No. 840,828. PATENTED JAN. 8, 1907.

F. A. DEMERS.

KNITTING MACHINE.

APPLICATION FILED AUG. 5, 1902.

2 SHEETS—SHEET 1.

FIG. 1.

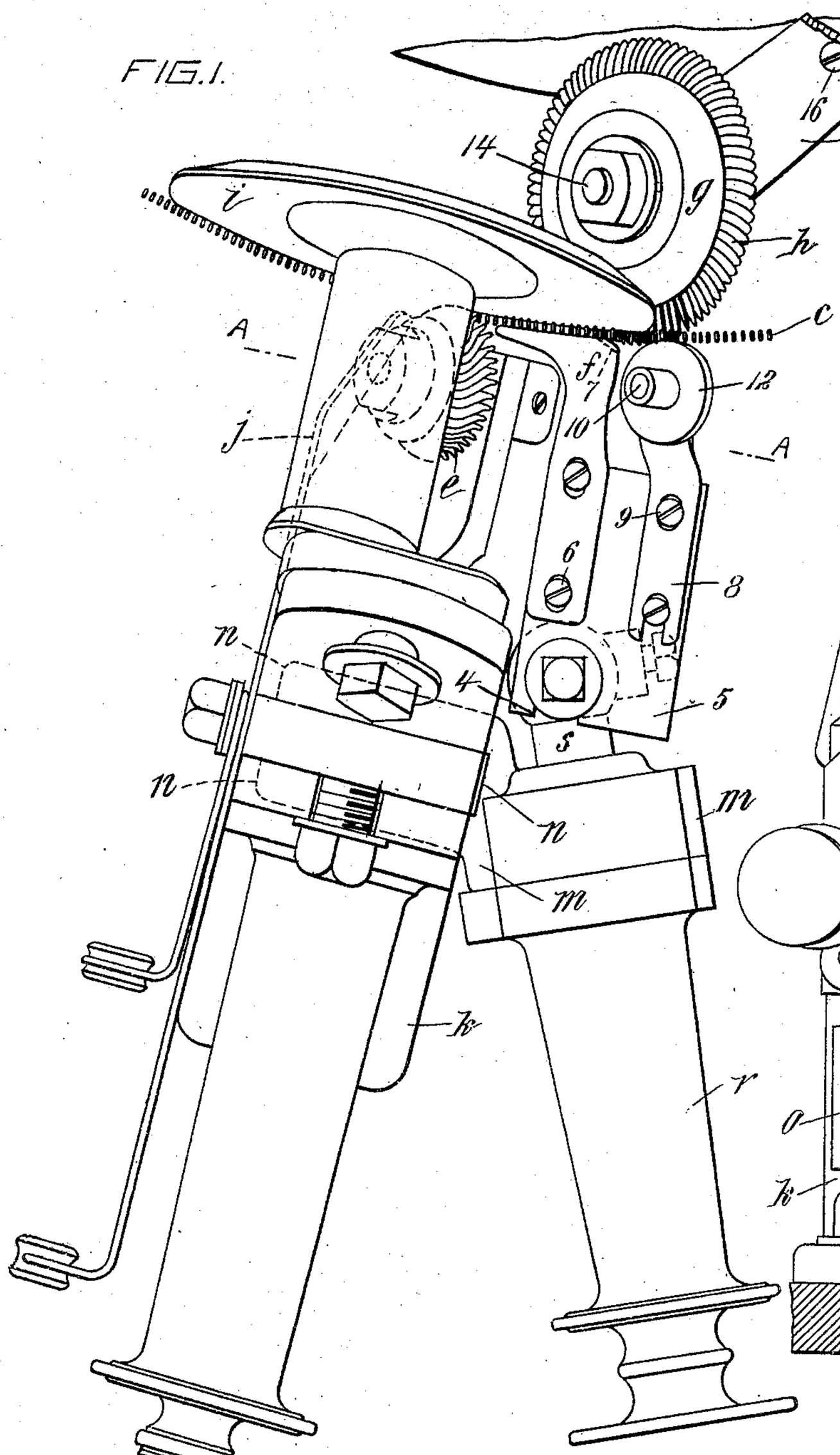
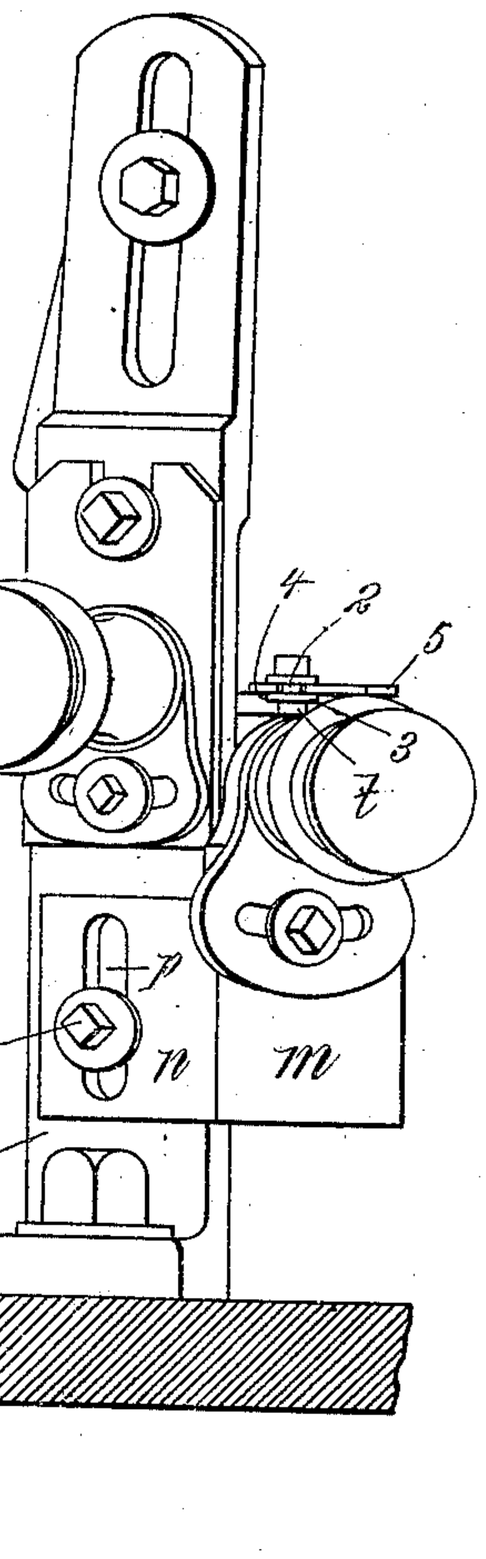


FIG. 4.



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2 SHEETS—SHEET 2.

FIG. 2.

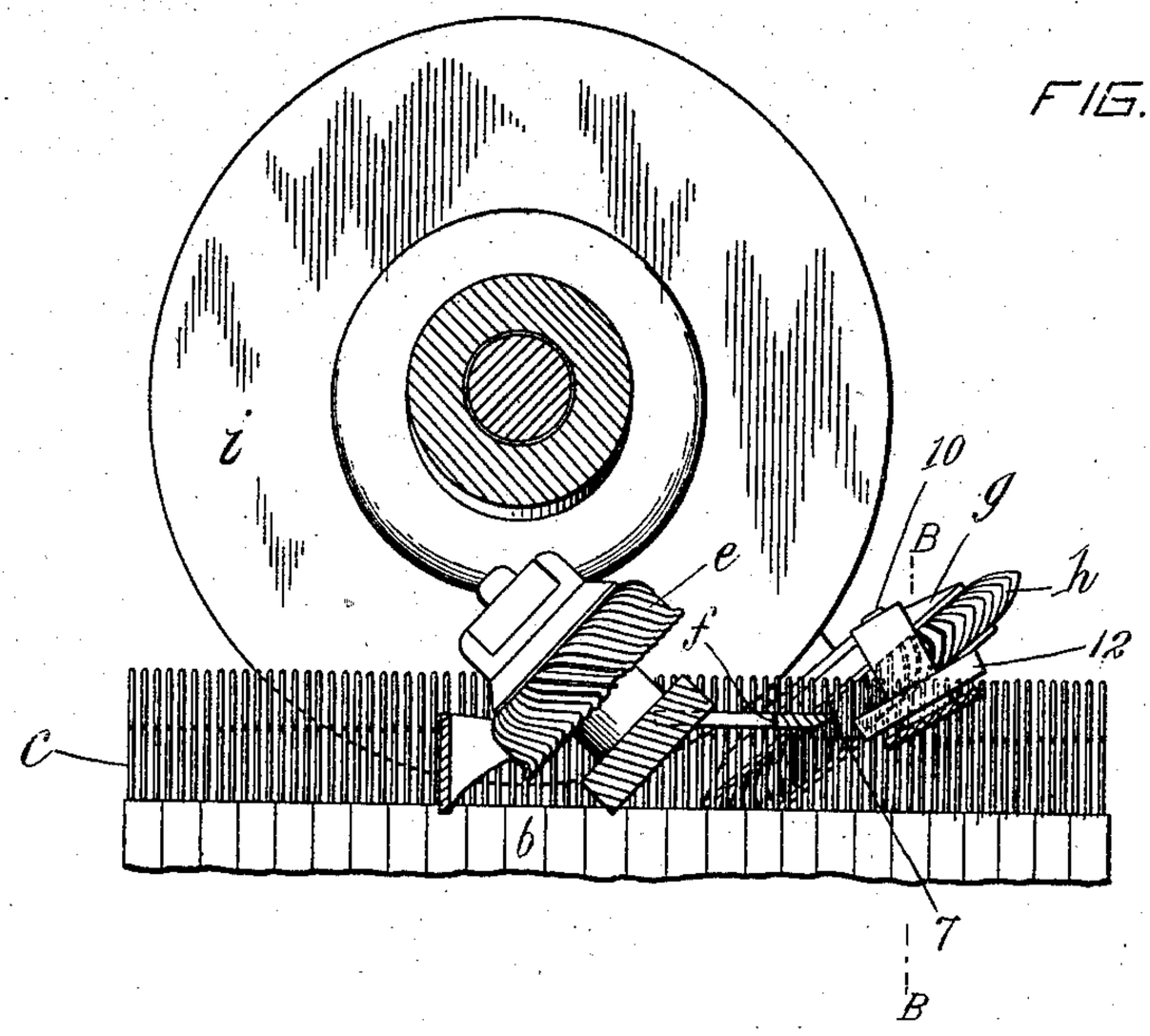

FIG. 5.

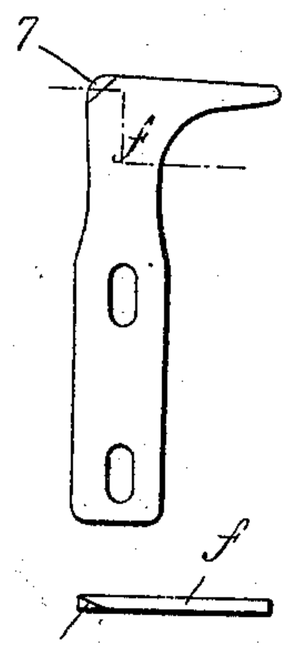

FIG. 6.

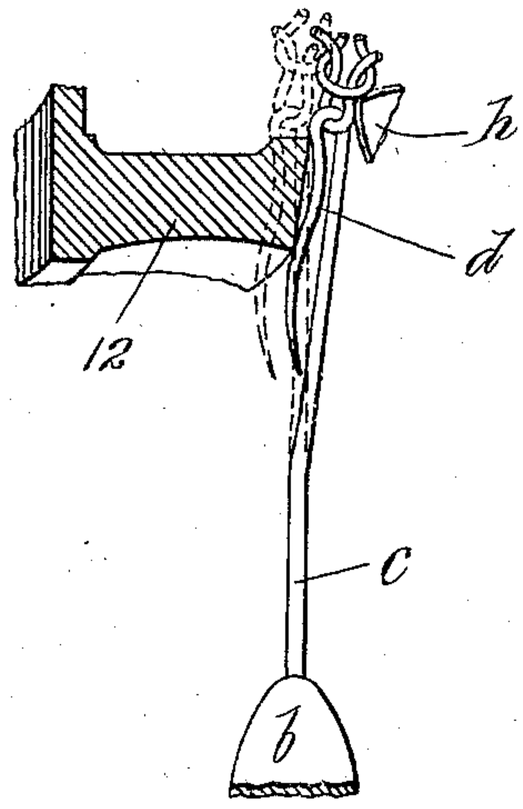

FIG. 3.

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UNITED STATES PATENT OFFICE.

FRANK ALEXCE DEMERS, OF ST. HYACINTHE, QUEBEC, CANADA, ASSIGNOR OF ONE-HALF TO CHARLES E. WAKEMAN, OF PONTIAC, MICHIGAN.

KNITTING-MACHINE.

No. 840,828. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed August 5, 1902. Serial No. 118,504.

To all whom it may concern:

Be it known that I, FRANK ALEXCE DEMERS, of the city of St. Hyacinthe, Province of Quebec, Canada, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates particularly to knitting-machines of the circular type; and it has for its object to obviate the stretching and wear of the yarn or other flexible length being knitted, and thus produce a softer and closer fabric than it has been possible to produce heretofore by this type of machine; and a further object is to produce fabric with perfectly uniform spaced wales and stitches. In fact, as will be hereinafter shown, a circular-knitting machine of the usual type furnished with coarse needles—say of twenty-two gage—and provided with my invention will produce fabric equal in fineness and appearance to fabric produced by the same machine without my invention when furnished with fine needles of, say, about twenty-six gage.

The invention may be said briefly to consist in arranging a cast-off wheel in a position (relatively to the circular gang of needles and the presser-foot) with its circumferential line intersecting the perimetric line of the gang of needles at a point to have its wings or teeth intermesh with the needles while the latter are in the act of emerging from the pressure of the presser-foot, and therefore cast the stitches off as they arrive at this point.

Another feature of the invention is providing means for causing the needles to, at the time of the cast-off, successively assume a position closer to the point upon the cast-off wheel bearing the loop of the stitch being cast off.

More specifically speaking, the invention consists in assembling a cast-off wheel, presser-foot, and a combined loop-slackener and needle-positioner in the following relative positions: The presser-foot is, as usual, outside the circle of needles and bearing upon the beards thereof, the cast-off wheel, as usual, within the circle, but in close proximity to the presser-foot, and the combined loop-slackener and needle-positioner in close proximity to the cast-off wheel. With the exception of the cast-off wheel all of these instrumentalities, together with the cloth-wheel, are adjustably carried upon a single stand.

For full comprehension, however, of my invention reference must be had to the accompanying drawings, forming a part of this specification, in which like reference characters indicate the same parts, and wherein—

Figure 1 is a plan view of a portion of a knitting-machine furnished with my invention. Fig. 2 is a transverse sectional view of my improved stitch-forming instrumentalities taken on line A A, Fig. 1. Fig. 3 is an enlarged sectional view taken on line B B, Fig. 2. Fig. 4 is a detail perspective view of my improved frame for carrying my improved instrumentality and accessory instrumentalities. Fig. 5 is a detail plan view of the rear side of the presser-foot, and Fig. 6 an end view thereof.

The rotatable cylindrical needle-carrier *b*, the means (not shown) for driving same, needles *c* having beards *d*, loop or feed wheel *e*, presser-foot *f*, cast-off wheel *g*, with its angular wings or teeth *h*, cloth-wheel *i*, and guide *j* are in themselves of the construction well known in the art of manufacturing knitting-machines, and therefore need not be described in detail herein. The main frame *k* is also of usual construction, and the cloth-wheel *i* and guide *j* are carried thereby, as formerly.

The presser-foot *f* and my improved combined loop-slackener and needle-positioner, to be presently described, are carried upon a bracket *m*, forked at its lower end, as at *n*, to straddle the brackets of the main frame *k*, to which it is adjustably secured by a bolt *o*, taking through a slot *p* in the said standard and through a boring in the frame. This bracket is formed with a sleeve *r*, in which a rod *s* is yieldingly supported and carries a vertically-adjustable rod *t*, as formerly used for supporting the presser-foot. The last-mentioned rod has a tapped boring in its upper end which receives a screw 2, between the head whereof and a shoulder 3 upon the rod the forked end 4 of a plate 5 is adjustably held. The presser-foot *f* is adjustably secured upon this plate 5, near the edge thereof adjacent to the frame, by screws 6, and the

under side of the heel thereof is preferably beveled, as at 7, to accommodate the wings or teeth *h* of the cast-off wheel, while an arm 8 is adjustably secured by screws 9 to this plate 5 near the opposite edge thereof and has a spindle 10 thereon, upon which a beveled wheel 12, having a steadying-sleeve, is rotatably carried. This beveled wheel constitutes my combined loop-slackener and needle-positioner and steadier, and it causes each needle as the stitch is to be cast therefrom to assume a position adjacent to the wing or tooth by which the stitch is being cast and steadies the needle in substantially the line of pull exerted by said wing or tooth. The needle is steadied because owing to its natural stiff resiliency it can only be displaced a very minute distance, and consequently when the bevel-wheel displaces it this distance it strongly resists being displaced farther, and hence stands momentarily steadily in the position it is caused to assume by the bevel-wheel, such position as is shown in Fig. 3 being in substantially the line of pull (indicated by dotted line 3) effected by the particular wing casting off the loop. This positioning of the needles slackens the stitch being cast off and prevents undue stretching of the loop. The cast-off wheel *g* is located between this combined loop-slackener and needle-positioner and the presser-foot, but on the opposite side of the needle, and it is mounted, as usual, loosely upon a spindle 14, carried by an adjustable bracket-arm 15, adjustably secured by screws 16 to the interior hub, a portion whereof is indicated at 17. The precise location of this cast-off wheel is such that its peripheral line intersects and projects slightly beyond the perimetric line of the circular gang of needles and in such a position as to have its wings or teeth pass through the space at the under side of the heel of the presser-foot formed by the bevel 7. This arrangement insures that the wings or teeth will during the rotation of the wheel act upon the loop or stitches as they are emerging from the line of pressure between the presser-foot and needles. Thus the new loop is moved continuously by the wheel *h*, first over the closed beard and then over the head of the needle.

My invention is particularly effective in machines of the above type and wherein it is known that the strain upon, and stretching of the yarn, is when the stitch is being cast off and it is exerted mainly upon the portion of the yarn extending between the stitch last formed, and the needle from which the stitch is being cast and between the last-mentioned needle and the needle adjacent thereto and upon which the stitch is being formed.

The presser-wheel 12 (which acts as a presser member auxiliary to the presser-foot) is practically continuous or in conjunction with the presser-foot, because of its being carried upon the adjustable carrying part 5, upon which the presser-foot is mounted, while the presser-foot and presser-wheel are oppositely beveled in order to accommodate the cast-off wheel and obviate any chance of the yarn being cut between the said presser-foot and presser-wheel and the wings or teeth of the cast-off wheel as the stitch is being cast.

In order that the invention may be thoroughly understood, I will point out, in conclusion, that the combined landing and cast-off wheel is set in such a position as to cause the lowermost wings in mesh with the needles to come in contact with the loops of the stitch previously formed and which have been pressed down in the regular way below the beards of the needles and out of the way of the thread on the feed-wheel. These loops are then lifted by the wings and in their upward movement are landed onto the beards below the presser-foot, which has pressed the beards against needles, as usual, to allow said loops to pass over them. As the combined landing and cast-off wheel continues rotating these loops in continuity of their movement are cast off successively and the stitches completed. My improved loop-slackening and needle positioning and steadying device constituted by said beveled wheel 12 has been meanwhile borne upon by the needles as they move past it, and the needles from which the stitch is being cast and those following it are successively caused to assume a position inward of their normal position and in close proximity to and below the wings of my combined landing and cast-off wheel, and the needles will assume this position simultaneously with the passage of the wings outwardly and upwardly from between the needles, and consequently as the stitch is being cast off. In this manner the wheel 12 relieves the loop of yarn of undue strain, and therefore slackens it and obviates the stretching thereof and destruction of its life. At the same time the friction created between the needles and my improved device steadies these needles sufficiently to prevent their being displaced laterally away from one another, which has been found to occur at intervals and make the wales and stitches irregular. Furthermore, the positioning of the needles according to my invention creates a greater area of frictional contact between the fabric and my combined landing and cast-off wheel, because the fabric is caused to bear not only upon the upper edges of the wings, but also upon the points and a portion of the lower edges, thereby distributing the strain throughout a greater proportion of the fabric. This also enables the cast-off wheel to be set farther back from the needles, which prevents the wings tripping upon the ends and sides of the latter, as has frequently happened heretofore, with the un-

desirable result that the regularity of the stitches has been disturbed.

Although I have illustrated my auxiliary presser member as consisting of the wheel 12, it is obvious that a non-rotatory part with a similar function can be substituted therefor within the scope of my invention.

This invention, as has been evidenced, renders it possible to dispense with the separate landing-wheel, and the particular arrangement enables the cast-off wheel to answer the purpose of both landing-wheel and cast-off wheel heretofore used.

By the use of my invention additional feed devices can be accommodated and the speed of the machine increased from fifty (50%) to one hundred (100%) per cent., thereby correspondingly increasing the output of this type of machine, and consequently correspondingly reducing the cost of production.

What I claim is as follows:

1. In a knitting-machine the combination with a rotatable circular gang of bearded needles, a feed-wheel and a presser-foot outside of said circular gang of needles for closing the beards thereof, and a cast-off wheel within said circular gang of needles, a combined loop-slackening and needle-positioning and steadying device located in the path of said needles and in a position to cause each needle as it is having its stitch cast therefrom to ride thereon and be displaced toward the cast-off wheel, for the purpose set forth.

2. In a knitting-machine the combination with a rotatable circular gang of bearded needles, a feed-wheel and a presser-foot outside of said circular gang of needles, and a cast-off wheel within said circular gang of needles, a combined loop-slackening and needle positioning and steadying device in conjunction with said presser-foot and located in the path of said needles and in a position to cause each needle as it is having its stitch cast therefrom to ride thereon and be displaced toward the cast-off wheel, for the purpose set forth.

3. In a knitting-machine the combination with a rotatable circular gang of bearded needles, of a presser-foot, an auxiliary presser member in conjunction with said presser-foot, a toothed cast-off wheel, on the opposite side of said needles to that upon which said presser device and auxiliary presser member bear, and intermeshing with the needles borne upon by said auxiliary presser member, for the purpose set forth.

4. In a knitting-machine the combination with a rotatable circular gang of bearded needles and a toothed cast-off wheel intermeshing with the said needles, of a presser-foot, an auxiliary presser member in conjunction with the said presser-foot and together therewith bearing upon the needles at the opposite side to that at which the cast-off wheel is located, the end of the bearing-face of the presser-foot adjacent to the said auxiliary presser member being beveled to accommodate the teeth of the cast-off wheel in the movement thereof, for the purpose set forth.

5. In a knitting-machine the combination with a rotatable circular gang of bearded needles, a toothed cast-off wheel intermeshing with the said needles, of a presser-foot, an auxiliary presser member in conjunction with the said presser-foot and together therewith bearing upon the needles at the opposite side to that at which the cast-off wheel is located, the end of the bearing-face of the presser-foot adjacent to the auxiliary presser member and the bearing edge of said auxiliary presser member being oppositely beveled to accommodate the teeth of the wheel in the movement of the latter, for the purpose set forth.

6. In a knitting-machine the combination with a rotatable circular gang of bearded needles and a toothed cast-off wheel intermeshing with the said needles, of a presser-foot, a presser-wheel in conjunction with said presser-foot and together therewith bearing upon the needles at the opposite side to that at which the cast-off wheel is located, the end of the bearing-face of said presser-foot adjacent to said presser-wheel and the periphery of said presser-wheel being oppositely beveled to accommodate the teeth of the cast-off wheel in the movement thereof, substantially as described and for the purpose set forth.

7. In a circular-knitting machine the combination with a rotatable circular gang of needles, a cast-off wheel and a frame supporting a guide, a feed-wheel, and a cloth-wheel, of a bracket and means for slackening the loop and positioning and steadying the needle, said means being carried by said bracket and accessory to the stitch-forming instrumentalities carried by said frame, and means for adjustably supporting said bracket for the purpose set forth.

8. In a circular-knitting machine the combination with a rotatable circular gang of needles, a cast-off wheel and a frame supporting a guide, a feed-wheel, and a cloth-wheel, of a bracket, said bracket carrying a presser-foot, and a combined loop-slackener and needle positioner and steadier also carried by said bracket and accessory to the stitch-forming instrumentalities carried by said frame, and means for adjustably supporting said bracket for the purpose set forth.

9. In a circular-knitting machine the combination with a rotatable circular gang of needles, a cast-off wheel and a frame supporting a guide, a feed-wheel, and a cloth-wheel, of a bracket, a presser-foot and a combined loop-slackener and needle positioner and steadier carried by said bracket and accessory to the stitch-forming instrumentalities

carried by said frame, and means for adjustably securing said bracket to said frame, for the purpose set forth.

10. In a knitting-machine, the combination with a rotatable circular gang of needles, of accessory stitch-forming instrumentalities and a toothed cast-off wheel having its teeth intermeshing with said needles, of a presser device located with the bearing portion of its face beneath the teeth adjacent thereto of said cast-off wheel and in a position to press the needles inwardly toward the axis of said cast-off wheel and retain them against displacement while the stitch is being cast off.

11. In a knitting-machine, the combination with a rotatable circular gang of needles, and accessory stitch-forming instrumentalities and a cast-off wheel having teeth of wing form, of a presser device located with the bearing portion of its face beneath the teeth adjacent thereto of said cast-off wheel and in a position to press the needles inwardly toward the axis of said cast-off wheel and retain them against displacement while the stitch is being cast off.

12. In a knitting-machine, the combination with a rotatable circular gang of needles, and accessory stitch-forming instrumentalities, a presser-foot and a toothed cast-off wheel having its teeth intermeshing with said needles, of a presser device in conjunction with said presser-foot and located with the bearing portion of its face beneath the teeth adjacent thereto of said cast-off wheel and in a position to press the needles inwardly toward the axis of said cast-off wheel and retain them against displacement while the stitch is being cast off.

13. In a knitting-machine, the combination with a rotatable circular gang of needles, and accessory stitch-forming instrumentalities and a toothed cast-off wheel having its teeth intermeshing with said needles, of a presser-wheel located with a portion of its periphery beneath the teeth adjacent thereto of said cast-off wheel and in a position to press the needles inwardly toward the axis of said cast-off wheel and retain them against displacement while the stitch is being cast-off substantially as described.

14. In a knitting-machine, the combination with a rotatable circular gang of needles, and accessory stitch-forming instrumentalities, a presser-foot, and a toothed cast-off wheel having its teeth intermeshing with said needles, of a presser-wheel in conjunction with said presser-foot and located with a portion of its periphery beneath the teeth adjacent thereto of said cast-off wheel and in a position to press the needle inwardly toward the axis of said cast-off wheel and retain them against displacement while the stitch is being formed, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRANK ALEXCE DEMERS.

Witnesses:

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RICHARD DORANN.