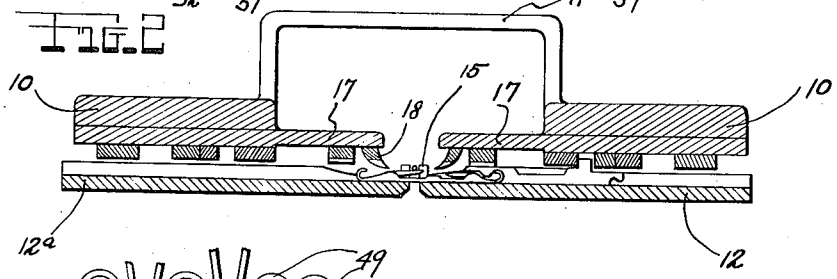


FIG. 2



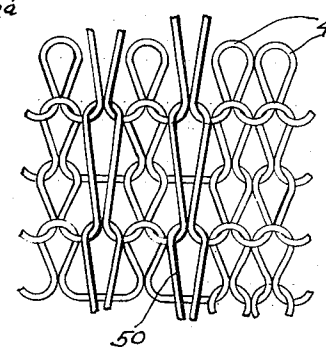


FIG. 3

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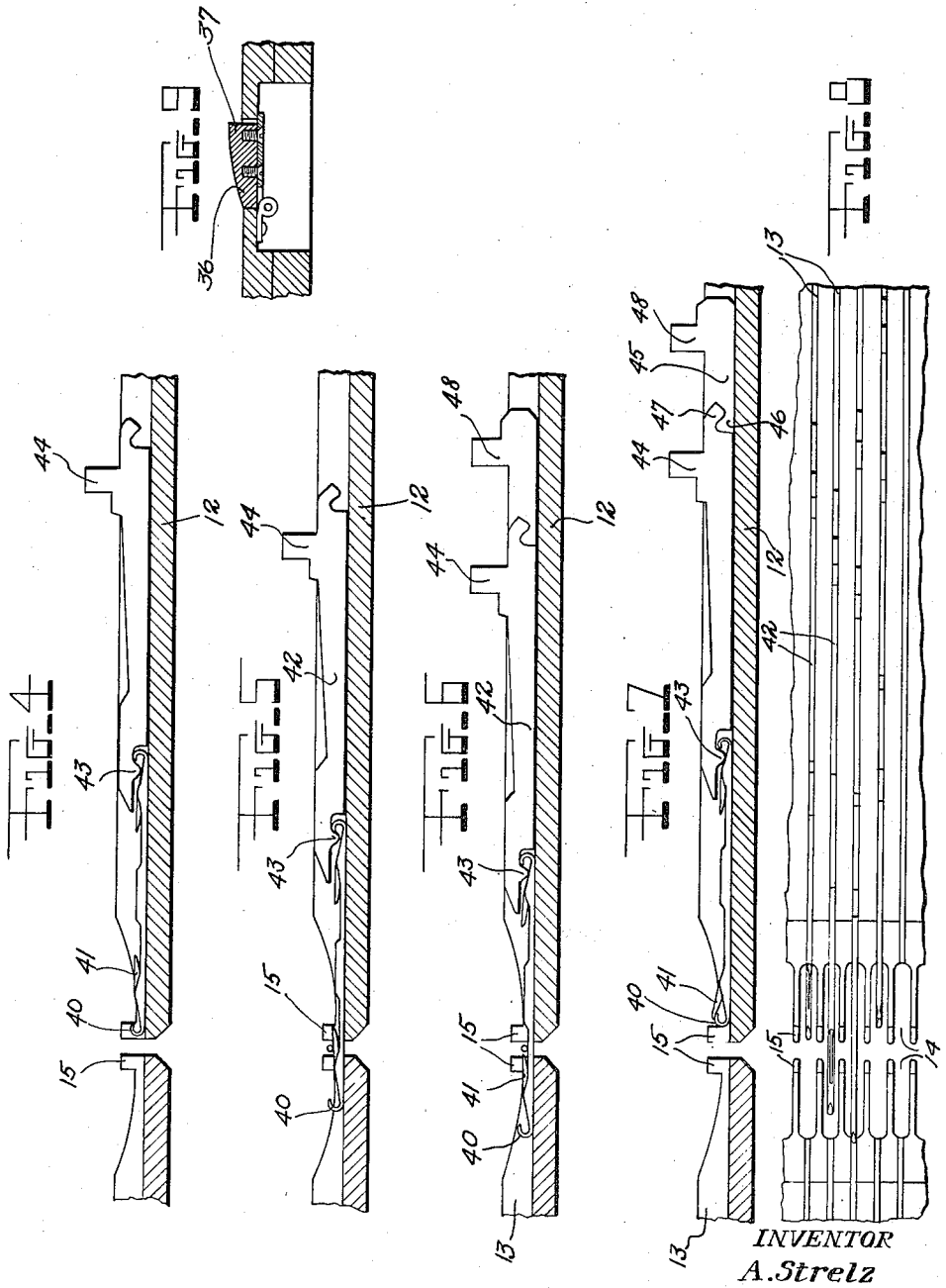
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KNITTING MACHINE

Filed May 29, 1923 3 Sheets-Sheet 2



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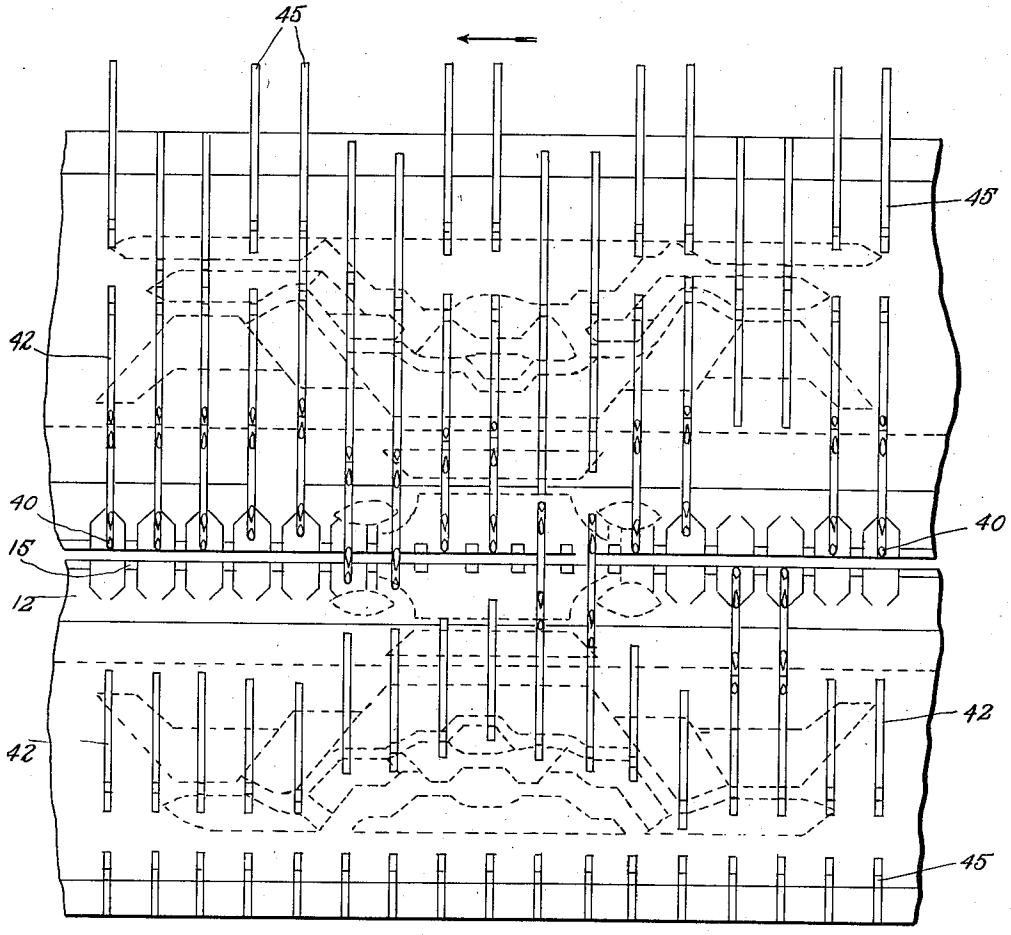
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KNITTING MACHINE

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FIG. 10



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UNITED STATES PATENT OFFICE.

ANTON STRELZ, OF BROOKLYN, NEW YORK.

KNITTING MACHINE.

Application filed May 29, 1923. Serial No. 642,156.

This invention relates to knitting machines, and the main object is to provide a novel method of knitting a raised stitch upon a purl stitch in an operation simultaneous with that of knitting the body of the fabric. The purl stitch is well known in the art, but an additional raised stitch upon this purl stitch has not been thus far fabricated in simultaneous operation and with the same set of needles.

Another object is to provide a set of cams upon the usual type of knitting machine carriage by which the hook of a needle is retained in position between the needle beds during a time interval in which the remaining needles continue to knit the purl stitch. This operation accomplishes a stitch which has the length of a full round, a round comprising two rows of stitches.

These and other objects will become apparent in the description below, in which characters of reference refer to like-named parts in the drawings.

Referring briefly to the drawings, Figure 1 is a bottom plan view of the cam carriage, the latter being shown inverted so that the cam channels may be more clearly illustrated.

Figure 2 is a sectional elevational view of the same showing the method of opening the needle latches, taken on line 2—2 of Figure 1.

Figure 3 is an enlarged view of a portion of knitted fabric, showing the combination of purl stitch and my new stitch formed thereon.

Figure 4 is a fragmentary sectional elevational view showing the hook of the needle between the teeth of the needle bed.

Figure 5 is a similar view showing the needle latch opened and in position to receive a thread.

Figures 6 and 7 are similar views showing the needles in various positions for forming a purl stitch.

Figure 8 is a top plan view of a portion of a needle bed and shows the various positions taken by the needles.

Figure 9 is a sectional elevational view of one of the hinged cam blocks, taken on line 9—9 of Figure 1.

Figure 10 is a schematic view, showing the movement of the needles and jacks during the performance of making a purl stitch.

Referring to the drawing in detail, the numeral 10 indicates the longitudinal bars of a knitting machine carriage which are connected by a yoke 11. The particular machine referred to in this specification is of the "Dubied" type, the latter being of foreign make, and it is provided with a pair of needle beds having the needle slots directly aligned with each other, and also has double ended needles which alternately slide from one needle bed to the other in performing the stitch. These needle beds are relatively long rectangular plates and are indicated in the drawings by the numerals 12^a and 12. The beds have slots 13 which traverse the width of the plates. At the adjacent edges of the plates recesses 14 are formed into which the yarn threads are pulled by the needles when the latter are urged toward the back of the plates. The adjacent ends of the needle beds are also provided with teeth 15. Said plates 12^a and 12 are rigidly mounted on a frame, and the bars 10, connected by yokes 11, are slidable lengthwise over said beds. Each of the carriage bars has a projecting plate 17 extending from the adjacent edges, and on the underside of which latch wedges 18 are provided, the latter being adapted to lift the needle latches as the needles are urged forward. In Figure 1 the carriage is shown inverted to illustrate the arrangement of the cam blocks by which the particular path of travel of the needles used in making my stitch is arrived at. Both of the bars 10 have their cam blocks arranged in such order as to be symmetrical to each other, but it is to be noted that in making my new type of stitch illustrated in Figure 3 (which is the simplest form), one needle bed and the corresponding side bar of the carriage, is only used. The cam blocks 19, 20, 21, 22, 23, and 24, are grouped in the manner shown in Figure 1, and are rigidly secured to the face of the bars 10 by screws 25. The cam blocks 26, 26^a, 27, and 28, are members which may be retracted and advanced at will as a lever on the carriage is manipulated. When forming my simplest type of stitch, cam block 28 is retracted and cam blocks 26, 26^a, and 27, are advanced. Thus it will be seen that a stitch having the length of one round, will have the cam blocks arranged in the manner shown on the lower bar of Figure 1. The spaces between these cam blocks are divided into cam channels and guide channels. When the carriage is being urged over the

needle bed in one direction, as indicated by the arrow in Figure 1, the guide channel 29 will be the entering path for the needle moving means. The cam channel bordered by the surface 30 of the cam block 24 is called the lowering channel and urges the needle rearward from the center of the needle beds. A cam channel 32 whose outline is bordered by a hinged sinking cam block 31, again moves the needle toward the center of the needle beds until it meets the guide channel 33. A lowering cam channel 34 communicates with the guide channel 33 and transfers the path of movement into a longitudinal guide channel 35 over the retracted block 28. At the end of this channel the needle moving means, which will be more fully hereinafter described, rides over the rounded edge 36 of the block 37, the latter being identical to the block 31 but in reversed position. Cam channel 38 and the foremost guide channel 39 are channels used with the usual purl stitch but are also used in completing my new stitch when the carriage is on the return stroke. The cam blocks are grouped in symmetrical manner on both sides of the channel 39 with the exception of blocks 27 and 28, block 27 being advanced and block 28 retracted.

The needles used with this machine are of the double-ended type, that is, the ends of the needles have hooks 40, each hook being provided with a hinged latch 41. These needles are moved longitudinally in the slots 13 of the needle bed by jacks 42 comprising a flat plate having a catch lug 43 at its forward end engaging the hook at one end of the needles. A butt 44 projects from the upper edge of the jack and registers in the cam and guide channels of the carriage. This type of jack when used alone with the cam blocks arranged as stated, forms my new stitch at predetermined intervals on the knitted fabric. In making the regular purl stitch a jack helper is provided which comprises a short flat plate 45 at one end of which is a nose 46 which readily interlocks with an inverted nose 47 formed on the rear end of the jack 42. A butt 48 also projects from the rear end of the helper jack.

The regular purl stitch is formed by a series of loops 49. In making one row of loops, the needles are urged in one direction. As the next row of loops are made, this procedure is reversed. Thus a stitch is formed in one row of which the loops will be on the upper surface and the previous and following row will have loops on the lower surface of the fabric. Two of these rows of loops constitute what is called a round. The stitch which I desire to knit into the fabric has a loop 50 equal in length to one round, and is accomplished by having the cam blocks arranged on the carriage as shown in Figure 1. In making my type of stitch the jacks by themselves are used. As the carriage passes over the butt 44 of the main jack 42 into the channel 29 it is inactive while remaining therein. Further advance of the carriage will urge the jacks toward the center of the machine thru the cam slot 32 and into the channel 33, the position being shown by the broken line indicated by the letter A, an elevation of this position being shown in Figure 5. During this interval the remaining needles form the purl stitch by passing from the most advanced position indicated by the letter B in which the thread is stripped from the hook of the needle to the retracted position shown by the letter E. After the operations just described are completed, the jacks making the purl stitch are again advanced and the jacks on the opposite needle bed engage said needles which then function from the opposite side in a similar manner. When the new type of stitch is knitted, the needles do not pass from one jack to the opposite one, but remain coupled to one jack. I have just described the position of the needle and jack with the carriage in the designated position when making my new stitch. This position corresponds to that shown in Figure 5, in which a new thread is received by the needle, the latter having its latch 41 in open position. In forming a stitch equal to the length of one round it is necessary to prevent the thread from stripping from the latch as is indicated in Figure 6. This is accomplished by the channel 33 which controls the most advanced position of the needle indicated by the letter A. As the carriage is moved farther in the same direction, the butts 44 of the jacks not equipped with a helper jack will be urged rearward by contacting on the side 34 of the cam until said butts enter the channel 35. This position is indicated by the dotted lines marked with the letter D and is shown in elevation in Figure 4, the latter view showing the needle hook between the teeth 15 of the needle bed, in which position it is prevented from picking up a new thread. Further progress of the carriage slightly lowers the jack butt 44, after which the latter will pass over the curved surface 36 of the hinged sinking cam 37, and will thereafter follow thru the channel 30a. On the return stroke of the carriage the butts 44 of the needle jacks will of necessity follow the usual path used in making the purl stitch and will consequently form a loop at the completion of every round or every second row of stitches as indicated by the numeral 50.

The combination of my new stitch with the purl stitch would be impossible with this design were it not for the helper jacks attached to the purl stitch needles. Said helpers are necessary as all the butts 44 would pass thru the channel formed by the

retracted cam block 28. In order to advance the main jack across this channel the helper jacks are provided, the butts 48 of which enter the channel 51 and are advanced toward the center of the machine by the cam surface 52, thus lifting the jacks across the gap formed by the retracted block 28. The helper jacks thereafter remain inactive and the butts 44 of the main jacks 42 pursue the regular course used for moving the needles to form a purl stitch.

It is possible to elongate my stitch to three rows or more, by manipulation of the cam blocks 27 and 28. I have stated that, for making a stitch having the length of a round, the cam block 27 is advanced and cam block 28 is retracted. By this arrangement the needle jack is urged outward by passing thru the channel formed by the retracted cam block 28, thence passing into the channel 35 and over the hinged cam block 37. In making a stitch the length of three rows, the cam blocks of the carriage are arranged as stated for one stroke and are then changed by the lever which retracts cam block 27 and advances cam block 28. On the return stroke of the carriage, the butt of the needle jack will enter the channel 30ª and pass thru the usual path until it arrives at a position above the retracted cam block 27 and then passes outward thru the channel formed by the said retracted block 27 into the channel 35 from which it will emerge over the hinged cam block 31 to thereafter pursue the regular course. By alternately retracting and advancing the said cam blocks 27 and 28, it is obvious that a stitch as described and having any desired length, may be knitted into the fabric, as by this means the thread is prevented from stripping off the needle latch, the latter being necessary to complete a stitch.

Heretofore it has been impossible to fabricate circular fabric upon this type of machine but with the cam blocks arranged and constructed as shown in the drawings this can now be accomplished in the following manner. The blocks 27 and 28 are positioned so that block 28 is advanced and block 27 retracted. Cam block 26 on the opposite bar of the carriage is retracted, and the opposite block indicated by the numeral 26ª is advanced. This arrangement is permanently retained throughout in knitting a circular fabric. The needle jacks are used without helpers and the carriage in one stroke will have the butts of said jacks pass through the channels 32, 33, and 35, and thence on over the hinged cam block 37. This side of the carriage will retain the needles in inactive position, as the butts of said jacks when in the channels mentioned, will retain the loops of the needles between the teeth 15 of the respective bed of said needles and will prevent said needles from taking up a new thread or stripping the preceding thread. The jacks of the needles slidable in the opposite needle bed during the same interval pursue the usual course used for making a purl stitch as the cam block 26 is lowered, thus causing the needles to ride toward the center of the machine to perform their usual stitch, the positions of the needles being shown in Figures 6 and 7. On the return stroke of the carriage, the reverse operation takes place; that is, the jacks of the needles will pass through the channel formed by the lifted block 26ª, thereby holding the needles on that side of the machine inactive while the jacks in the opposite bar of the carriage will move the needles to perform the usual stitch. From this description it will be seen that, as the carriage is urged over the needle beds, the cam channels on one of the bars 10 will guide the needle jacks through the complete stitching movements required for forming a loop, and the cam channels on the opposite bar will during the same interval retain the needle jacks in a position where the needles will remain inactive.

I claim:

1. In a knitting machine having a carriage provided with irregular guide channels, said channels being symmetrical in both directions from a central point on the carriage, cam blocks 22, 31, 20, 23, 22 and 36 forming substantially parallel channels, said cam blocks being fixed between said channels, a pair of additional cam blocks 28 and 27 between the first and second-named channels and positioned between the cam blocks 22 and 23, said additional cam blocks being adapted to be alternately lifted or lowered to create a passage between the first and second-named channels intermediate the length of the channels, needle beds beneath said carriage, jacks slidable in said needle beds, butts at the rear ends of said jacks, said butts being normally engaged in the first-named channels and adapted to pass from the first-named channels to the second-named channels when one of said pair of cam blocks is lifted creating a channel.

2. In a knitting machine having mutually adjacent needle beds and a carriage slidable over said needle beds, jacks slidable in said needle beds, butts on said jacks, needles releasably secured to the ends of said jacks, said needle beds having teeth on the adjacent sides, cam blocks having their edges forming pairs of irregular channels on the bottom of said carriage, additional cam blocks forming channels substantially parallel to the first-named channels, pairs of cam blocks between the first-named and second-named channels adapted to be retracted and advanced, said last-named cam blocks when retracted and advanced alternately permitting the butts of the needle jacks to enter

the second-named channels from the first-named channels to prevent the needle from forming a loop, and means for guiding the butts of the needle jacks out of the second-named channels.

3. In a knitting machine having mutually adjacent needle beds and a carriage slidable over said needle beds, jacks slidable in said needle beds, butts on said jacks, needles releasably secured to the ends of said jacks, said needle beds having teeth on adjacent sides, cam blocks on the underside of said carriage forming channels which course toward the center of the machine at the center of the carriage, additional cam blocks forming channels parallel to and exterior of the first-named channels with respect to the center of the machine, means for guiding the butts of the needle jacks from the first-named into the second-named channels, and hinged cam blocks at the ends of the second-named channels for passing the butts of the needle jacks from the second-named to the first-named channels.

4. In a knitting machine having mutually adjacent needle beds and a carriage slidable over said needle beds, jacks slidable in said needle beds, butts on said jacks, needles releasably secured to the ends of said jacks, said needle beds having teeth on adjacent sides, cam blocks on the underside of said carriage forming channels which course toward the center of the machine at the center of the carriage, additional cam blocks forming channels parallel to and exterior of the first-named channels with respect to the center of the machine, means for guiding the butts of the needle jacks from the first-named into the second-named channels, cam blocks separating the ends of the second-named channels from the first-named channels, the edges of said last-named cam blocks facing the second-named channels being rounded, and means for retracting said last-named cam blocks.

5. In a knitting machine having mutually adjacent needle beds and a carriage slidable over said needle beds, jacks slidable in said needle beds, butts on said jacks, needles releasably secured to the ends of said jacks, said needle beds having teeth on adjacent sides, cam blocks on the underside of said carriage forming channels which course toward the center of the machine at the center of the carriage, additional cam blocks forming channels parallel to and exterior of the first-named channels with respect to the center of the machine, means for guiding the butts of the needle jacks from the first-named into the second-named channels, cam blocks separating the ends of the second-named channels from the first-named channels, the edges of said last-named cam blocks facing the second-named channels being rounded, said carriage having openings above said last-named cam blocks, hinges secured to the rounded edges of the cam block and carriage, the butts of said jacks when in the second-named channels adapted to pass over the rounded surface of the last-named cam blocks, lift the latter, and enter into the first-named channels, and means for retaining the butts of the needle jacks riding in the first-named channels.

In testimony whereof I affix my signature.

ANTON STRELZ.