W. A. INGALLS.

CAM ADJUSTING DEVICE FOR CIRCULAR KNITTING MACHINES.

APPLICATION FILED MAR. 12, 1914.

1,147,730.

Patented July 27, 1915.

3 SHEETS—SHEET 1.

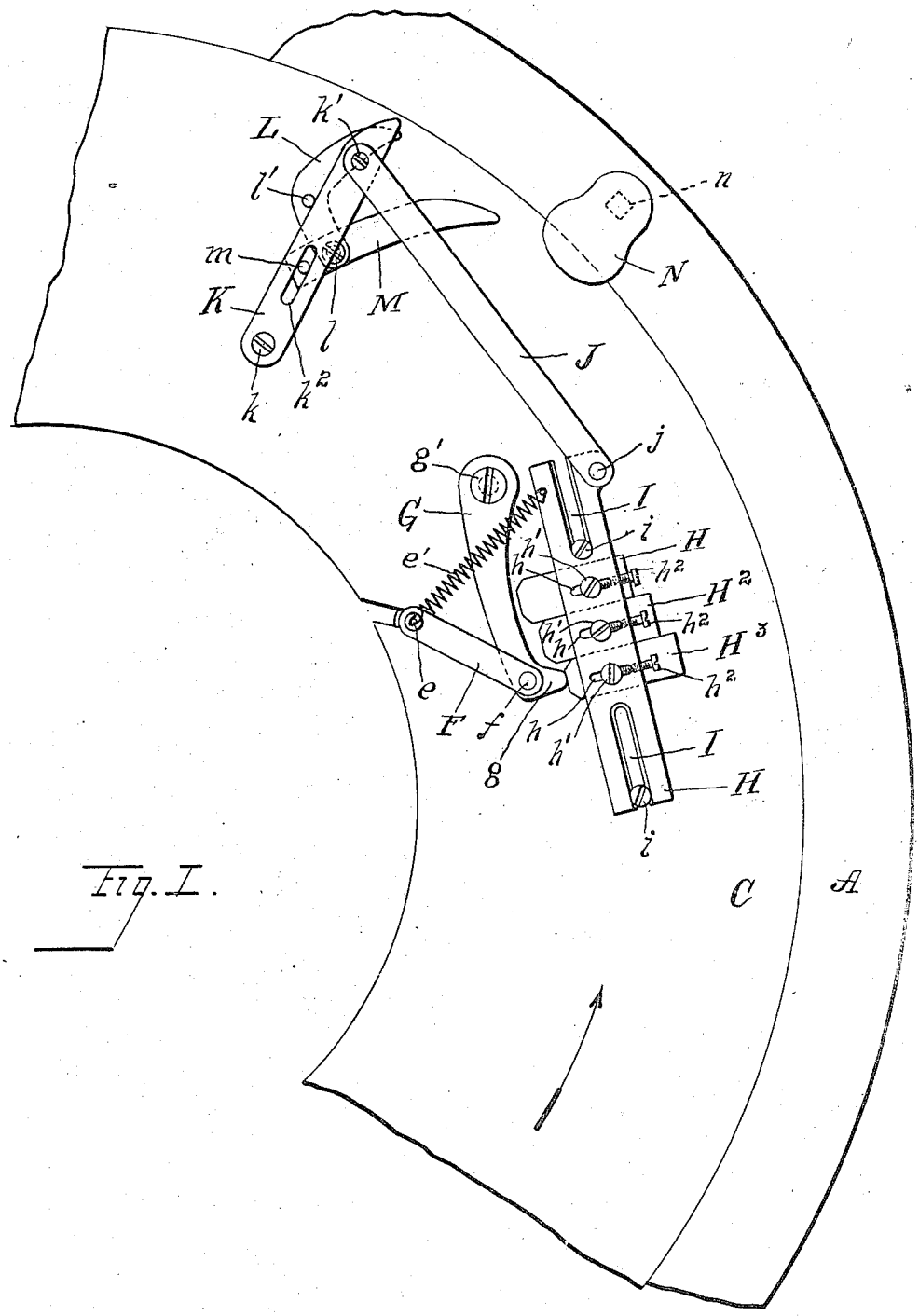


Fig. I.

Witnesses:

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Willis A. Ingalls

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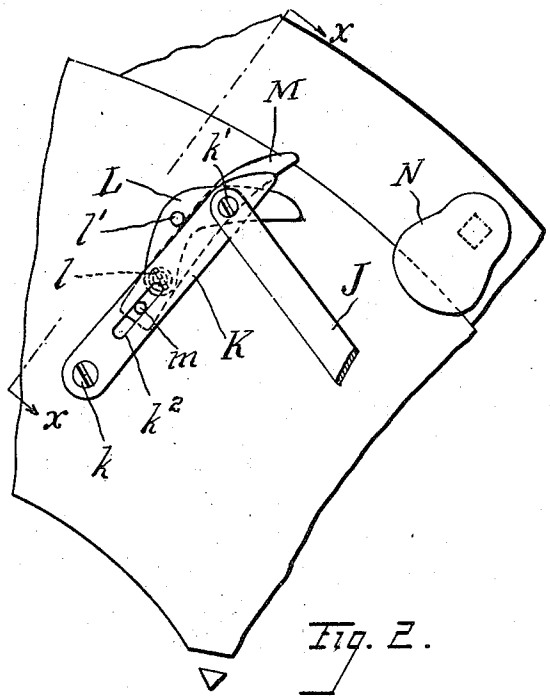


Fig. 2.

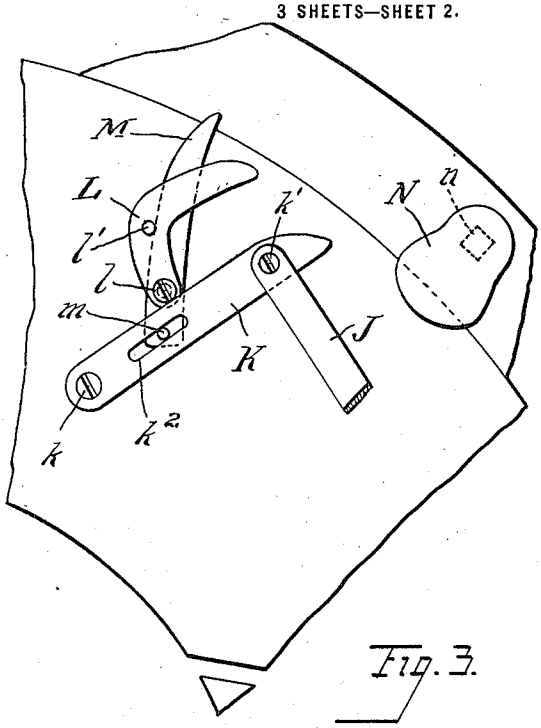


Fig. 3.

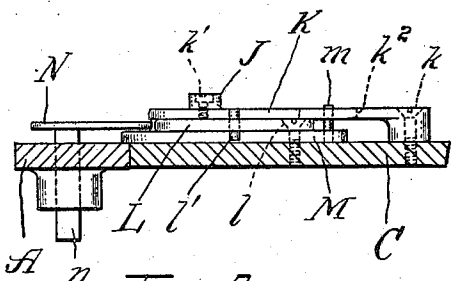


Fig. 4.

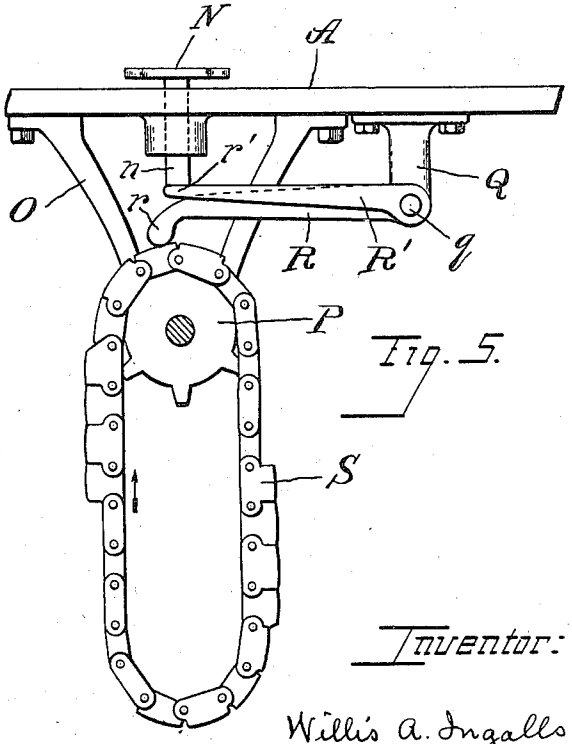


Fig. 5.

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3 SHEETS—SHEET 3.

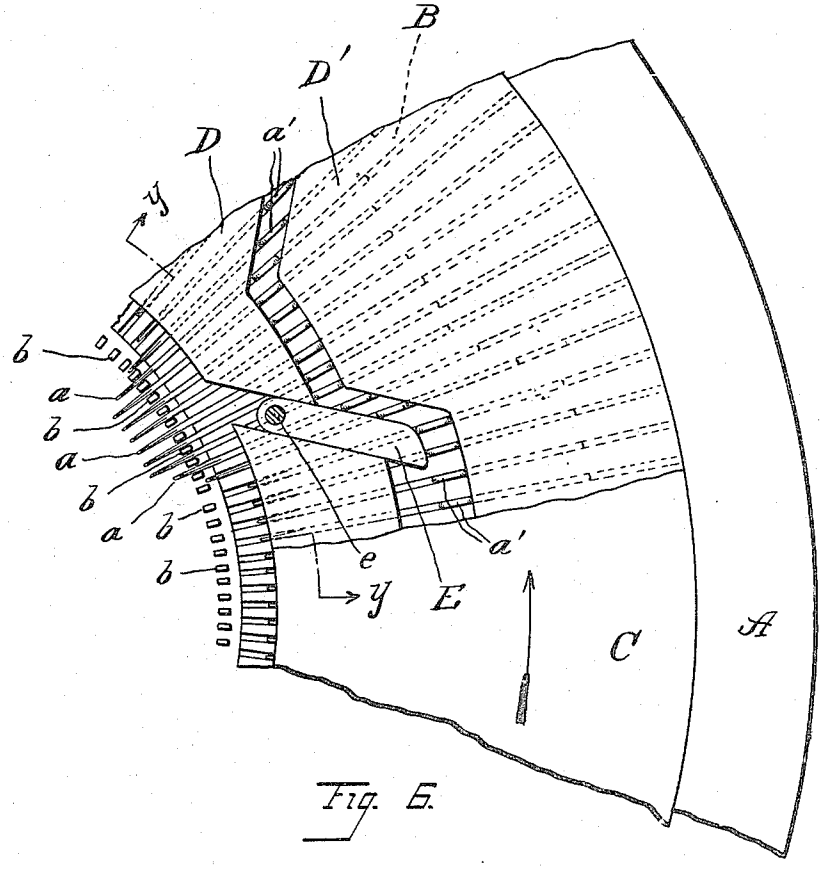


Fig. 6.

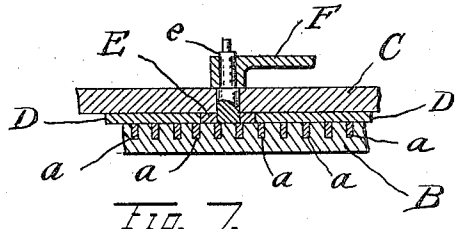


Fig. 7.

Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIS A. INGALLS, OF CLEVELAND, OHIO.

CAM-ADJUSTING DEVICE FOR CIRCULAR-KNITTING MACHINES.

1,147,730. Specification of Letters Patent. Patented July 27, 1915.

Application filed March 12, 1914. Serial No. 824,097.

To all whom it may concern:

Be it known that I, WILLIS A. INGALLS, a subject of George the Fifth, King of England, residing in Cleveland, Cuyahoga county, Ohio, have invented certain new and useful Improvements in Cam-Adjusting Devices for Circular-Knitting Machines, of which the following, in connection with the accompanying drawings, is a specification, such as will enable others skilled in the art to which it appertains to make and use it.

In the knitting of fabric it is frequently desired to tighten or loosen the stitch and this is effected by increasing or decreasing the length of the movement of the needles. In knitting stockings and similar goods it is sufficient to shorten the stitch and in machines heretofore made mechanism is provided for shortening the stitch by successive steps and thereafter returning to the original length of stitch. In the knitting of certain kinds of sweaters and similar garments it is necessary to lengthen or shorten the stitch and thereafter to reverse the process and partially shorten or lengthen the stitch in the same piece without readjusting the machine. The distinctive feature of my invention lies in automatically lengthening or shortening the stitch as may be desired without the necessity of returning to the original length of stitch, and in the means for so doing.

In the accompanying drawings Figure 1 is a plan view of a section of the frame and cam plate of a circular knitting machine showing the part of my invention that is mounted on the top of the cam plate. Figs. 2 and 3 are of smaller sections of the frame and cam plate showing positions of the levers, differing from those shown in Fig. 1. Fig. 4 is a side elevation at line x, x, Fig. 2. Fig. 5 is a side elevation showing a section of the frame of the machine and illustrating the chain bracket control mechanism. Fig. 6 is a plan view showing part of the frame of the machine, and part of the cam plate and, where a cam plate is removed, showing part of the cams and needles. Fig. 7 is a detailed sectional view on line y, y, Fig. 6.

A is the frame of the machine, B is the needle plate and C the cam plate.

D, D′, are cams of the usual form, and E is an adjustable cam mounted between the needle plate and the cam plate and provided at its inner end with a projecting pin e extending upward to the upper surface of the cam plate C and there connected to the connecting rod F whereby it is moved inward and outward thus controlling the length of movement of the plate needles a, a, a, in the manner hereinafter described.

b, b, b, are the cylinder needles and are of the usual form.

Mounted on the upper surface of the needle plate C is a bar H provided at each end with a longitudinal slot I adapted to permit the bar H to move longitudinally. The screws i, i, are secured to the cam plate C and fitted into the slides I, I, to secure the bar H and still permit longitudinal movement thereof. The bar H is cut away on its under side to receive the stops H^1, H^2, H^3 and is also provided with transverse slots h, h, h,. The screws h^1, h^1, h^1, are adapted to slide in the transverse slots h, h, h, and have heads of diameter larger than the width of the transverse slots and at their lower end are screwed into the stops H^1, H^2, H^3.

In the outer side of the bar H, I provide screws h^2, h^2, h^2, the points thereof extending into the slots h and adapted to come in contact with the sides of the screws h^1, h^1, h^1. The lever G is mounted on the upper surface of the cam plate C, its fixed end being pivotally secured thereto by the screw g^1 while the free end has a head g adapted to come in contact with the inner ends of the stops H^1, H^2, H^3. The free end of the lever is attached to the projecting pin e of the adjustable cam E by the connecting rod F hereinbefore referred to, and the pin f. I also provide on the upper surface of the cam plate the levers K, L and M. K is pivotally attached to the cam plate by the screw k, and L and M by the screw l. The free end of the lever K is attached to the sliding bar H through the connecting rod J and pins k^1 and j. The lever K is provided with a slot k^2 adapted to engage the pin m fixed in the inner end of the lever M. The lever L is mounted between the levers M and K and is provided with a pin l^1 extending above and below the lever and adapted to come in contact with the sides of the levers M and K as shown in Fig. 4. The cam N is mounted in the frame in any manner adapted to prevent its turning, but permitting vertical adjustment. The vertical movement of the cam is controlled by the usual form of chain bracket device illustrated in

Fig. 5, wherein the sprocket wheel P and its shaft are mounted in the bracket O and the two arm R, R^1, are mounted on the shaft or pin q, which in turn is mounted in the bracket Q, both said brackets being suitably attached to the frame A of the machine.

The lower end of the square extension n of the cam N is adapted to engage the end r^1 of the lever R^1. The head r of the lever R is adapted to bear against the upper surface of the cams of the chain S, the position of the cam N being regulated by the thickness or height of the chain link with which the head r is in contact. The cam is forced to its highest position when the point r of the lever R is in contact with the highest links, in the middle position when the point r is in contact with the links of medium height, and in the lowest position when in contact with the lowest links. By providing appropriate links the position of the cam N may at all times be automatically adjusted to suit the requirements of the work.

The operation of the device is as follows: The cam plate revolves in the direction of the arrow. When the fabric to be made is to consist of a normal stitch and stitches tighter or looser than the normal stitch, the cam N is placed by means of the chain bracket device in the position to engage the outer end of the lever L. When the end of the lever shall have come in contact with the cam N the pins l^1 will bear against the sides of the levers K and M bringing them into alinement and thereby sliding the bar H to its middle position and the head g of the lever G will be held in contact with the inner end of the stop H^2 through the pressure of the coil spring e^1, the stop H^2 having been previously adjusted to the position that will produce the desired length of stitch by adjusting the screws h^2 and securing the stop in its desired position by tightening the screw h^1. The stops H^1 and H^3 are in a like manner adjusted to such positions as will give the desired increase or decrease in the length of the stitch as may be required. The links on the chain bracket (Fig. 5) are adjusted to such position that when the fabric shall have been knitted to the point where it is desired to lengthen or shorten the stitch, the cam E will through the mechanism described and in the manner following, be adjusted accordingly. Assuming that the stops H^1, H^2, H^3, have been adjusted to the position shown in Fig. 1 and it is desired to increase the length of the stitch, the cam N is adjusted to its lowest position so that the cam plate C moving in the direction of the arrow (Fig. 1) will cause the outer end of the lever M to come in contact with the cam and throw the levers and the bar H and the stops into the position shown in Fig. 1. The spring e^1 will thereupon immediately draw the point g of the lever G into contact with the stop H^3 and place the adjustable cam E at the outer extremity of its movement and thereby increase the travel of the needles and lengthen the stitch. When the desired number of long stitches shall have been made, if it be desired to resume the normal stitch, the cam N is raised so as to come in contact with the head of the lever L, the contact with said lever again placing the levers M and K in alinement at the half way position (Fig. 2) and placing the point g of the lever G in contact with the inner end of the stop H^2. When it is desired to shorten the stitch the cam N is placed in position to engage the lever K and thereby force the bar H and the adjustable stops into the position shown in Fig. 3 and bring the point of the pawl G in contact with the inner end of the stop H^1, and thereby force the cam E to the innermost point of its travel and lessen the extent of the movement of the needles shortening the stitch accordingly.

It is apparent that if it is desired only to make a normal stitch and either a tighter or a looser stitch, but not both, it will not be necessary to provide more than two stops and a corresponding number of levers. In the construction shown the lever L and the stop H^2 may be omitted, and the device will still be within my invention. There may also be substituted for the sliding bar H and its adjustable stops a cam or eccentric pivotally mounted on the cam plate and connected with levers in the manner similar to the connections and levers here shown. The cam or eccentric may even be adjusted to correspond with the adjustment here provided by adjusting the pivotal point on which it is mounted, but I prefer the method here shown as being easiest to construct and best adapted to easy and accurate adjustment.

Having described my invention, I claim:

1. In a circular knitting machine the combination with an adjustable cam suitably mounted in the cam plate, of a sliding bar mounted on the cam plate and provided with stops, an operative connection between said stops and said adjustable cam, levers connected with said sliding bar and pivotally mounted on said cam plate and having their outer ends adapted to engage a vertically adjustable cam mounted in the frame of the machine and means for raising and lowering said vertically adjustable cam whereby through its contact with said levers the sliding bar may be moved forward or back one or more stops, for the purpose set forth.

2. In a circular knitting machine the combination with an adjustable cam suitably mounted in the cam plate, of a sliding bar mounted on the cam plate and provided with adjustable stops, an operative connec-

tion between said stops and said adjustable cam, levers connected with said sliding bar and pivotally mounted on said cam plate and having their outer ends adapted to engage a vertically adjustable cam mounted in the frame of the machine and means for raising and lowering said vertically adjustable cam whereby through its contact with said levers the sliding bar may be moved forward or back one or more stops, for the purpose set forth.

3. In a circular knitting machine the combination with an adjustable cam suitably mounted in the cam plate, of a sliding bar mounted on the cam plate and provided with three adjustable stops, an operative connection between said stops and said adjustable cam, three levers connected with said sliding bar and pivotally mounted on said cam plate and having their outer ends adapted to engage a vertically adjustable cam mounted in the frame of the machine and means for raising and lowering said vertically adjustable cam whereby upon contact between said vertically adjustable cam and one of said levers, the sliding bar will be adjusted to its middle position, and upon said cam coming in contact with a second lever the sliding bar is adjusted to one end of its travel and upon said cam coming in contact with the third lever the sliding bar is forced to the opposite end of its travel for the purpose set forth.

4. In a circular knitting machine the combination with an adjustable cam suitably mounted in the cam plate, of a sliding bar mounted on the cam plate and provided with three adjustable stops, an operative connection between said stops and said adjustable cam, three levers connected with said sliding bar and pivotally mounted on said cam plate and having their outer ends adapted to engage a vertically adjustable cam mounted in the frame of the machine and means for raising and lowering said vertically adjustable cam whereby upon contact between said vertically adjustable cam and the middle lever the sliding bar will be adjusted to its middle position, upon said cam coming in contact with the lower lever the sliding bar is adjusted to the forward end of its travel and upon said cam coming in contact with the upper lever the sliding bar is forced to the opposite or rear end of its travel substantially as and for the purpose specified.

5. In a circular knitting machine the combination with an adjustable cam suitably mounted in the cam plate of a sliding bar mounted on the cam plate and provided with three stops, an operative connection between said stops and said adjustable cam, three levers connected with said sliding bar and pivotally mounted on said cam plate and having their outer ends adapted to engage a vertically adjustable cam mounted in the frame of the machine and means for raising and lowering said vertically adjustable cam whereby upon contact between said vertically adjustable cam and the middle lever the sliding bar will be adjusted to its middle position, upon said cam coming in contact with the lower lever the sliding bar is adjusted to the forward end of its travel and upon said cam coming in contact with the upper lever the sliding bar is forced to the opposite or rear end of its travel substantially as and for the purpose specified.

In witness whereof I hereunto set my hand at Cleveland, Ohio, this 10th day of March, 1914.

WILLIS A. INGALLS.

In the presence of—
E. A. PETERS,
ALFRED CLUM.