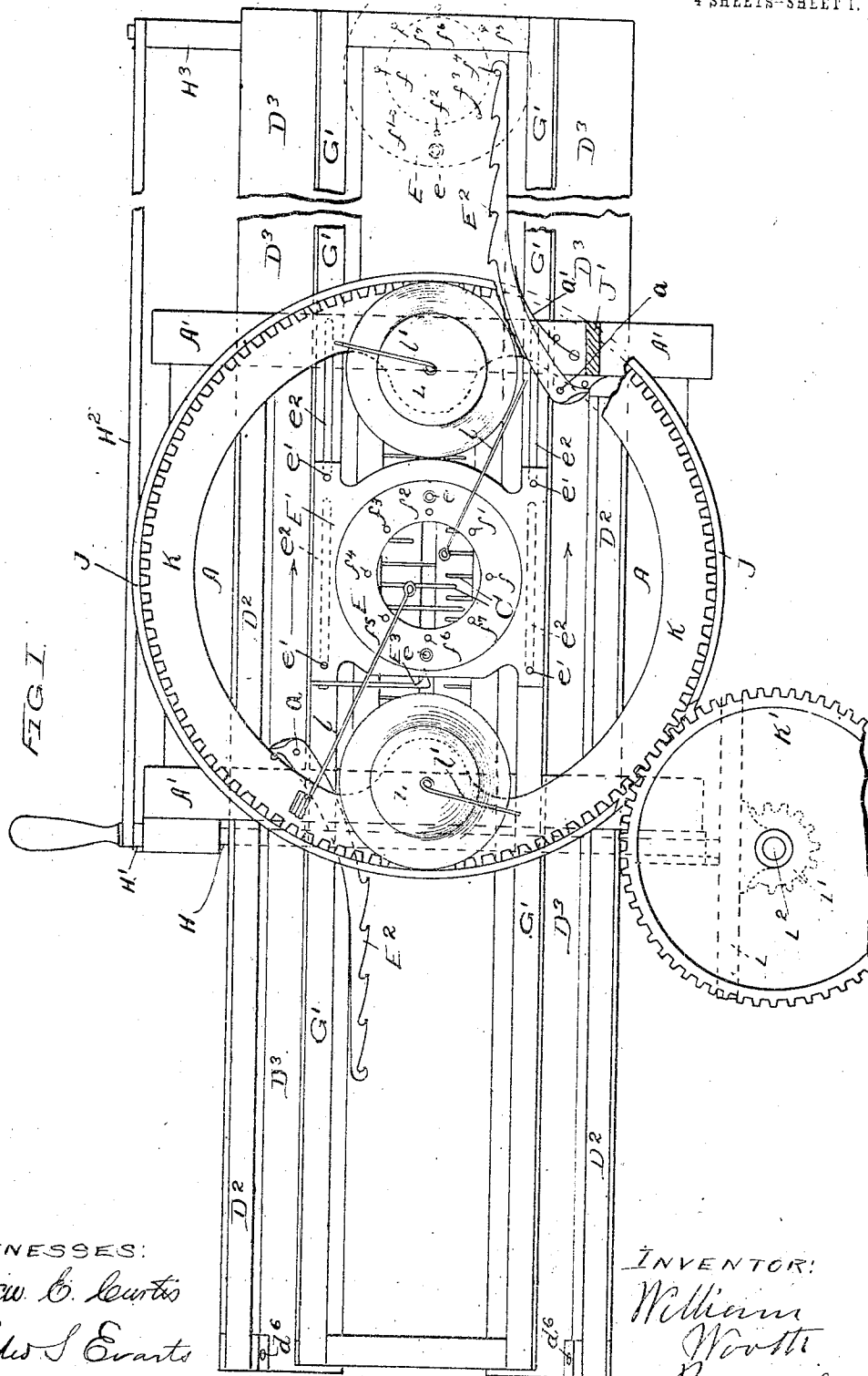


W. W. BURSON.
KNITTING MACHINE.
APPLICATION FILED JUNE 22, 1896.

1,046,147.

Patented Dec. 3, 1912.

4 SHEETS-SHEET 1.



WITNESSES:

Lea C. Curtis
Edw S. Evans

INVENTOR:

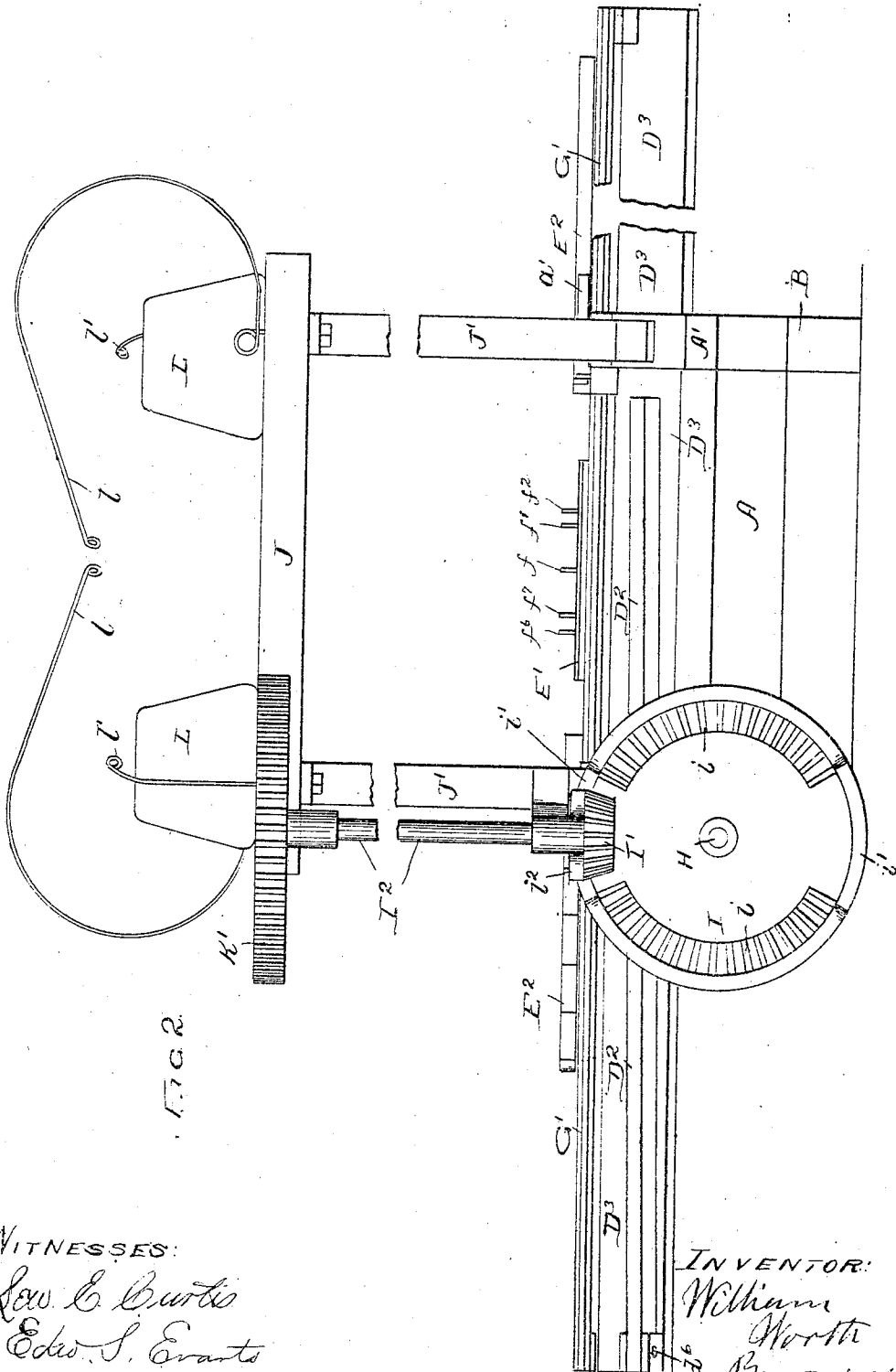
William
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4 SHEETS—SHEET 2.



WITNESSES:

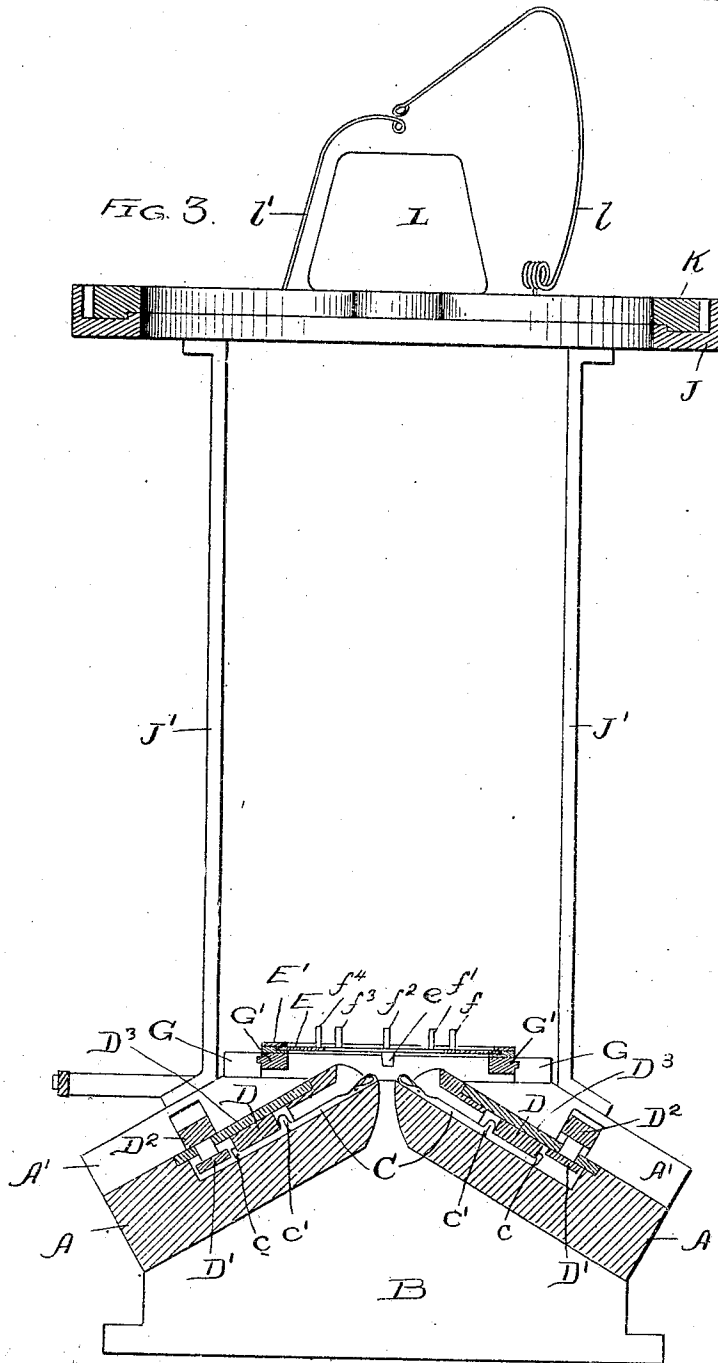
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4 SHEETS—SHEET 4.

FIG. 4.

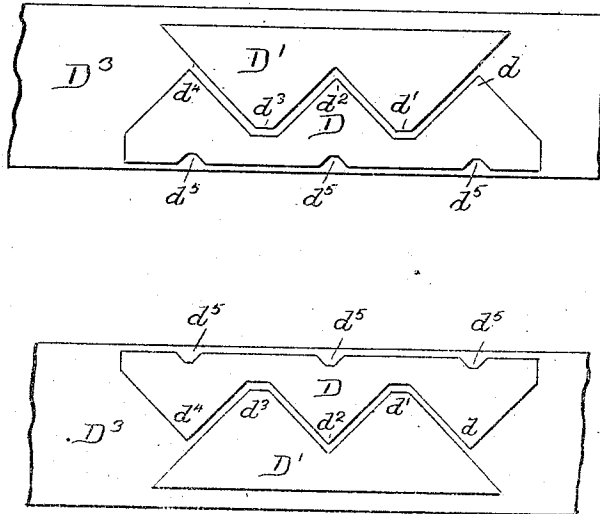


FIG. 5.

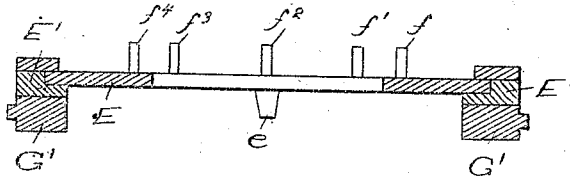


FIG. 6.

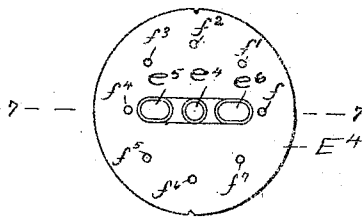
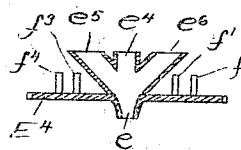


FIG. 7.



WITNESSES:

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William North Burson.

UNITED STATES PATENT OFFICE.

WILLIAM WORTH BURSON, OF CHICAGO, ILLINOIS.

KNITTING-MACHINE.

1,046,147.

Specification of Letters Patent.

Patented Dec. 3, 1912.

Application filed June 22, 1896. Serial No. 596,371.

To all whom it may concern:

Be it known that I, WILLIAM WORTH BURSON, a citizen of the United States, residing at Chicago, in the county of Cook and the State of Illinois, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification.

My invention relates to improvements in straight row knitting machines.

In the accompanying drawing:—Figure 1 is a plan view of certain portions of a knitting machine having the invention applied thereto. Fig. 2 shows a rear elevation of certain of the parts of said machine. Fig. 3 is a crosswise vertical section of Fig. 1. Fig. 4 shows the needle operating cams. Fig. 5 shows a central crosswise section of the yarn-carrier and its supports. Fig. 6 shows a plan view of the modified yarn carrier E'. Fig. 7 is a section of Fig. 6 on the line 7, 7.

Similar letters of reference denote the same parts throughout the several views.

The needle-beds A, A, Fig. 3, are fastened to the base pieces B, B, of the machine-frame in the usual manner. The needle-beds are constructed in any approved manner.

The needles C are each provided with the usual operating lug *c* and have in addition the lug *c'*, the use of which will be described hereafter. When needles having jacks are employed, the lugs *c*, *c'*, will be provided on said jacks.

The needle-retracting cams D, D, Fig. 4, are mounted on the cam-bars D², D³ in usual manner, and are adjustable in any convenient manner.

The needle-projecting cams D', D', are each fastened to an arm D², Figs. 1 and 3, which latter is pivoted to the corresponding cam-bar D³ at *d*, Fig. 1, so as to permit a movement vertical to the plane of the needle-movement, whereby the said cams may be caused to occupy their working position, to cause the needles of both rows to be simultaneously advanced, as in ribbed knitting, or the said cams may be alternately raised at the opposite sides of the machine, as in tubular knitting. For the purpose of this description the vertical movement of arm D² may be assumed to be given by hand, but for practical work automatic means should be provided to raise and lower said arm, as for instance in U. S. Letters Patent No. 616,600 granted December 27, 1898 on my

application filed March 13, 1886. Reciprocating movement is communicated to the cam-bars D², D³, from the shaft H mounted in bearings on the machine-frame, by means of the crank H' on said shaft and the pitman H² connecting said crank with an arm or stud H³ projecting from one of said cam-bars.

The yarn-carrier E, Figs. 1, 3 and 5, is provided with two distributing eyes *e*, *e*, through which yarn passes to the needles. This carrier is circular and rests in its support E', which in turn is carried by the bars G', G' moving in the supports G, G, Fig. 3, which are fastened to the pieces A', A'. The bars G', G', are operatively connected in suitable and usual manner with the cam bars D², D³, to move in unison with the latter. The slots *e*², *e*², in said bars, coacting with the pins *e'*, *e'*, of the yarn-carrier support E', permit the yarn-carrier to fall back each time a knitting movement is begun, and thus provide for adjustment of the yarn-carrier to the needle-movement in either direction.

The yarn-carrier E is provided with the upwardly-projecting studs *f*, *f'*, *f*², *f*³, *f*⁴, *f*⁵, *f*⁶, *f*⁷, which co-act with the hooked racks E², E², Figs. 1 and 2, placed near the ends of the yarn-carrier movement, to turn the yarn-carrier as hereinafter to be described. After each turning movement it is held in position for work by the spring dog E³ engaging one or the other of the opposite notches which are formed in its periphery. It will be perceived that the said studs *f*, *f'*, etc., are the equivalent of teeth. The hooked racks E², E², are pivoted at *a*, *a*, to the side pieces A', A', of the machine-frame, and are held in operating position by springs *a'*, *a'*, which permit the said racks to yield as the return movement of the yarn-carrier carries the studs against the backs of the teeth of a rack.

The general construction of the machine being essentially of the well-known Lamb pattern, it is not deemed necessary to describe in detail those parts which are well known, but only the novel features. The means and manner of adjusting the retracting cams D, D, and controlling the vertical movement of the projecting cams D', D', are purposely omitted as forming no part of my invention.

In operation, the end of the yarn from either cone L is passed through the central

overhead drawing-off guide l' , then through the eye of a take-up l , then through the yarn-carrier eye e , when it is ready to be engaged by the needles C. Each cone has its central overhead drawing-off guide l' , take-up l , and yarn-carrier eye e . The knitting operation will be understood by reference to Fig. 4. The lug c of a needle C is acted upon by the retracting point d of cam D, to draw the needle down, and is then engaged by the point d' of cam D' to project the needle. Then cam D draws the needle downward by means of retracting point d^2 , a yarn being engaged as the needle passes the first yarn-carrier eye e . The first yarn is knit when the needle passes the said retracting point d^2 . The needle is again advanced by the point d^3 of projecting cam D', and again retracted by point d^4 of retracting cam D to engage and knit the second yarn, the latter being supplied by the second yarn-carrier eye e . On the upper edge of cam D opposite the retracting points d , d^2 , d^4 , are the reëntrant cam notches d^5 , the side-walls of which, coacting with the needle-lug c' , operate to raise the needle after it is knit, insuring the prompt "paying-up" of the needle in all cases. This construction of the cams admits of knitting back and forth on the same row.

When the needle enters the cam groove at the point d , as in knitting from left to right, the knitting ends at d^4 , and when it begins at d^4 , as in knitting from right to left, it ends at d .

When the yarn-carrier has passed over the needles, one of the studs of the yarn-carrier engages the first tooth of the toothed rack E^2 , and consecutively other studs engage the corresponding teeth of said rack, by which operation the yarn-carrier is turned one half around for the return stroke. On the succeeding movement in the other direction the yarn-carrier is again turned one-half around by means of the other rack E^2 , it completing one full revolution for each round of the knitting.

It will be understood that the supply-cones L, L, containing the yarns that are being knit must have their relative positions changed as often as the yarn-carrier is turned, so as thereby to prevent the said yarns from becoming twisted or entwined together. To accomplish this, the annular ring J is held above the machine by the supports J' , Fig. 3, which are connected with stationary parts of the machine. The ring K provided with external teeth rests on the support J. The supply-cones L, L, are mounted on the ring K, as also the "take-ups" l , l , and drawing-off yarn guides l' , l' . Movement is given to the ring K by the mutilated gear I, Fig. 2, which is fastened on the crank-shaft H and meshes with pinion I' on the lower end of the

shaft I², on the upper end of which shaft is the spur gear K' which meshes in the tooth of ring K. At each turn of the yarn-carriers the yarn-cones L, L, are correspondingly turned by a segment i of the mutilated gear I meshing into pinion I'. The mutilated gear I has the segments i , i , oppositely located thereon, and between these segments outside of their radius, the delay tracks i' , i' , for co-action with the flat outer face of the locking-piece l^2 , Fig. 2, of the bevel pinion I', to hold said pinion at rest when not engaged by the segments. The flat surface of the said locking-piece l^2 of pinion I' is of such length as to hold the said pinion at rest while said flat surface is in contact with either of the delay surfaces i' , i' , one of which with its corresponding segment i occupies just one half of the entire gear wheel I, the rotation of which gear gives the pinion two complete intermittent revolutions for each of its single revolutions.

If it is desired to change the yarn only at one end of the needle-rows, then the proper rack E^2 , should be removed, and one segment i omitted from gear I, which will reduce the yarn-carrier movement to one half revolution for each round of knitting, as also the movement of the yarn-cones.

Figs. 6 and 7 of the drawings show a modified form of yarn-carrier by means of which, when desired, two yarns may be delivered together to the same set of needles, instead of separately to different needles as with the carrier already described. The yarn-carrier E^4 of Figs. 6 and 7 is adapted to be rotatably mounted upon the yarn-carrier support E' , Figs. 1, 2 and 3. To this end it is provided with a disk-shaped body corresponding substantially with that of the yarn-carrier E, and capable of fitting a socket or bearing which is provided upon the said support E' , as in the case of yarn-carrier E. In practice, when desired, the two yarn-carriers may be interchanged according as it is desired to produce one variety of knit goods or the other. The yarn-carrier E^4 is provided, below, with a single, delivery-eye e , from which the yarn or yarns that are threaded therethrough extend to the needles. Above, the said yarn-carrier is furnished with three eyes, namely oppositely-arranged eyes e^5 and e^6 , and an intermediate eye e^4 , all converging toward the delivery-eye e . In the normal position of the carrier E^4 the three eyes e^5 , e^4 , e^6 , extend in a line at right angles to the length of the needle-beds. The disk-shaped body of the carrier E^4 is formed in its edge with notches, as indicated in Fig. 6, to receive the point of the detent-spring E^3 , Fig. 1, by which accidental movement of the yarn-carrier after being set or adjusted is prevented in the case of either carrier. When it is desired to form the knit stitches

of two yarns laid together, with one of such yarns appearing upon the outer face of the goods or fabric and the other thereof upon the inner face thereof, the said yarns are led, respectively, through the eyes e^5 and e^6 , respectively, before being drawn through eye e . The yarn which is to appear at the outer face of the goods or fabric is led through that eye (e^5 or e^6) which, during the traverse of the carrier in a given direction in the operation of the machine, is turned toward the outer side of the fabric, the other yarn being led through the eye which is turned toward the inner side of the goods or fabric during such traverse. The carrier, after arriving at the end of its traverse in such direction, will be turned half-way around, as in the case of yarn-carrier E, for the traverse in the other direction. If the yarn or yarns be threaded through the intermediate eye e^4 before going to eye e the carrier E^4 will operate as an ordinary carrier.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination with a needle provided with two lugs, of a projecting cam adapted to advance the needles, a retracting cam adapted to draw down the needles to knit one yarn, both of said cams acting upon one of the said lugs, and the retracting cam in addition provided on its upper edge with a projecting part adapted to act upon

the other of said lugs to advance the needle after the stitch is formed, substantially as set forth.

2. The combination with a needle provided with two lugs, of the projecting cam D' and the retracting cam D both engaging with the same lug, the said retracting cam in addition constructed to move the needle upward to "pay back" the needle by engagement with the other lug, substantially as set forth.

3. The combination of a series of needles, reciprocating knitting cams, a yarn carrier provided with two distributing eyes and supplying two yarns which are both knit by the same needles at each reciprocation, a yarn cone holder with an outside support and a central opening, and mechanism for turning the yarn carrier and cone holder at the end of the knitting stroke, substantially as described.

4. The combination of a crank-shaft, mutilated gear, and intermediate gears, and annular ring K, and a knitting mechanism including traversing yarn-guides receiving the yarn from supplies carried by the said ring, operating substantially as and for the purpose set forth.

WILLIAM WORTH BURSON.

Witnesses:

WM. T. LATHROP,
H. D. EASTMAN.