2 Sheets—Sheet 1.

O. TWOMBLY.

ROTARY KNITTING-MACHINE.

No. 173,086. Patented Feb. 1, 1876.

Fig. 1

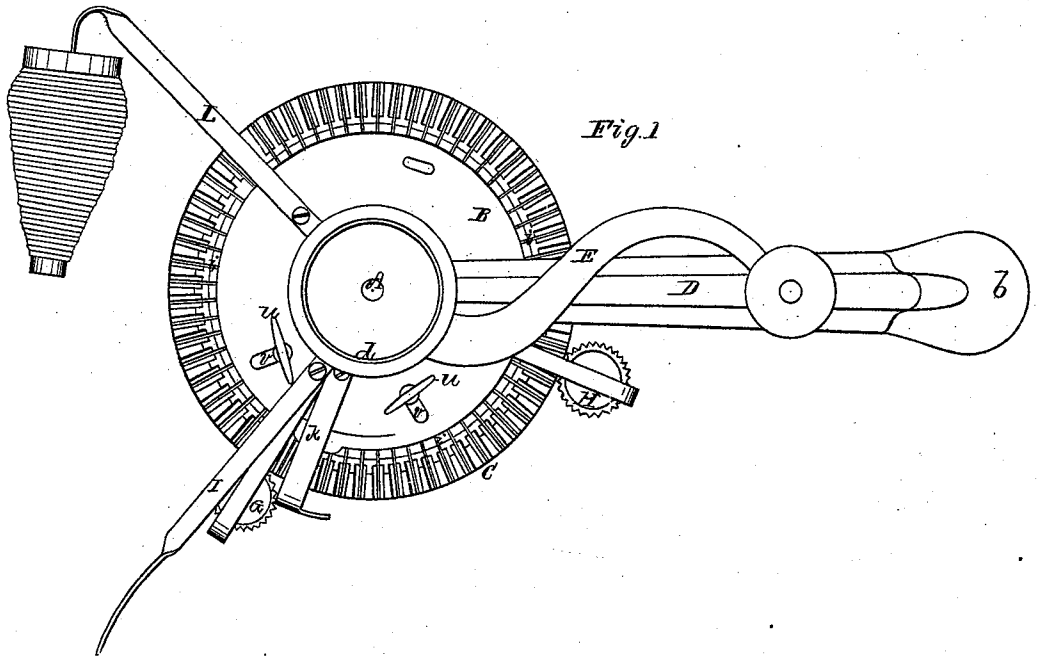
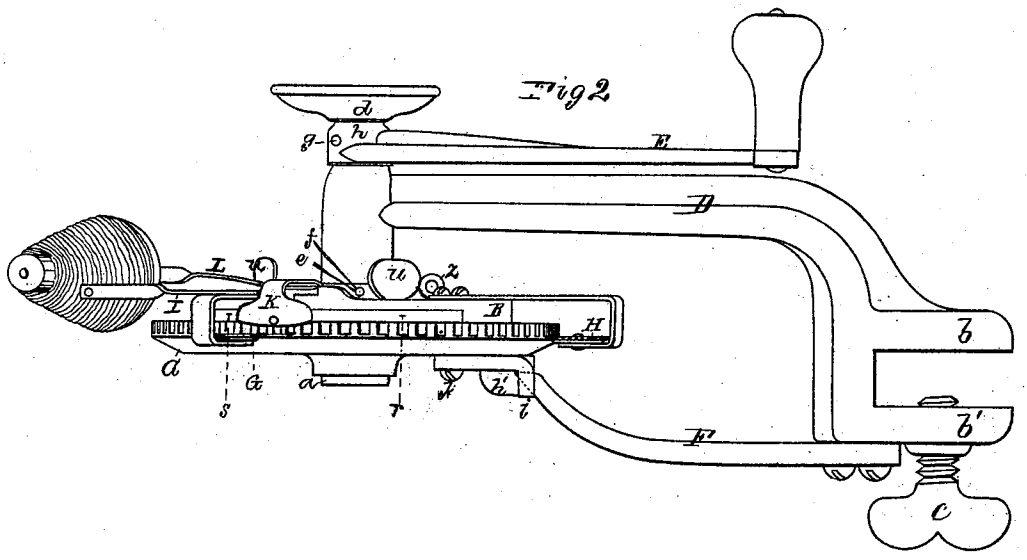


Fig 2



Witnesses.

S. N. Piper.

L. N. Moller.

Orison Twombly.

by his attorney.

R. H. Eddy.

2 Sheets—Sheet 2.

O. TWOMBLY.

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Fig 3.

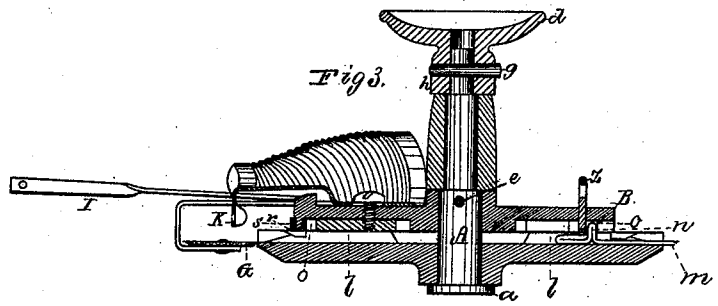


Fig 4.

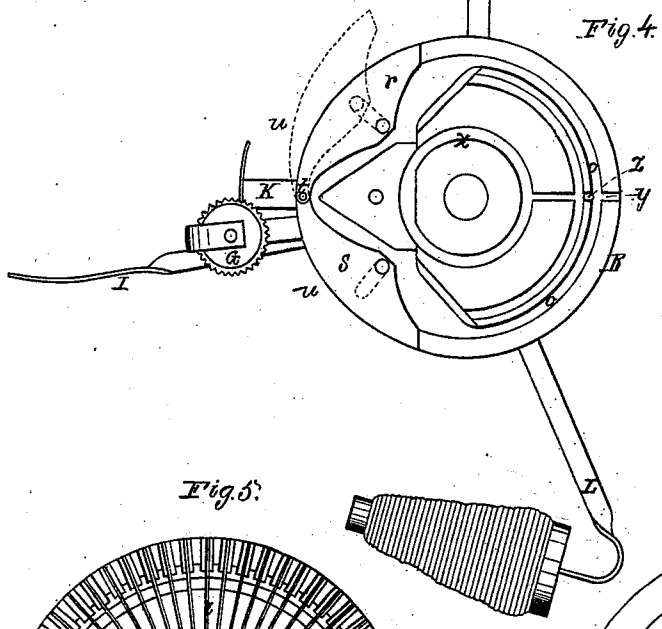


Fig 5.

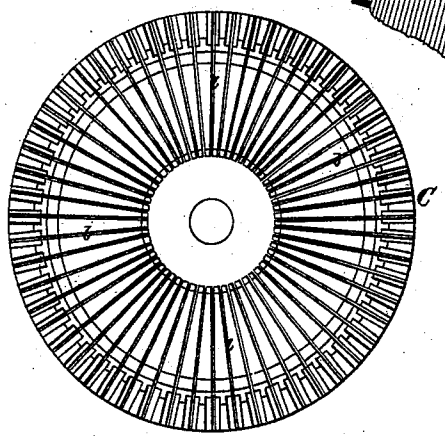
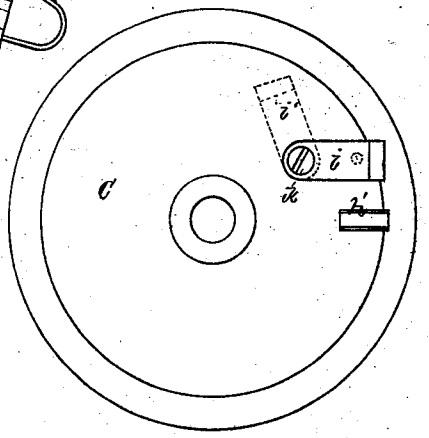


Fig 6.



Witnesses.
S. N. Piper
L. N. Höller

Orison Trombly.
by his attorney.
R. H. Eddy.

UNITED STATES PATENT OFFICE.

ORISON TWOMBLY, OF LAKE VILLAGE, NEW HAMPSHIRE.

IMPROVEMENT IN ROTARY KNITTING-MACHINES.

Specification forming part of Letters Patent No. **173,086**, dated February 1, 1876; application filed April 22, 1874.

To all whom it may concern:

Be it known that I, ORISON TWOMBLY, of Lake Village, of the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in Rotary Knitting-Machines; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 denotes a top view, Fig. 2 a side elevation, and Fig. 3 a transverse section, of a machine embodying my invention. Fig. 4 is an under-side view of the rotary cam-wheel and its adjuncts. Fig. 5 is a top view of the stationary wheel for carrying the needles. Fig. 6 is an under-side view of the said needle-wheel.

With this machine, either a tube or a band may be knit.

In the drawings, A denotes a short vertical shaft, provided at its lower end with a head, *a*. This shaft extends up through and concentrically with the rotary cam-wheel B and the stationary needle-wheel C, and also through an arm, D, projecting, as shown, from two connected clamp-jaws, *b b'*, furnished with a clamp-screw, *c*, which is screwed upward through the lower of them, all being as represented. A crank, E, provided with a needle-cup, *d*, is fixed on the upper end of the shaft A. A pin or key, *e*, going diametrically through the shaft A and the hole *f* of the cam-wheel, serves to fix the cam-wheel to the shaft, in order that the cam-wheel may be revolved by the crank when the latter may be in the act of being turned around. Another pin, *g*, going through the crank-eye *h* and the shaft A, serves to fix one to the other.

From the clamp-jaws an auxiliary arm F is extended to and underneath the needle-wheel a short distance, as shown, the said wheel having an abutment, *h'*, projecting down from it, which, by bringing up against the auxiliary arm, stops the wheel from revolving in one direction with the cam-wheel. There is also applied to the under side of the needle-wheel a movable stud, *i*, arranged as shown, to turn around on a clamp-screw, *k*, which goes through the arm of the stud and screws into the wheel, the whole enabling the stud to be fixed in the position against the auxiliary arm, as shown, or in that represented by dotted lines at *i'* in Fig. 6. When the movable stud is against the auxiliary arm, and the latter is against the abutment *h'*, such stud and abutment and arm hold the needle-wheel from being revolved in either direction horizontally. By putting the movable stud in the position shown in dotted lines at *i'* in Fig. 6, it will be out of the way of the work, which, as a tube, while being knit and drawn downward, passes between the auxiliary arm and the abutment. In knitting the tube the cam-wheel revolves continuously in one direction, and bears the abutment constantly toward the arm, in which case the movable stud is not required to be used, and has to be thrown back, or into the position denoted by the dotted lines; but when the machine is knitting a belt or band of work a reciprocating rotary motion is given to the cam-wheel, and it becomes necessary to have the stud *i* brought around against the auxiliary arm, in order to prevent the needle-wheel from being revolved, the stud keeping it from turning one way, and the abutment operating to prevent it from revolving the other.

The needle-wheel is provided, as shown, with a series of radial grooves, *l*, to receive the needles, one or more of which are shown at *m*, whose studs *n* extend into the actuating groove *o* of the cam-wheel B. This groove, formed as shown in Fig. 4, is provided with two cams, *r s*, formed and arranged as shown, and pivoted at their inner ends to the cam-wheel, their pivot being shown at *t*. There is to each of the cams a clamp-screw, *u*, which goes through a slot, *v*, in the cam-plate, such slot being curved to a radius whose center is the pivot of the cam. The cam can be moved from the position shown in full lines to that indicated in dotted lines, or to any intermediate one, and be fixed in either position by the clamp-screw.

When the two cams are in the positions indicated by the full lines the machine is adapted for reciprocating knitting, or in other words, knitting a band of work, as to accomplish this it has to knit, while the cam-wheel is being revolved in either direction; but when either of the cams is thrown out into the position denoted by the dotted lines the machine will

be adapted for tube-knitting, one cam enabling it to knit in one direction, and the other in the opposite. By means of the adjustable cams the length of loops made by the machine may be varied as the work to be done may require.

Like other rotary knitting-machines of the kind, this is provided with two spur-wheels, G H, yarn-guide I K, and a bobbin-carrier, L, all combined and arranged with the cam-wheel in the manner shown. The knitting is performed by this machine as in other machines, except that the work, when in the form of a tube, passes down between the auxiliary arm and the fixed stud of the needle-wheel. The machine will also perform, as stated, band or belt knitting.

The cam-wheel has a circular groove, *x*, and a straight groove or passage, *y*, leading radially therefrom to the circumference of the wheel, they being arranged as shown. There is also a pin or gate, *z*, inserted in a hole made in the cam-wheel at the junction of the passage *y* with the groove *o* of the cam-wheel.

On removing the pin each of the needles, while brought around in the plane or line of the passage *y*, may be shoved back through such passage, so as to carry the stud of the needle into the circular groove *x*, by which the needle will be kept out of operation, or be prevented from knitting. Thus by means of the circular groove *x*, and its passage *y*, more or less of the needles may be thrown out of action, as circumstances may require, the pin, when in place, serving to prevent any return of the needles to act with the groove *o*.

I do not claim, in a knitting-machine, whose needles are arranged to work or play up and down vertically, adjustable cams applied to and combined with their operating groove; nor do I claim, in such a machine, a channel or groove to lead out of the needle-operating cam-groove, and provided with a gate, all as shown in the United States Patent No. 112,027; nor do I claim, in a machine for rib-knitting, the needle plates or carriers, as provided with two stops to prevent the upper of the said carriers from revolving in one direction, all being as shown in the United States Patent No 37,161.

I claim—

1. In combination with the horizontal needle-wheel or dial C, with the needles arranged therein to move radially, I claim the cam-wheel or cap B, provided with the groove *o* and pivoted adjustable cams *r s*, arranged as described, for operating the needles as set forth.

2. In a knitting-machine, having its needle-wheel C and its cam-wheel D constructed and arranged as herein described, the combination of the auxiliary arm F with the abutment *h'* and movable stud *i*, provided with clamp-screw *k*, as and for the purpose set forth.

ORISON TWOMBLY.

Witnesses:

JOHN T. COFFIN,

JAS. E. EDLIN.