

A. ROSCHER.
CIRCULAR KNITTING MACHINE.

No. 494,229.

Patented Mar. 28, 1893.

Fig. 1.

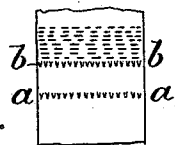


Fig. 2.

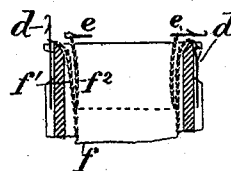
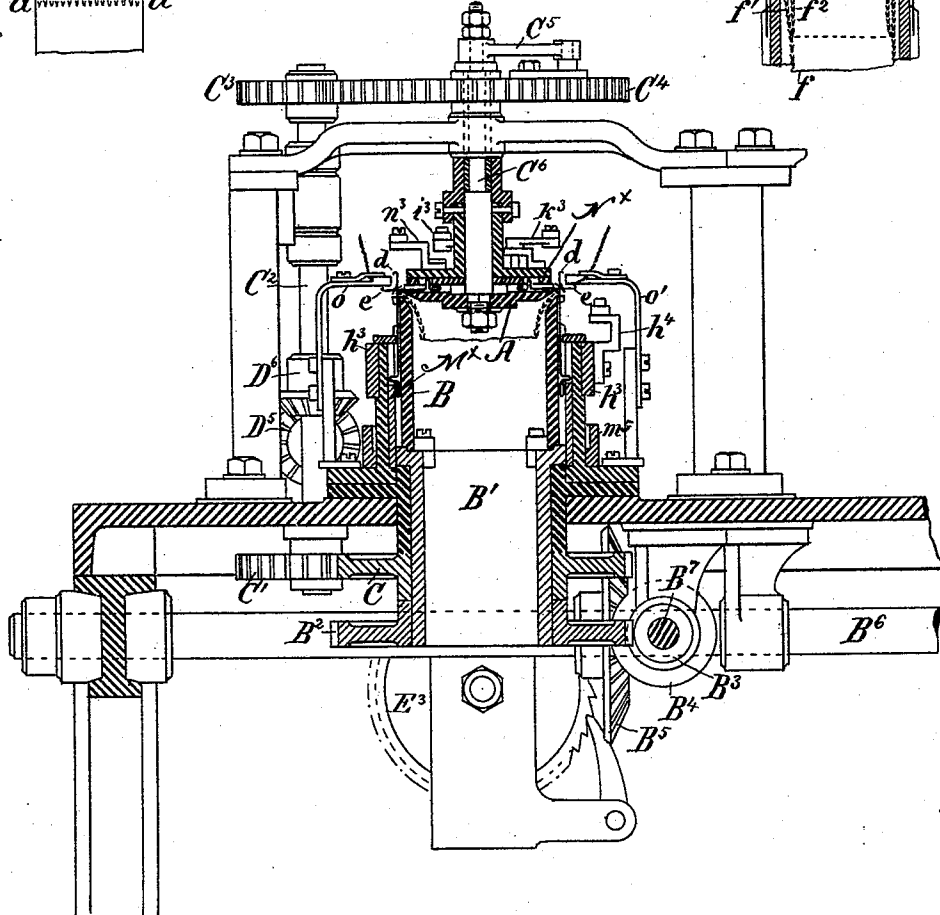


Fig. 3.



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A. S. Büsing

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(No Model.)

4 Sheets—Sheet 2.

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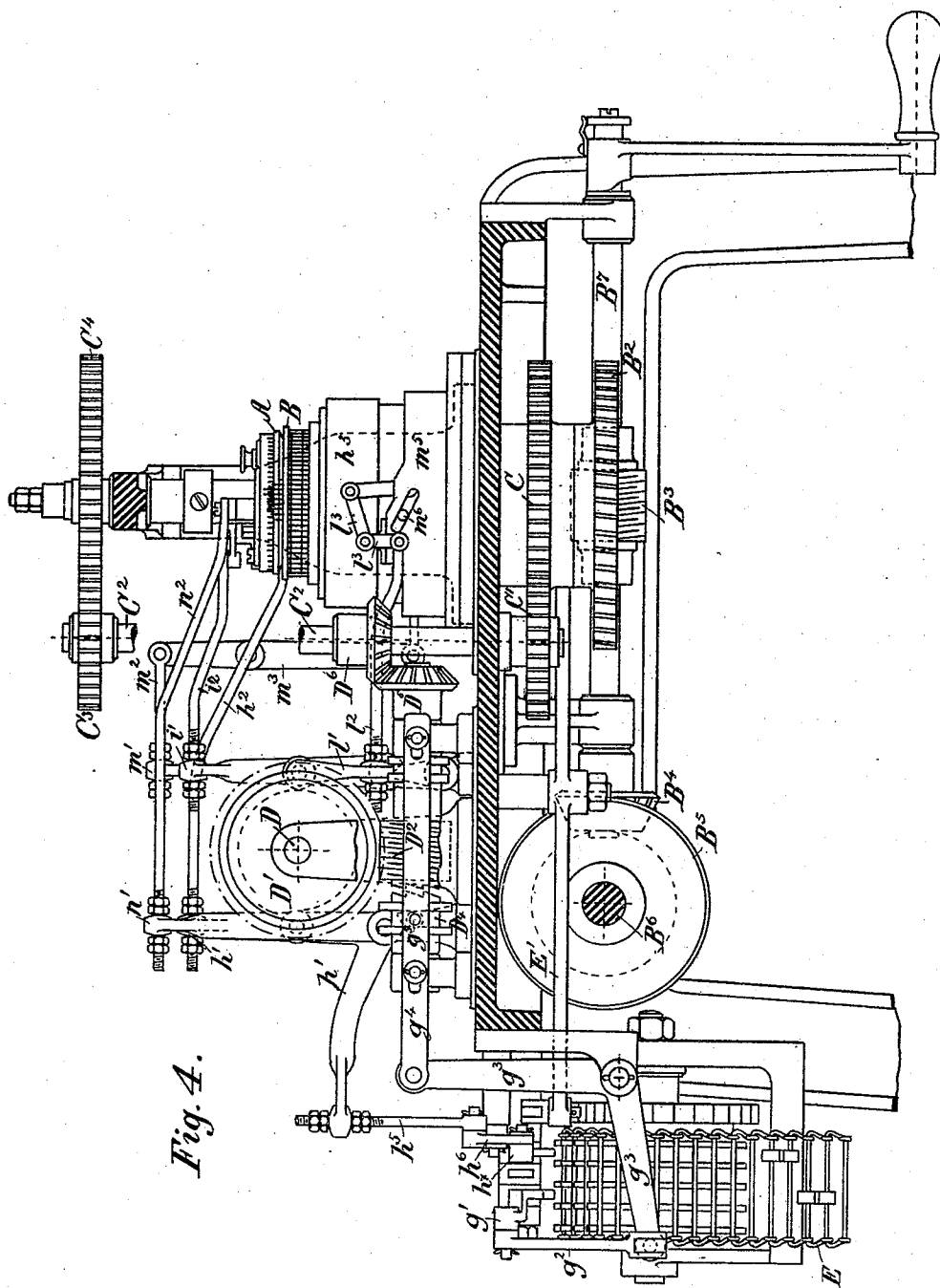


Fig. 4.

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(No Model.)

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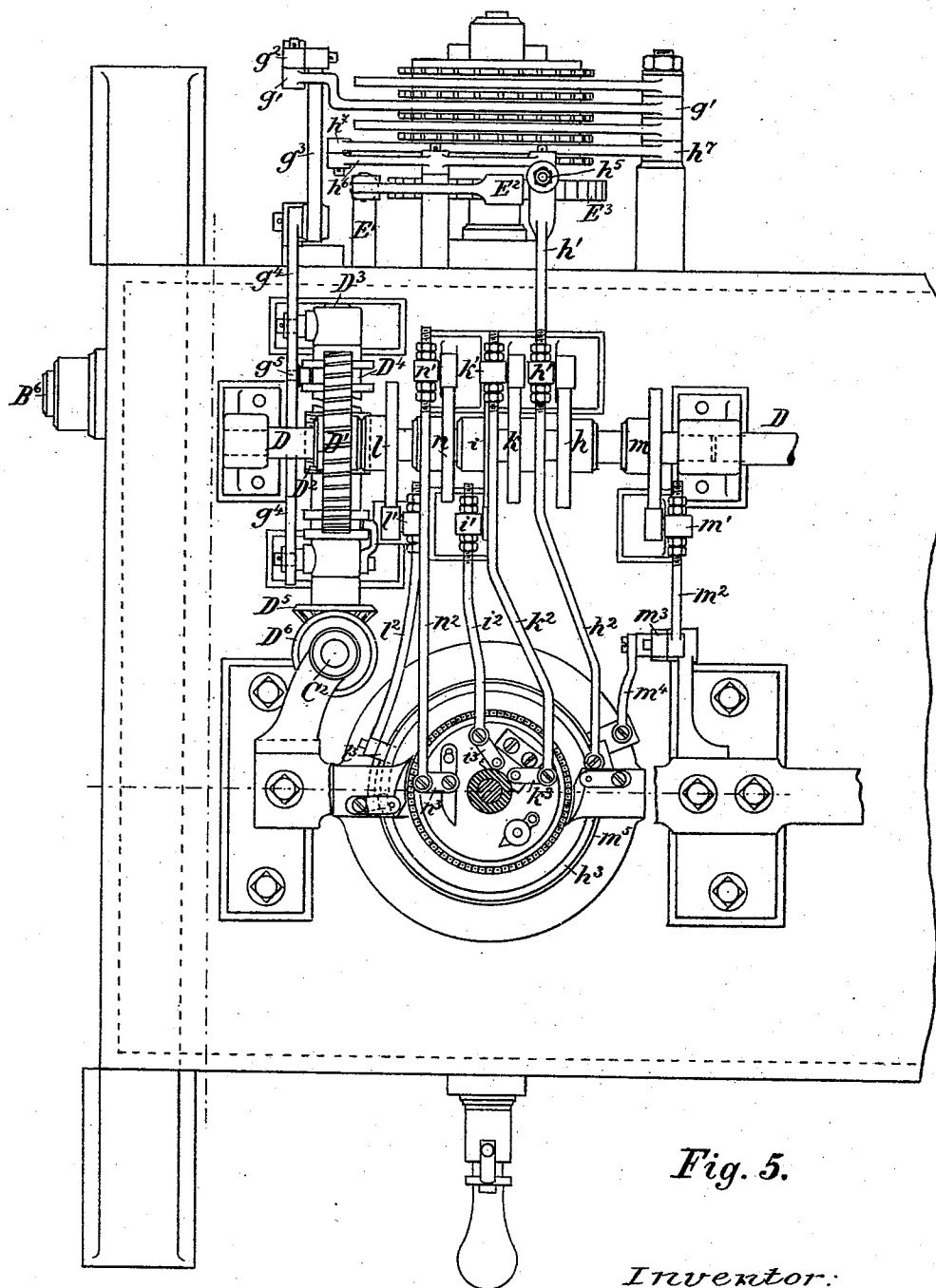


Fig. 5.

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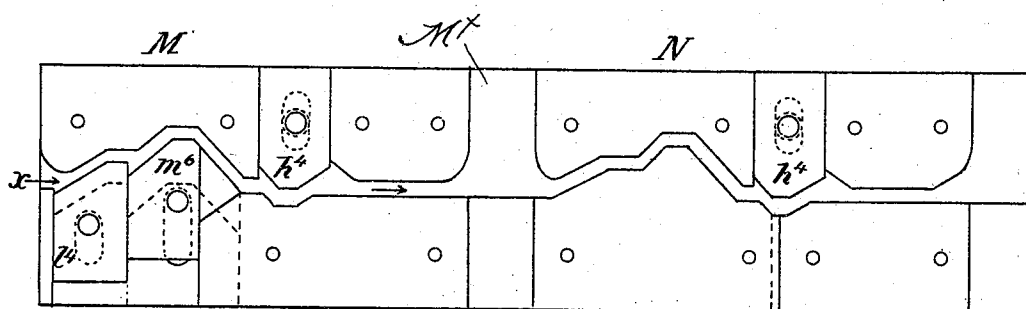
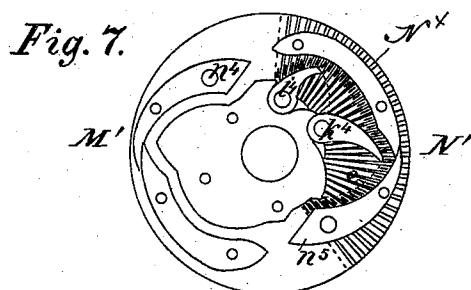
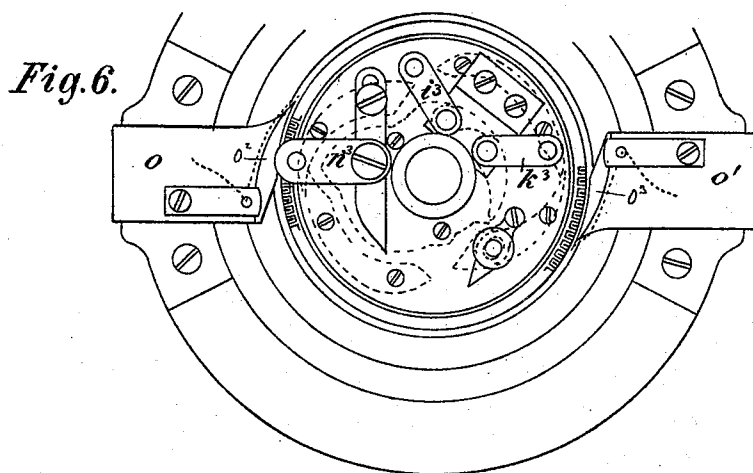


Fig. 8. Inventor:

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UNITED STATES PATENT OFFICE.

ALBIN ROSCHER, OF CHEMNITZ, GERMANY.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,229, dated March 28, 1893.

Application filed June 30, 1892. Serial No. 438,630. (No model.) Patented in England June 20, 1891, No. 10,503.

To all whom it may concern:

Be it known that I, ALBIN ROSCHER, manufacturer, a subject of the King of Saxony, residing at Chemnitz, in Saxony, Germany, have invented certain new and useful Improvements in Circular-Knitting Machines, of which the following is a specification.

The essential features of the invention are disclosed in British patent granted me under date of June 20, 1891, No. 10,503.

The invention is a machine for the production of a welt of any desired width on circular knitting-frames with independent needles.

For the production of tubular ribbed-goods which are cut into sections and sewed to sleeves of jackets, hose, &c., the cylindrical loom, as well known, is provided with two rows of needles usually working at right angles to each other. The needles are driven either directly by the locks of the machine or they are soldered into plates on which the parts of the lock act. Every piece of rib-top is provided with a so-called double-rib or welt.

In the accompanying drawings, Figure 1 is a diagrammatic face view of the fabric. Fig. 2 is a detail view showing the relative arrangement of the cylinder and rib needles when forming the double welt. Fig. 3 is a central vertical section through the machine with parts in elevation. Fig. 4 is a side view with portions in section and portions broken away. Fig. 5 is a plan view of the entire machine below the upper gearing. Fig. 6 shows a plan of the dial cam-plate for the rib needles, the locks therein being shown in dotted lines as out of gear. Fig. 7 is a bottom plan view of the rib needle locks or operating cams. Fig. 8 is a view of the cylinder locks, the cylinder being represented in side elevation as though straightened out.

The machine contains two systems of locks for the movement of the needles *e d* Fig. 2—(Sheet 1). The cam cylinder is marked *M*^x and the rib needle cam disk *N*^x. Every system consists of a cylindrical lock (for example *M* and *N*, Fig. 8), for the vertically standing so-called cylinder-needles (*d*) and a rib-lock (for example, *M'*, and *N'*), for the so-called rib-needles (*e*). If the parts of the locks of both systems are in operation, two rows of ribbed fabric are produced by one

revolution of the loom. If a double-rib or welt is desired, then a slack-course *a a* Fig. 1— is given to the cylinder needles by sinking their loops deep, while the rib-needles work on in the ordinary manner. The row of long stitches, namely the slack course, arising from this, serves to suspend the ribbed-piece on the needles of the frame, which knits the other part of the fabric. After, say, four to six rows of ribbed fabric, have been formed the slack course is given again (*b* Fig. 1—) so that the tube may afterward be cut off at this place. When, again, another row of ribbed fabric is knit, then follows the double-rib which consists of a tubular fabric having double walls. This is obtained through the action of only one lock in each of the systems of locks previously mentioned. Each system has one of its locks as *M* or *N'* capable of being thrown out of gear and a second lock *N* or *M'* which is stationary and the arrangement is such that the movable lock *M* of the cylinder needles operates adjacent to or in conjunction with the stationary lock *M'* of the rib needles while the stationary lock *N* of the cylinder needles operates with the movable lock *N'* of the rib needles. In this way when the movable locks are thrown out of gear as indicated by the dotted lines in Figs. 6 and 8, the two threads shown in Fig. 6 as passing through the opposite thread guides *O, O'* will be caught only by the needles operated by the stationary locks, and as the stationary lock *N* for the cylinder needles is located at the left of Fig. 6, the said needles will take the thread of the left hand thread carrier here, but the rib needles will now miss this thread and only take the thread on the other side of the machine at the carrier *O'*, their stationary lock being located here. As the movable locks of the cylinder needles are also at this side and now out of gear, the right hand thread will be missed entirely by the cylinder needles. For example, the cylinder needles, *d* Fig. 2—working to the left knit one thread into a tube of plain fabric, and the rib-needles *e*, working to the right, knit the second thread into a tube which hangs within the first. After the desired number of rows or courses, both tubes of fabric are united through the common action of all the

locks, as in the formation of the rib-fabric, where all the needles are employed. This finishes the double rib or welt.

My invention relates to the manipulation and mechanism of the locks through which it is possible to produce automatically a broad welt or double-rib on the cylindrical frames. Upon the completion of the welt the locks M and N' first raise and push out the needles only partially, so that the tongues fall over back, but the fabric still engages or hangs upon the tongues. Then the needles are driven completely forward, and the meshes come behind the tongues. When the thread is caught the needles are drawn back through the action of the lock into their rearward position, the new meshes being drawn through the preceding.

In the lock marked M, Fig. 8— and N', Fig. 7—all there parts of the lock or cams are separated from one another, and are capable of being shifted singly to produce or interrupt the above mentioned action of the needles. On the contrary, in the locks N, Fig. 8 and M', Fig. 7— only the depressing and withdrawing cams h^4 and n^4 are movable. In the movable lock M Fig. 8, l^4 represents the preliminary up throw-cam, m^6 the full upthrow cam, and h^4 the depressing cam. In the movable rib-lock N', Fig. 7— i^4 represents the preliminary outthrow-cam, k^4 the full outthrow cam, and n^3 the withdrawing-cam. Every cylindrical lock M, capable of being thrown out of gear, works with a rib-lock M' which cannot be thrown out of gear as previously mentioned and likewise the lock N works with N' when all the locks are in working position. In the out of gear position of the parts of the lock M Fig. 8— l^4 — and m^6 will be drawn down and come into the dotted position as before stated. For the out-of-gear position of the rib-lock, Fig. 7. i^4 and k^4 come in the dotted position, Fig. 6. The needles are thus no longer driven out and the formation of stitches is stopped.

The outthrow and upthrow cams N' and M are formed in the two parts as before stated, that is, with the preliminary and full throw parts, in order to secure a better and more certain action of the needles as to the opening of their latches and in taking the thread. The thread guides O, O' are provided with latch openers o^2 , o^3 and the preliminary outthrow and upthrow parts i^4 , l^4 , are arranged in advance of the latch openers so that the needles are projected far enough to cause the latches to be opened fully before the needles pass beneath said latch openers, but not so far as to free the latches from the loops on the needles, as this would render liable the closing of the latches again before the needles pass under and engage the latch openers. After this preliminary movement has taken place and the needles with open latches have passed below the threaded guides with their latch openers, the full throw parts k^4 m^6 of the cams are brought into action and the nee-

dles are then given their full movement to take the thread. Were the needles projected suddenly and at one movement they would be liable also to carry the web with them and pass under or engage the thread guides before the latches were properly opened and held, but the momentary cessation of the movement described prevents this defective action. The parts of the cams are separately movable and the means for moving the various parts of the locks will now be referred to.

On the frame of the machine is placed a horizontal shaft D, Figs. 4— and 5—, called the cam-shaft, which bears a number of cams. The shaft D is set in rotation, only when the welt or double-rib is to be knit, and makes, during the formation of the double-rib only one revolution. In order to set this cam shaft D, in motion, it is provided with a gear D' which meshes into the snail wheel D² of the shaft D³. The snail wheel, however, is placed loosely on the shaft D³, and in consequence must at times be connected to the shaft D³ which is constantly rotated with the loom, by the bevel-wheels D⁵ and D⁶ and spur-wheels C and C, Fig. 4—. The vertical shaft C² which carries the bevel-wheel D⁶ moves, by means of the wheels C³ and C⁴, the rib-disk A, which contains the grooves for the horizontal needles. If the cam-shaft is to perform a revolution the lever g' , Figs. 4— and 5— is raised by a lug on the pattern chain. This acts upon the connecting-rod g^2 and the elbow-lever g^3 , and the last-named one shoves the rod g^4 , which with its peg g^5 in the groove of the clutch-member D⁴ brings its teeth into gear with those of the member D². By turning the cam-shaft D the cams thereon come into operation. By this means, first the slack course b Fig. 1— will be produced. The cam h draws back the lever h' , and by means of the draft-bar h^2 , turns the upper lock-ring h^3 Fig. 3— so far forward, that the pegs of the depressing cams h^4 Fig. 8—resting in oblique slots of this ring are moved, causing the needles to form a row of longer stitches b . After one revolution of the needle cylinder, the ring h^3 and with it the cams h^4 h^4 return to their original position, and the machine then knits a course of ribbed-fabric. Then follows the throwing out of gear of the movable cams.

The cam i^4 , Figs. 6 and 7— of the rib lock N' is turned by the cam i , Fig. 5—, lever i , and connecting-rod i^2 , by means of the crank i^3 , and likewise the cam k^4 Fig. 7—, is moved by the cam k , Fig. 5—, lever k' , connecting rod k^2 , and crank k^3 . On the other hand the cam l^4 of the cylinder-lock Fig. 8— is pressed down by means of the lifting-disk or cam l , Fig. 5—, lever l' , connecting-rod l^2 and the elbow-lever l^3 Fig. 4, while the cam m^6 , Fig. 8— is driven down by the lower rock-ring m^3 which is provided with an oblique slot. The movement of the lower lock-ring results from the cam m , Fig. 5— lever m' , connecting-rod m^2 , lever m^3 and link m^4 .

If, in the formation of the welt, in which each row of needles knits a separate tube, the working parts of the lock were allowed to stand exactly as in the formation of the rib-fabric, the stitches would then be too tight. To avoid this, the cams h^4 h^4 and n^4 are moved in the cylinder and rib-locks Figs. 8, and 6. In the cylinder lock the movement of h^4 h^4 takes place through the ring h^3 as in the formation of the slack-course as stated. In the rib-lock, the cam n Fig. 5— is provided for this purpose, and produces by means of the lever n' , connecting-rod n^2 and crank n^3 the proper operation of the parts. After a desired number of rows, which depends on the number of the teeth of the wheel D^2 , Fig. 4—, the shape of the cams on the shaft D allows the knitting cams previously thrown out of action to be returned (by springs hereinafter mentioned) to their active positions and ribbed work is resumed. The first slack-course, a Fig. 1— which is designed only to be suspended on the needles of another loom does belong to the welt, since after this slack course the loom must again form a number of ribbed-rows until the beginning of the double-rib or welt; on this account, the first slack-course is begun by a special tappet (elevation) of the pattern-chain. The arm h^7 , Figs. 4— and 5— is used to actuate the lever h^6 thereby pulling down the rod h^5 , which is in connection with the elbow lever h' , thus actuating the same independently of the cam h , and causing the rotation of the upper lock ring h^8 Fig. 3. All the levers of the cams are pressed against the same by means of springs (not shown in the drawings).

The machine is driven from a shaft B^7 which has a worm wheel B^8 meshing with the gear

B^2 connected with the cylinder. The machine may be driven from the lineshaft B^6 connected to the shaft B^7 by the beveled gears B^5 , B^4 . The pattern chain is operated by the ratchet wheel E^3 , pawl E^2 , and the lever E' .

What I claim is—

1. In combination the cam cylinder, the rib needle cam disk, each of said parts having a movable upthrow or out throw cam formed in two portions adapted to advance the needles by successive steps, and the stationary cams arranged adjacent to the movable cams to act in conjunction therewith, the means for operating the portions of the movable cams independently, the thread guides and the needles, substantially as described.

2. In combination in a latch needle knitting machine, the thread guides having latch openers, the needles, and the out throw cams formed in sections with means for operating the said sections independently, substantially as described.

3. In combination the cam cylinder and rib cam disk, the two thread guides, the stationary cams and the movable cams for operating the needles, the means for operating the said movable cams whereby the separate portions or the welt may be formed by the stationary cams, the said stationary cams having adjustable depressing or drawing-in portions, with means for adjusting them to vary the length of the stitches while the welt is being knit, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ALBIN ROSCHER.

Witnesses:

R. E. JAHN,
EUGEN A. TRAISSINET.