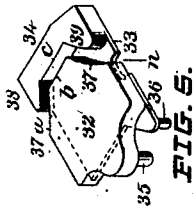
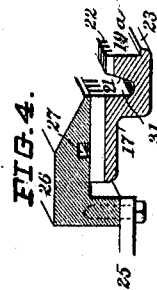
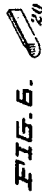
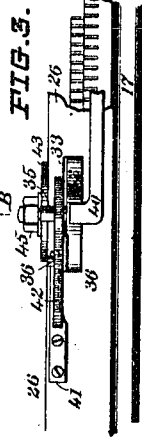
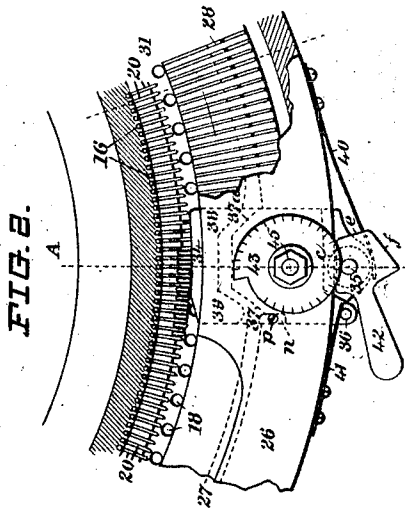
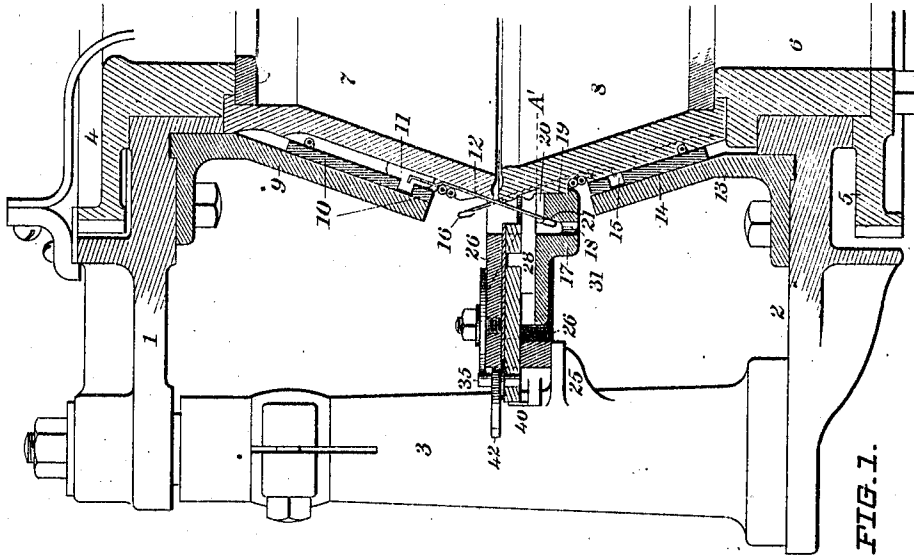


F. LASHER.  
CIRCULAR RIB KNITTING MACHINE.  
APPLICATION FILED SEPT. 28, 1903.

992,012.

Patented May 9, 1911.



WITNESSES,

Charles H. Houghton.  
Geo. F. Houghton

INVENTOR,

FRANK LASHER,

BY HIS ATTORNEY,

Franklin Scott.

# UNITED STATES PATENT OFFICE.

FRANK LASHER, OF BENNINGTON, VERMONT, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO BRADFORD & LASHER, OF BENNINGTON, VERMONT, A PARTNER-SHIP.

## CIRCULAR-RIB-KNITTING MACHINE.

992,012.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed September 28, 1903. Serial No. 174,898.

*To all whom it may concern:*

Be it known that I, FRANK LASHER, of the village of Bennington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Circular-Rib-Knitting Machines, of which the following description, in connection with the accompanying sheet of drawings, constitutes a specification.

These improvements relate to cylinder knitting machines in which independently movable needles and independently movable sinkers are employed. They embrace improvements in the sinker beds and means for actuating the sinkers, and the consolidation in one structure of a needle cylinder, a sinker bed and a series of needle head supports, the sinker bed, sinkers and needle head supports being mounted on and carried by the needle cylinder.

Other minor features of improvement incidental to the foregoing will appear in the description and are covered by the claims.

As this type of knitting machines have heretofore been generally constructed the annular sinker beds have been mounted and adapted to revolve upon their own track and to be driven independently of the needle cylinders so that a separate driving gear became necessary and the friction resulting from driving over its own track required more power. Furthermore, a high degree of skill and great accuracy became necessary in constructing machines after the old plan to secure perfect registration of the grooving of the sinker bed and the cylinder with which it cooperated so that the sinkers should in sinking the loops enter accurately between the needles of the cylinder to which the feed thread was being delivered.

Among the objects secured by this invention are a lighter and simpler machine which runs much easier and more accurately due to the fact that the old sinker bed track with its attendant friction and driving gears is dispensed with as a result of attaching it to or mounting it upon the needle cylinder, the cylinder and sinker bed being mutually adapted to each other so that when the two parts are adjusted to accurate registration with reference to each other, thus are permanently fastened together, thus preventing any subsequent derangement. By so consolidating these members they may

be made very light thereby contributing to a much higher rate of speed.

The invention is fully illustrated in the drawings in which—

Figure 1 shows a radial vertical section through the cylinders of a circular rib knitting machine. Fig. 2 is a plan view of that part of the machine which exhibits the sinker actuating devices. It also shows a horizontal section of the lower cylinder taken on the plane A of Fig. 1. Fig. 3 is an elevation of the parts shown in Fig. 2. Fig. 4 is a radial section through the sinker bed and sinker cam plate. Fig. 5 is an inverted perspective view of the slur-cock and sinker guard which cooperates therewith. Fig. 6 is a detail perspective view of one of the needle supporting ring tricks.

As a type of the knitting machine to which my improvements are applicable, in Fig. 1 I have shown two conical grooved needle cylinders 7 and 8, which are driven through gears 4 and 5 by pinions on a driving shaft, not shown. These gears run in bearings in the upper and lower tables 1 and 2, respectively, of the machine frame. Both these cylinders are grooved in the usual manner for jacks 11 and 15 and needles 12 and 16. The needles are actuated by cams 10 and 14, on stands 9 and 13 respectively, or by any other approved means. In this case I have preferably selected the lower cylinder 8 to carry a sinker bed 17, which consists of an annulus substantially of the form shown in cross-section in Figs. 1 and 4. The cylinder 8 is turned up with a cylindrical seating 19, through or across which the needle grooves are milled, and the interior edge 19<sup>a</sup> of the sinker bed 17, is turned to fit this seating. It is put in place by inverting the cylinder, heating the sinker bed until it will drop over seating 19 when flange 23 will rest upon the under shoulder of the seating. It is then allowed to cool and shrink on in place. In doing this care is taken that the grooves of the sinker bed and those of the cylinder exactly coincide or register.

Sinker bed 17 has an annular channel 18 the inner wall, 21, of which coincides in slope with the surface of such a cone as would be produced by extending the bottom of the upper needle grooves downwardly so that when an upper needle is forced down

by its cam its hook end will rest upon this bearing surface. The material of the bed between channel 31 and seating 19 is radially grooved across its upper side for the reception of needle separating bars or "tricks" 20, one of which is shown detached in Fig. 6. The outer ends of these tricks project into the channel 31 far enough to constitute a complete bar of separation between the needles when they are driven down between them, and their function is to hold each needle in true alinement with its groove and equi-distant from its adjacent fellows, as well as to prevent lateral spreading or bending of such needles. This provision for holding the needles in equally spaced positions secures absolute uniformity in the lengths of the loops as they are formed by the sinkers. The ends and upper edges of the projections of these tricks over channel 31 may be brought to a V shape to aid or direct the end of a bent or sprung needle into its proper position, but if the needles and their connections are in proper condition this is not necessary. The channel 31 has a perforated bottom as shown at 18, 18, for the escape of dirt, oil and lint and to facilitate cleaning.

The combination of two cylinders and two sets of independent needles, a ring support for the advanced needles and a separate annular sinker bed is shown in my pending application No. 692,377, but the sinker bed in that case is driven by independent gearing. In this case by mounting the sinker bed on one of the cylinders the driving gearing may be dispensed with, its encumbrance upon and about the machine is relieved, its cost is saved and the entire machine is lightened and improved. The space formerly occupied by sinker bed supports is cleared, whereby other parts are rendered more accessible. When the needle cylinder and sinker bed are separately mounted and driven, the registration of the sinker blades with the needles with which they cooperate is not positive and is liable to be easily disarranged, but in this invention such registration is positive, accurate and fixed. Little or no extra power is required to drive the sinker bed as it has no bearings to create friction.

The improvements in the mechanism for actuating and controlling the sinkers are designed to hold each sinker while in action positively in a definite position or line of action so as to neutralize all momentum in the direction of its advance due to its impact with the slur-cock cam, and all tendency to recoil under the tension of the yarn in the formation of successive loops. These results are accomplished by running the sinker shanks through a cam race of which one wall is yielding and the other relatively stationary. The fixed wall is the cam side which

acts to propel the sinkers toward the needles, and the yielding side acts to hold the shanks of the sinkers up to and against the opposite wall while sinking the loops and to retract them after the completion of their function. Thus each wall of the race acts as a cam to move the sinker in one direction, and as a stop to check its reversed movement. The fixed cam acts as a "slur-cock" and is provided with means for regulating and holding it in adjustment to limit the length of the loops. Thus the walls of this part of the sinker shank race act on the shanks while passing through between them in the nature of a clamp, one jaw of which is yielding.

The yarn sinking apparatus consists of the rotating grooved annular bed 17, previously described and an annular cap therefor 26, which is supported on any stationary provision therefor connected with the frame of the machine, as for instance in this case, on brackets 25 of the standards 3, which support the upper table 1, which carries the upper cylinder 7 and cam stands 9. This cap has a concentric shank-groove or race 27 for the shanks of the sinkers 28. At each point where a feed thread is to be introduced, the outer rim of this cap is perforated with a horizontal radial mortise or slide-way for the reception of the sinker actuating devices. These consist of the two parts seen inverted in Fig. 5. They are practically two slides, one of which, 32, is the slur-cock which by its cam edge 37 imparts to the sinker its forward movement, and the other 33, carries at its inner end a guard 34, one end of which, 38, acts as a draw-back cam to retract the sinkers after they have sunk the loops, while the other end, 39 acts as a fore-stop or guard to bear against the front edges of the shanks of the sinkers as they pass the cam 37. The corner 37<sup>a</sup> of the slur cock is beveled opposite the draw-back cam 38, to form a back stop for the rear edges of the shanks of the sinkers to impinge against as they are withdrawn from action. Thus the front edge of the slur-cock member and the rear edge of the fore-stop member constitute a race through which the sinker shanks travel in sinking the loops and retiring from action. The outer end of the slur-cock slide projects out beyond the rim of the cap 26 to take on a stud 35 upon which a retracting cam lever 42 is pivoted. This lever is fitted with several facets, *c*, *e*, and *f* disposed at variable distances from the pin, and adapted when the slide is forced inwardly to bear against the surface of the cap rim. As this lever is turned from left to right facet *c* will be turned out of contact with the rim and facet *e* will be brought around into its position, thereby drawing the slur-cock slide a short distance out of its normal position. By bringing facet *f* into position the ends of

the sinkers will be entirely withdrawn from cooperation with the needles so that no loops will be formed while the sinkers are passing the slur-cock. The length of the loops is determined by a scroll gage 43 which is pivoted on the top of the cap 26 and is held in place by a nut 45. A spring 40 of substantial stiffness attached to the cap bears against the outer end of the slur-cock, the function of which is to force the pin 35 against the edge of the scroll and hold it there. Accordingly as the position of the scroll is changed by rotation, the inner limit of movement of the slur-cock will be altered. Slide 33, which carries the fore-stop or guard 34, also projects outside of the rim of cap 26 and has a pin 36, against which another spring 41 acts to throw this slide outwardly or in opposition to the action of spring 40. Spring 41, however, is much weaker than spring 40 and is only strong enough to enable the draw-back cam 38 to retract the sinkers without yielding to the resistance they may offer. By these means the opposing walls of the race act upon the shanks of the sinkers embraced between them like the two jaws of a clamp so that the sinker is firmly held in a positive position throughout the performance of its entire function as a sinker and cannot be forced out of its prescribed path in making its stroke in either direction. The shanks of the sinkers cannot wedge between the slur-cock and fore-stop as any tendency to do so is at once relieved by the spring 41 yielding sufficiently to allow the shank to pass through. By thus counteracting any tendency of the sinkers to jump or recoil under the action of the sinker cams an increased rate of speed may be maintained whereby the output of the machine can be augmented.

Slide 33 is limited in its movements by a notch *n* in its edge into which a pin *p*, Fig. 2, enters. The function of this pin is to prevent the withdrawal of slide 33 back of a certain point whenever it may be necessary to remove the slur-cock. This construction permits the slur-cock to be withdrawn at any time and at the same time the advanced positions of the sinkers can be preserved as the spring 41 will impel slide 33 outwardly until the inner shoulder of notch *n* strikes pin *p* where it will rest. When the slur-cock is again inserted it will push all the sinkers together with slide 33 forward until pin 35 strikes the gage 43 where it will be held by restoring spring 40 to its working contact therewith.

I therefore claim as my invention and desire to secure by Letters Patent the following:—

1. The combination in a circular rib knitting machine, of two needle cylinders, each of which is equipped with independent needles, a concentric sinker bed supported upon

and carried by one of the cylinders and equipped with independent sliding sinkers which are adapted to reciprocate between and feed the yarn to the needles of the other cylinder, and means for actuating said cylinders, needles and sinkers, substantially as specified.

2. In a circular rib knitting machine, a needle cylinder provided with a concentric sinker bed rigidly attached thereto, independent needles and a concentric support for the heads of the needles when advanced to receive the feed thread, which needle support forms substantially an integral part of the sinker bed, substantially as specified.

3. In a circular rib knitting machine, a consolidated structure consisting of a sinker bed concentric with the axis of the needle cylinders and a concentric series of individual supports for the heads of the needles, which supports are adapted to prevent their lateral deflection when advanced to receive the feed thread from the sinkers, substantially as specified.

4. In a circular rib knitting machine, the combination with two needle cylinders each equipped with independent needles, of a concentric sinker bed provided with a series of individual needle head supports each of which is adapted to receive and hold against backward and lateral deflection one of the needles of one of the cylinders when advanced to receive the feed thread from the sinkers, and means for actuating said cylinders, needles sinker bed and sinkers, substantially as specified.

5. In a circular rib knitting machine, a consolidated structure consisting of a needle cylinder, a concentric sinker bed and a concentric series of individual needle head supports, each of which is adapted to receive and hold against backward and lateral deflection one of the needles of one of the cylinders when advanced to receive the feed thread from the sinkers, substantially as specified.

6. In a circular rib knitting machine the combination with a consolidated needle cylinder, sinker bed and needle support, of another needle cylinder, independent needles for both cylinders, independent sinkers, and means for actuating said cylinders, needles and sinkers, substantially as described.

7. The annular sinker bed and concentric needle-support organized as a concrete structure and provided with openings beneath the needle support for the escape of dirt, lint, grease or other refuse matter, substantially as specified.

8. The sinker bed and needle support having division tricks consolidated as a single unitary structure, said tricks being adapted to render side support to the needles when lying therebetween, substantially as specified.

9. In a sinker actuating mechanism for knitting machines the combination with the sinkers, of a slur-cock cam, a cooperating fore-stop and means connected with said fore-stop for imparting to it yielding backward pressure against the sinkers, substantially as specified.

10. In a sinker actuating mechanism for knitting machines, a relatively stationary slur cock member, the sinker-propelling part of its operative edge being opposed by a yielding forestop of which the trailing part acts as a sinker-withdrawing cam and is opposed to the heel of the slur cock which acts as a back stop for the shanks of the receding sinkers, in combination with the sinkers and means for supporting and driving them through the race between the slur cock and the forestop, substantially as specified.

11. As a provision for imparting to reciprocating sinkers positive motions and for neutralizing momentum and recoil in their movements, a raceway through which the driving appliances of the sinkers travel, one wall of which in service is stationary and is of proper cam shape to impart the instroke of the sinkers and check their back stroke, and the other wall is movable, is fitted with a drawback cam to retract the sinkers, and is connected with means for gently pressing it toward the opposite wall, substantially as specified.

12. The combination with the sinkers, slur-cock and fore-stop, of an adjustable gage for limiting the inset of the slur-cock, a superior rearwardly yielding device for pressing forward and holding the slur-cock in its defined working position, and an inferior yielding device for retracting the forestop against the sinkers, substantially as specified.

13. In a knitting machine employing two cylinders and independent needles, the combination with one of said cylinders having a concentric sinker bed and a series of independently movable sinkers mounted thereon and revoluble therewith, said sinkers being adapted to feed the yarn to the needles of

the opposite cylinder, of a stationary sinker bed cap, a slur-cock, a forestop, an inset-gage carried by said cap, and yielding appliances connected with said slur-cock and forestop, adapted to cooperate substantially in the manner described for the purposes specified.

14. In a knitting machine employing two cylinders and independent needles, the combination with one of said cylinders and a concentric sinker bed and sinkers mounted thereon and supported thereby, of an independent sinker bed cap, sinker actuating devices and means connected therewith for checking momentum and recoil of the sinkers adapted to cooperate with the needles of the other cylinder in their advancing and receding movements, substantially as specified.

15. In a circular rib knitting machine embodying two conical needle cylinders equipped with independent spring needles, the combination therewith of an integral annular member inseparably attached to one of said cylinders and constituting in one piece a sinker bed for carrying sinkers to sink the knitting thread and a support for the back side of the needles of the other cylinder when advanced to receive the feed thread, substantially as specified.

16. In a circular rib knitting machine embodying two conical grooved needle cylinders equipped with independent spring needles, the combination with one cylinder thereof and inseparably attached thereto of an integral sinker bed and support for the heads of the needles of the other cylinder, said sinker bed having its grooves for the sinkers in the same radial planes as the needles of the cylinder upon which it is supported, substantially as specified.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

FRANK LASHER.

Witnesses:

JOHN A. CONNELLY,  
FRANKLIN SCOTT.