(No Model.)

# G. REID & C. STEVENSON.

## AUTOMATIC CONTROLLING MECHANISM FOR CIRCULAR KNITTING MACHINES.

No. 500,351. Patented June 27, 1893.

FIG. 1.

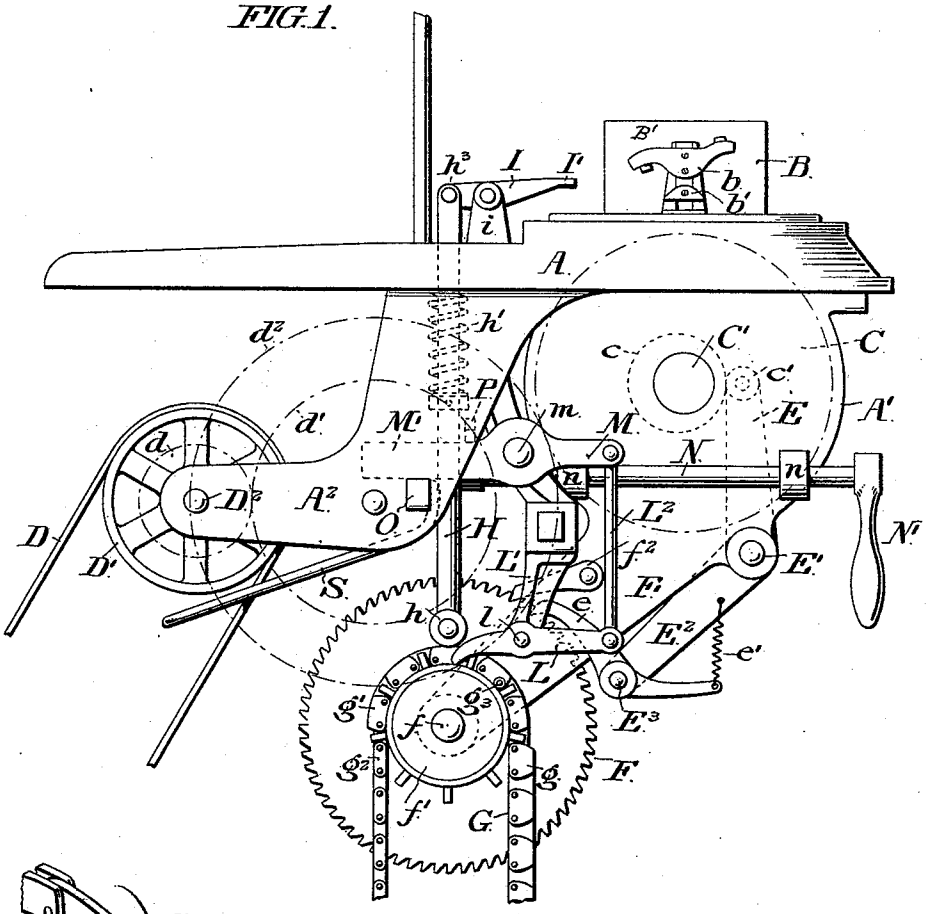



FIG. 3.

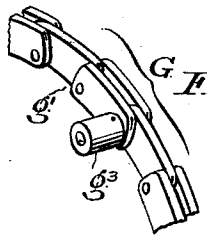
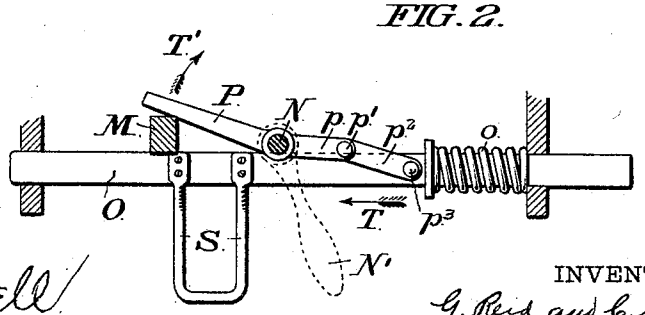



FIG. 2.

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# UNITED STATES PATENT OFFICE.

GRAHAM REID AND CHARLES STEVENSON, OF PHILADELPHIA, PENNSYLVANIA.

## AUTOMATIC CONTROLLING MECHANISM FOR CIRCULAR-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 500,351, dated June 27, 1893.

Application filed March 23, 1893. Serial No. 467,294. (No model.)

*To all whom it may concern:*

Be it known that we, GRAHAM REID and CHARLES STEVENSON, both of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Automatic Controlling Mechanism for Circular-Knitting Machines, whereof the following is a specification, reference being had to the accompanying drawings.

Our invention is particularly adapted for use in connection with circular knitting machines having needle-lifting and needle-depressing devices of the character set forth in Letters Patent No. 471,220, dated March 22, 1892, but it, of course, may be applied to other machines of this class.

In the drawings Figure 1 represents a view in side elevation of a machine embodying our invention. Fig. 2 is a partial rear view of the belt-shifting rod and its direct controlling mechanism; and Fig. 3 is a view, in perspective, of a portion of the pattern chain employed in connection with the controlling devices.

Referring to Fig. 1, A represents the table or base plate on which is supported, in the usual manner, the cam cylinder, B.

The details of the knitting mechanism proper and needle-lifting or depressing mechanism are not shown, as they can be readily understood by reference to the said patent, and we have only deemed it necessary to indicate in a general manner at B′, the vertically movable group of mechanism which is carried by the cam cylinder and which, in one extreme position, actuates the needle lifting devices, in its other extreme position, actuates the needle depressing devices, and in the intermediate, or neutral position, permits both of said devices to remain inoperative. The necessary vertical shifting of said group is obtained by means of the tripping lever, I, acting upon one or the other of two oppositely inclined cam-pieces, *b*, *b′*, facing one another, as shown, and having an interspace sufficient to permit the passage of the end I′ of the tripping lever, I. The neutral position of the actuating mechanism for the needle shifting devices corresponds with such a vertical position of the cam-pieces as brings the opening between them opposite to the end of the tripping lever, I, when said lever is in its intermediate position, but the rise or fall of the lever will bring the surface of one or the other of said cam-pieces into operative engagement therewith so that the rotation of the cam cylinder past the lever will shift the group vertically into a position appropriate for actuating either the needle-lifting or the needle-depressing mechanism, as may be desired. When once thus shifted, the opening between the cam-pieces, *b*, *b′*, will of course be in a position to clear the end of the tripping lever, I, so long as it remains in a given position.

The driving belt is represented at B, the driving pulley at D′, said pulley being journaled at $D^2$ upon the rearward projecting end of the arm $A^2$, dependent from the table A.

By means of the intermediate gears, *d*, *d′*, and $d^2$, the bevel gear, C, is rotated to actuate the cam cylinder, either for continuous circular knitting or for the narrowing and widening operations, and as all of these are well understood, it is not necessary to describe the means whereby the cam cylinder is changed from continuous rotation to a reciprocative or oscillating movement.

The bevel gear, C, is secured to the shaft C′, which has its bearings in the usual guard-plate, A′, depending from the table, A, and said shaft carries an eccentric, *c*, whose periphery bears against a roller, *c′*, upon the arm, E, of a bent lever pivoted at E′, the other arm, $E^2$, of said lever carrying a pawl, *e*, pivoted at $E^3$ and provided with a spring, *e′*, to maintain it in operative contact with its ratchet wheel F. The shaft, *f*, of this ratchet wheel is provided with a bearing in the downwardly and rearwardly projecting arm, F′, which depends from the guard-plate, A′. At each rotation of the shaft, C′, the eccentric, *c*, throws the arm, E, outward and by means of the pawl, *e*, shifts the ratchet wheel, F, a distance of one tooth, the roller, *c′*, being maintained in operative contact with the cam, *c*, at all times, through gravity, by reason of the inward extension of the lower arm, $E^2$, of said lever. Said shaft, *f*, carries a sprocket wheel, *f′*, whose teeth engage with a pattern chain, G, having high links, *g*, medium links, *g′*, and low links, $g^2$, and also having laterally

projecting roller studs, $g^3$, shown more clearly in Fig. 3. The ratchet wheel, F, is also provided with a guard-pawl or keeper, $f^2$, mounted upon the arm, F′.

A longitudinally movable vertical rod, H, is mounted in position to engage operatively with the links of the pattern chain, the lower end of said rod being provided with a roller, $h$, which rests upon the outer surface of the links, being maintained in contact therewith by means of a spring, $h'$, bearing against the under side of the table, A, and normally thrusting the rod downward. The upper end of said rod is pivoted at $h^3$ to one end of a lever, I, mounted upon upright posts, $i$, on the upper surface of the table. The inner end, I′, of said lever extends inward within the range of movement of the cam pieces, $b$, $b'$, upon the exterior of the cam cylinder, B, so as to be capable of tripping either thereof. When the inner end, I′, of the lever, I, is in its medium position, as indicated in Fig. 1, it is at a level which is between the upper cam-piece, $b$, and the lower cam-piece, $b'$, so that as the cylinder rotates, said cam-pieces pass freely by the end of said lever. When, however, the inner end, I′, of said lever is raised, it engages with and trips the upper cam-piece, $b$, and conversely, when the inner end of said lever is lowered, it engages with and operates the lower cam-piece, $b'$. The movement due to engagement of the lever with one cam-piece or the other is of course communicated to the vertically movable group of mechanism, common in this class of machines, and throws said mechanism into the proper position for actuating either the needle-lifting or needle-depressing devices proper. As these devices themselves form no part of our invention, and as they differ in many individual machines, it is not deemed necessary to further describe them; the important feature for the purpose of the present invention being only their capacity for being thrown into or out of operative position by a shifting movement derived from the lever, I. Obviously, the vertical movement of the rod, H, due to its passage from one set of links to another upon the pattern chain, will shift the lever, I, so that its inner end, I′, can be brought to any one of the three positions indicated, and the lever can of course be maintained in any given position during a predetermined period. The pattern chain also controls the belt-shifting devices of the machine by the following arrangement: The laterally projecting studs, $g^3$, of the pattern chain engage with one end of the lever, L, pivoted at $l$ upon an arm, L′, which depends from the table, A, the other end of said lever being attached to a rod, $L^2$, which in turn is connected with the lever, M, pivoted at $m$ upon said arm, L′. The free end of said lever, M, is prolonged and weighted, as indicated at M′, so as to normally tend to depress the end of the lever, L, into a position ready for operative engagement with the rollers $g^3$; and when in this position, the inner end, M′, of the lever, M, rests upon the upper surface of the horizontally mounted belt-shifting rod, O. (See Fig. 2.) Said belt-shifting rod, O, is provided with the usual shifter-fingers, S, which embrace the belt, D, and is capable of longitudinal movement, being provided with a spring, $o$, which tends normally to throw the belt off the fast pulley, D′.

Direct control of the belt-shifting rod, O, is obtained by means of the following device: A rock-shaft, N, provided at its outer end with a handle, N′, is mounted in bearings, $n$, upon the guard-plate, A′. A rock-arm, $p$, is rigidly secured on said rock-shaft, N, and is pivoted at $p'$ to a link, $p^2$, pivotally secured at $p^3$ to the belt-shifting rod, O. A second rock-arm, P, is also rigidly attached to the rock-shaft, N, and projects therefrom a sufficient distance to rest upon the lever M.

In Figs. 1 and 2 the belt-shifting rod, O, is represented in a position corresponding with the running of the driving belt upon the fast pulley, and it will be seen that said rod is locked in this position, since any movement thereof in the direction of the arrow, T, is prevented by contact between the rock-arm, P, and the upper surface of the lever, M, the pivotal point of connection between the arm, $p$, and link, $p^2$, being above a line drawn from the axis of the rock-shaft, N, to the axis of the pivot, $p^3$. When, however, the lever, M, is actuated so as to raise its free end, its movement will throw the rock-arm, P, upward in the direction of the arrow, T′, and by thus rocking the shaft, N, will depress the arm, $p$, and link, $p^2$, carrying them past the center at $p'$, thus unlocking them and leaving them free to turn farther downward as the action of the spring, O, throws the belt-shifting rod, O, in the direction of the arrow T.

Having thus described our invention, we wish it to be understood that we do not limit its application to the particular tripping mechanism upon the cam cylinder, above mentioned, as the device may be modified in these respects without affecting the principle of operation, it being only necessary that there should be upon the cam cylinder parts adapted to engage with the tripping lever in certain positions of the latter, and to clear said lever in another position thereof.

We claim—

The combination, with the driving bevel-gear shaft, of an eccentric mounted thereon; a lever, one end of which is in operative relation to said eccentric; a pawl mounted upon the other end of said lever; a ratchet wheel in operative relation to said pawl; a pattern chain driven by said ratchet wheel and provided with links, of three different heights, and with laterally projecting studs; a longitudinally movable rod in operative relation to said links; a tripping lever connected with said rod and adapted in different positions to control the actuating mechanism for the nee-

dle lifting or needle depressing devices or free the same; a lever in operative relation to the pattern chain studs; a locking lever connected with said pattern chain lever; a belt shifting rod and shifting fingers; a rock-shaft having an arm engaging with said locking lever and a second arm and link pivoted to said belt shifting rod, whereby said rod is locked in the normal position of said locking lever and freed by the action of said pattern chain studs upon their lever, substantially as set forth.

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