(No Model.)

G. J. MANDERFIELD & J. C. BREWIN.

KNITTING MACHINE.

No. 557,845. Patented Apr. 7, 1896.

Fig. 6.

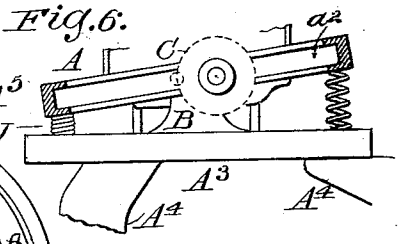


Fig. 2.

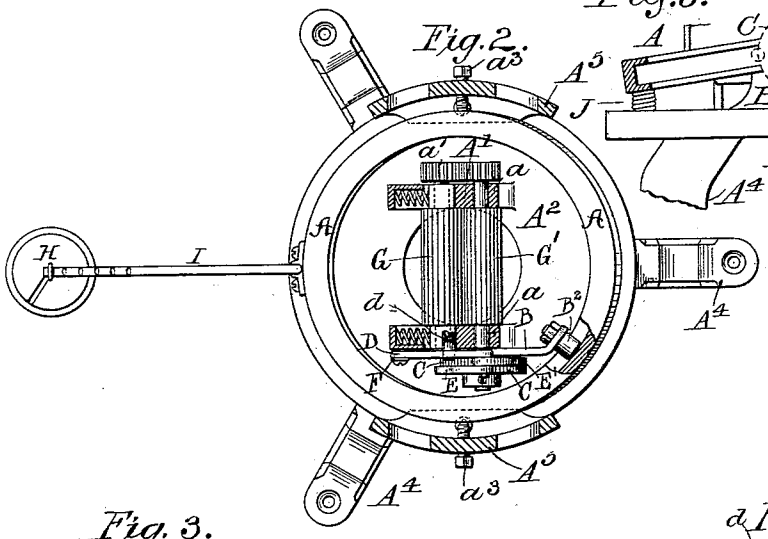
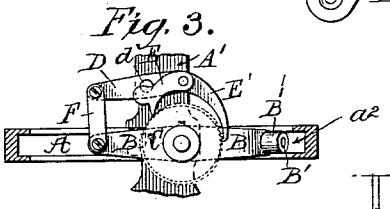


Fig. 3.



d Fig. 4.

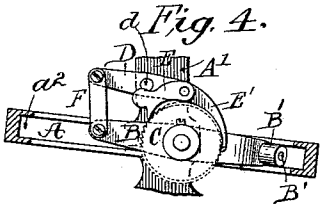


Fig. 1.

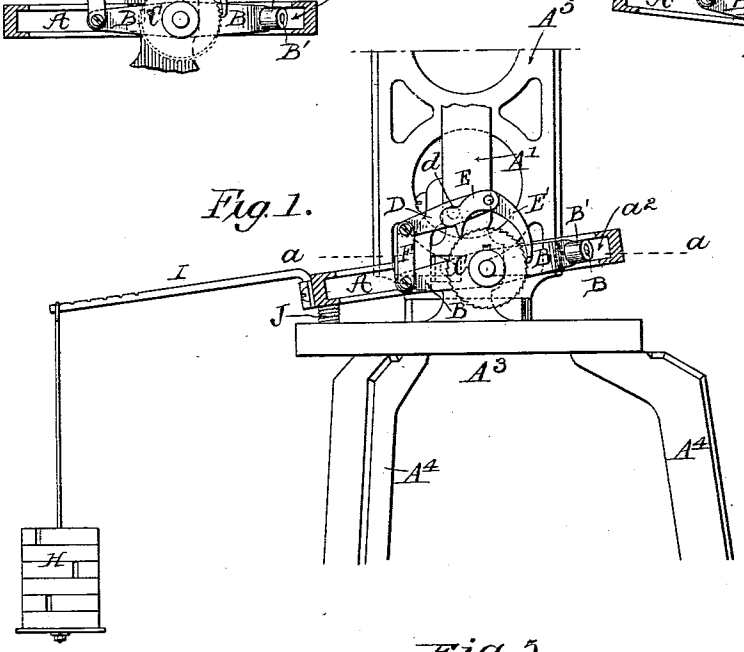


Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE J. MANDERFIELD AND JOHN C. BREWIN, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 557,845, dated April 7, 1896.

Application filed November 21, 1895. Serial No. 569,623. (No model.)

To all whom it may concern:

Be it known that we, GEORGE J. MANDERFIELD and JOHN C. BREWIN, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Knitting-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to knitting-machines, and is directed more particularly to the work-take-up device of circular machines employing a rotary cylinder. It is usual in machines of this character to take up the work as fast as it is produced by means of two rollers geared together and movable with the cylinder, the work passing between the rolls as the latter are rotated by a pawl-and-ratchet mechanism acting on one of the rolls, and receiving motion from a fixed cam-surface, in relation to which the rolls and their operating mechanism revolve. In machines employing this mechanism it frequently happens that the work is not produced in quantities commensurate with the capacity of the take-up rolls, the result being that they, in continuing to act, will subject the work to a great strain, resulting in injury to the same, the breakage of the yarn and needles, and a derangement of the knitting operation generally. It is the aim of our invention to obviate this objectionable action of the take-up mechanism, and this we accomplish by so constructing the driving mechanism for the rolls that when the take-up rolls are subjected to undue strain the driving mechanism will be automatically rendered inoperative and the rotation of the rolls cease. We prefer to accomplish this object by so supporting the cam surface or ring that it will yield under undue resistance offered to the pawl-lever when the work is not produced fast enough, the result being that the pawl-lever will not be operated and the rolls will cease to take up the work. When the work has formed in sufficient quantities to relieve the take-up rolls of strain, the pawl-lever will also be relieved of strain and the cam-surface will resume automatically its former operative position, giving motion to the intermediate parts and the take-up rolls.

In addition to the above features the invention consists in various details of construction and combinations of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a sectional elevation of the take-up mechanism of a circular-knitting machine having our invention embodied therein. Fig. 2 is a horizontal sectional elevation on the line *a a*. Fig. 3 is a view of the cam-ring in inoperative position. Fig. 4 is a view of the cam-ring, showing the parts in operative positions. Fig. 5 is a view of a modified form of the ring. Fig. 6 is a view of a modified form of device for holding the cam-ring yieldingly in an inclined position.

Referring to the drawings, A′ represents the usual take-up frame, consisting of the two vertical standards connected at their upper ends to the revolving needle-cylinder (not shown) and fixed at their lower ends to a horizontal disk A^2, mounted to revolve in a fixed horizontal annular frame A^3, sustained at the upper end of suitable legs A^4.

The needle-cylinder and adjacent parts of the machine, which are not shown, are sustained at the upper ends of two vertical frame-plates A^5, fixed to and rising from the upper side of the annular frame A^3. Between the two vertical standards of the take-up frame are journaled side by side in suitable bearings *a* two rolls G G′, between which the work is drawn down from the needles above in the usual manner as it is produced. The two rolls are provided on one end with intermeshing pinions *a*′, and one of the rolls is provided on its opposite end with a ratchet-wheel C, which is driven by a pawl mechanism operated, as hereinafter more fully described, from the cam-surface, the arrangement being such that the revolution of the take-up frame with the needle-cylinder will, through the medium of the cam-surface and pawl mechanism, rotate the take-up rolls in opposite directions.

The foregoing parts may be of the usual

and ordinary construction, and except in so far as hereinafter indicated they form no part of the present invention.

In applying our invention to a machine of this character we construct the cam-surface in the form of a ring A, containing an internal groove a^2, which ring is pivoted at diametrically-opposite points between screws a^3, extending through the fixed plates A^5, the said ring being in such position that it surrounds the take-up frame at or about the level of the rolls. Under this arrangement the ring may rock on a horizontal axis, and it is held normally yieldingly in an inclined position, as shown in Fig. 1, by means of a weight II, suspended on the outer end of an arm I, connected at its inner end to the ring at a point midway between its pivotal points. When in this position, the ring constitutes in effect an annular cam-surface having the limits of its throw at its highest and lowest points. To impart motion to the take-up rolls from this cam-ring we mount loosely on the axis of the roll G′, on which the ratchet-wheel is mounted and at the inner side of the same, a lever B, having on one end a friction-roller B′, adapted to travel in the groove in the ring. The lever has its opposite end connected by a vertical link F to a second horizontal lever D, extending parallel to the first lever and pivoted between its ends to the take-up frame, as at *d*. The lever D carries at its ends two pivoted pawls E E′, so formed and arranged that by the movement of the lever on its axis they will act to respectively push and pull the ratchet-wheel around and rotate the take-up rolls. The pulling-pawl E′ extends downward from the lever to the side of the ratchet-wheel, and is formed with a hook to engage the teeth. The pushing-pawl extends from the end of the lever in the opposite direction, and is formed with a nose engaging the teeth at such a point that by the descent of the end of the lever the pawl will push the wheel around on its axis.

The motion of the ratchet-wheel is thus effected on both the upward and downward stroke of the lever, so that by the revolution of the take-up frame the ratchet-wheel is, through the connections described, rotated by the one pawl when the friction-wheel travels in the lower part of the ring and by the other pawl when it travels in the upper part of the ring.

The operation of the device described is as follows: Assuming that the cam-ring is in its normal inclined position, as indicated in Fig. 1, and that the knitting operation is in progress with the needle-cylinder revolving as usual, under these conditions the take-up frame, which is connected to the cylinder, also revolves, and the friction-roller on lever B, traveling in the groove from its lowest to its highest point, will rock the lever on its axis, causing a corresponding movement to be imparted to the upper lever D, and this movement through the medium of the pawls will rotate the ratchet-wheel and the take-up rolls. Suppose now, for any reason, the production of the work is interrupted or the rate of its production decreased, the result is that the take-up rolls, in continuing to act with their usual capacity, will be resisted by the work, and this resistance being imparted through the intermediate driving connections to the lever B the latter will be held rigid, and the rotation of the take-up frame continuing the cam-ring will be rocked on its axis against the influence of the weight and will assume a horizontal position, thereby permitting the friction-roll to travel around in the groove in a truly horizontal plane. So long as the ring is in this position and with the roll traveling in a horizontal plane the take-up rolls will remain at rest so far as any rotation on their axes is concerned, and the parts will remain in this position until enough work is produced by the needles to relieve the rolls of strain when the action of the weight on the ring, coming into play, the latter will be again tipped to its inclined position and the friction-roll, traveling around the inclined ring, will cause the lever B to be rocked, and through the intermediate connections will impart motion to the take-up rolls as before.

It will be observed that the cessation of the take-up is effected automatically by the failure of the work to be produced in a quantity commensurate with the capacity of the take-up, and that the resumption of the action of the take-up is also effected automatically when the work is again produced at its normal rate, and these actions in no manner interfere with the continued operation of the machine.

The inclined ring described is adapted to give two movements to the pawl-lever with every revolution of the needle-cylinder, and in certain cases the movement imparted to the take-up rolls is sufficient to take the work up as it is produced. In other cases, however, where the capacity of the machine is much greater, as in large machines employing a plurality of feeds, this movement of the take-up rolls is not sufficient to take the work as fast as it is produced. Hence for every revolution of the needle-cylinder it is necessary to impart a greater movement to the take-up rolls. This may be accomplished by giving to the groove in the ring an undulating surface, as shown in Fig. 5, the effect of which is to rock the lever carrying the friction-roll according to the number of undulations. In this case the function of the rocking ring is not changed or modified, for in the event of an interruption in the production of the work the resistance offered to the lever would, as before, hold the same rigid, and it would move the ring on its axis against the influence of the weight instead of being moved by the ring, and in this way the action of the take-up rolls would cease.

It is obvious that in place of the weight to hold the ring yieldingly in an inclined posi-

tion an expansion-spring may be applied beneath the upper side of the ring, as shown in Fig. 6, and would act precisely in the same manner as the weight. We propose in either case to provide a stop for the lower side of the ring in the form of a spring J or a cushion of rubber in order to cushion the effect of the descent of the ring. It is obvious also that the details of the mechanism employed for transmitting motion to the take-up rolls may be modified and changed at will without departing from the limits of our invention, the essence of which resides in operating the rolls by mechanism including a yielding cam, so that in the event of the rolls being subjected to undue strain or a resistance this part in yielding will automatically render the driving connections inoperative.

Having thus described our invention, what we claim is—

1. In a knitting-machine the combination with the work-take-up rolls, of a yielding cam-surface, said parts being relatively movable one about the other an intermediate mechanism for rotating the rolls, said mechanism arranged to be driven by engagement with the cam-surface.

2. In a knitting-machine the combination with the work-take-up rolls, and the lever for actuating the same, of the yielding cam-surface for rocking the lever said rolls and cam-surface being relatively movable one about the other.

3. In a knitting-machine the combination with the rotary take-up frame, of the take-up rolls journaled therein, and adapted to draw the work between them, a yielding cam-ring, and a pivoted lever for rotating the rolls, said lever arranged to be moved with the take-up frame and rocked on its axis by engagement with the cam-ring.

4. The combination with the rotary take-up frame, of the take-up rolls journaled therein side by side and adapted to draw the work downward between them, a rocking ring sustained yieldingly in an inclined position and mechanism for rotating the take-up rolls, said mechanism movable bodily with the take-up frame and adapted to be actuated by engagement with the ring.

5. In a knitting-machine the combination with the rotary cylinder and rotary take-up frame movable therewith, of the take-up rolls mounted therein, the yielding cam-ring and intermediate mechanism for rotating the rolls, said mechanism adapted to be actuated by engagement with the cam-ring.

6. In a knitting-machine the combination with the rotary take-up frame, of the take-up rolls journaled therein, a cam-ring mounted on an axis fixed with relation to the take-up frame, means tending to hold the ring yieldingly at an inclination and a rocking lever adapted to rotate the rolls and movable bodily around with the take-up frame in engagement with the cam-ring.

7. In a knitting-machine the combination with the rotary take-up frame, of the take-up rolls journaled therein, the yielding cam-surface, the pawl-lever adapted to be engaged with the cam-surface and rocked thereby, the two pawls carried by said lever, and a ratchet-wheel on one of the rolls, adapted to be driven respectively by said pawls.

8. In a knitting-machine the combination with the rotary take-up frame, of the take-up rolls mounted side by side therein, a rocking cam-ring provided with an internal groove, a spring or weight acting on said ring and tending to hold the same yieldingly in an inclined position, a lever having one end in position to engage in the groove in the ring and movable with the take-up frame and connections between the lever and rolls for actuating the latter.

9. In a knitting-machine the combination with the rotary take-up frame, of the rolls mounted therein, the cam-ring surrounding the rolls and pivoted on a horizontal fixed axis, a weight or spring acting on the ring to hold the same in an inclined position, and mechanism for rotating the take-up rolls, said mechanism movable with the take-up frame and arranged to be actuated by engagement with the ring.

10. In a knitting-machine the combination with the rotary take-up frame, of the take-up rolls journaled therein, a yielding cam-ring formed with one or more undulations, mechanism for operating the rolls to take up the work, said mechanism adapted to be actuated by engagement with the cam-ring.

In testimony whereof we affix our signatures in presence of two witnesses.

GEO. J. MANDERFIELD.
JOHN C. BREWIN.

Witnesses:
CECIL M. DUFFIN,
JOSEPH B. GODSHALL.