No. 762,614. PATENTED JUNE 14, 1904.

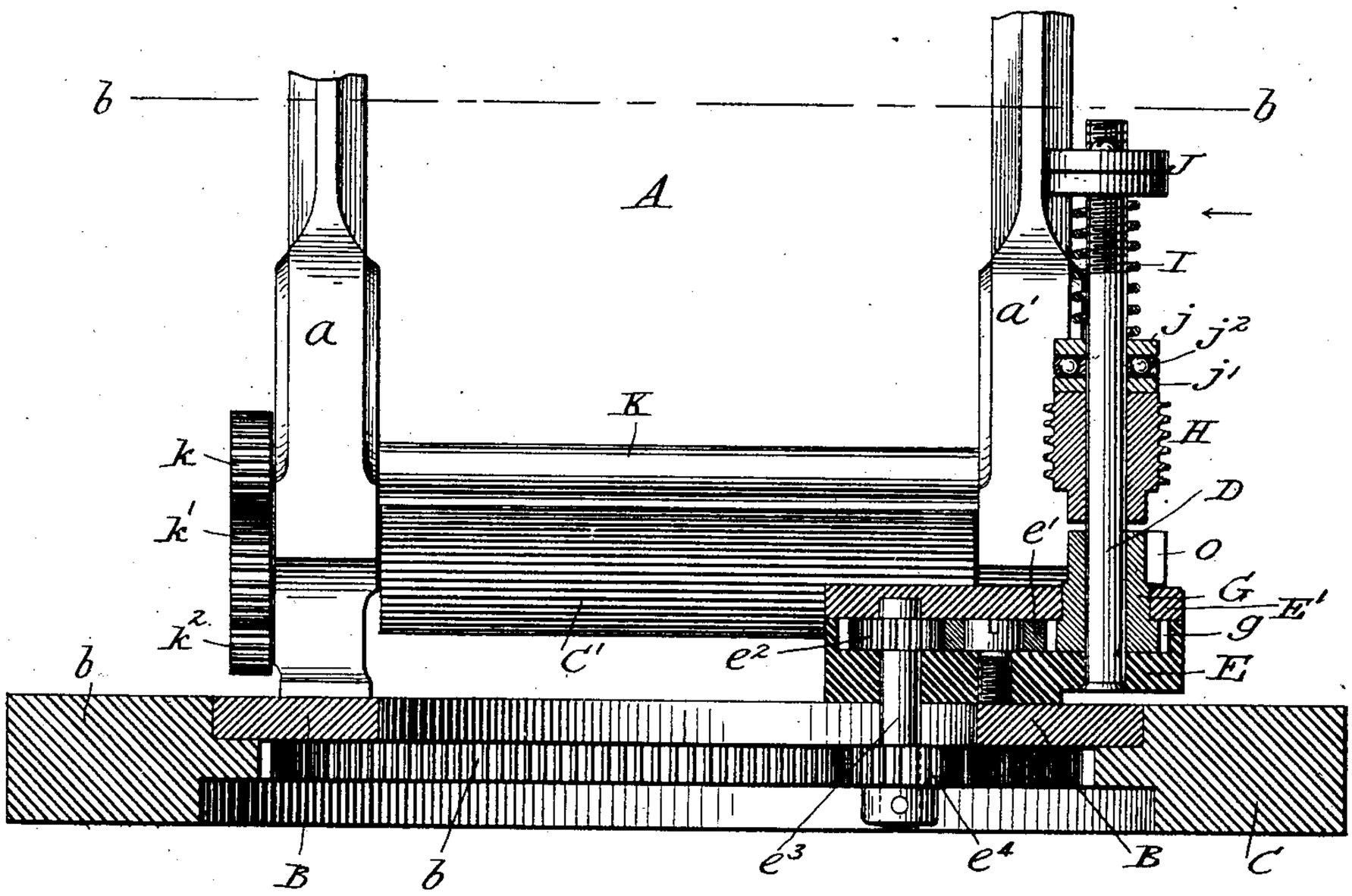
J. C. BREWIN.

TAKE-UP MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED SEPT. 30, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

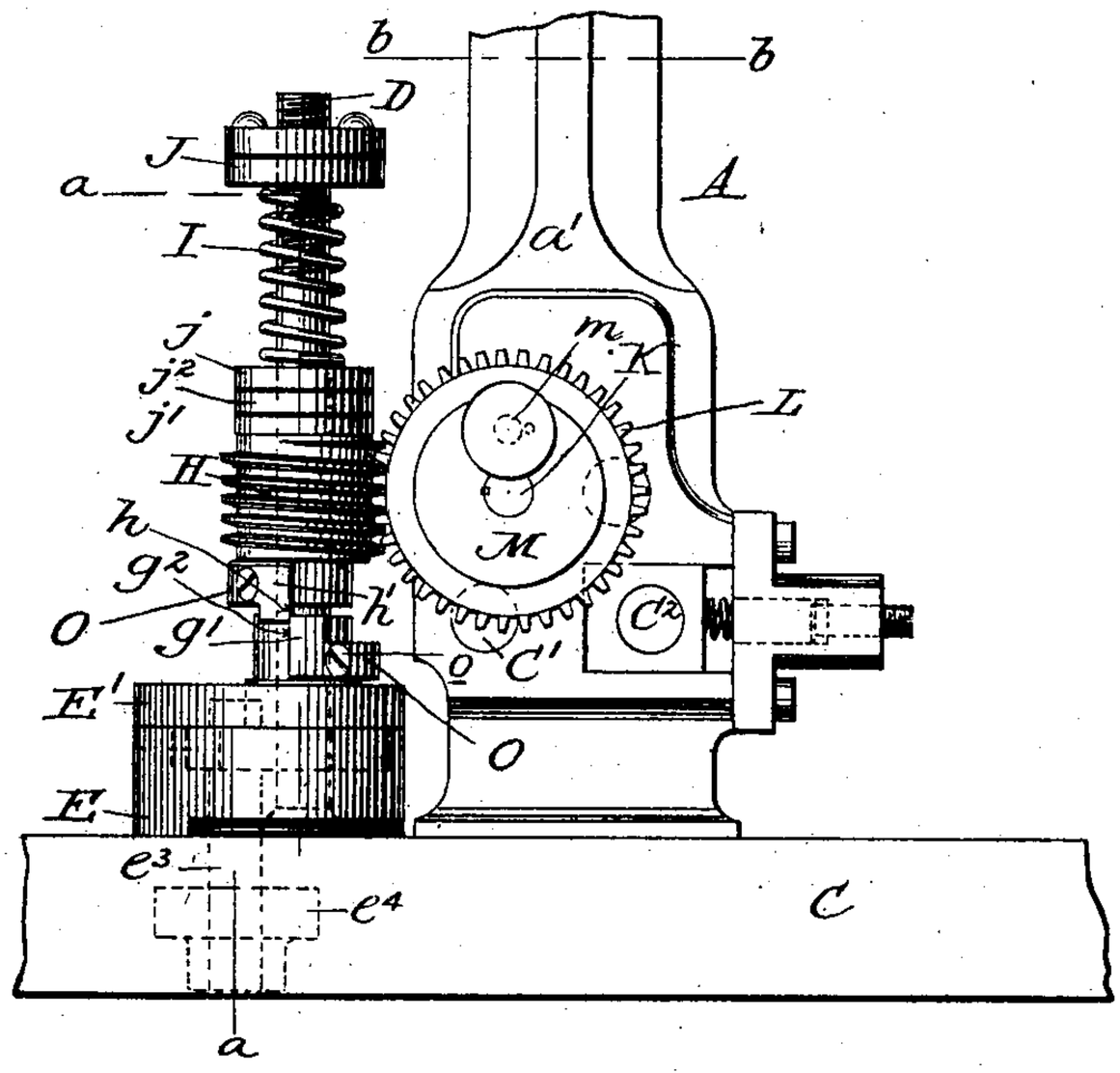


Fig. 4.

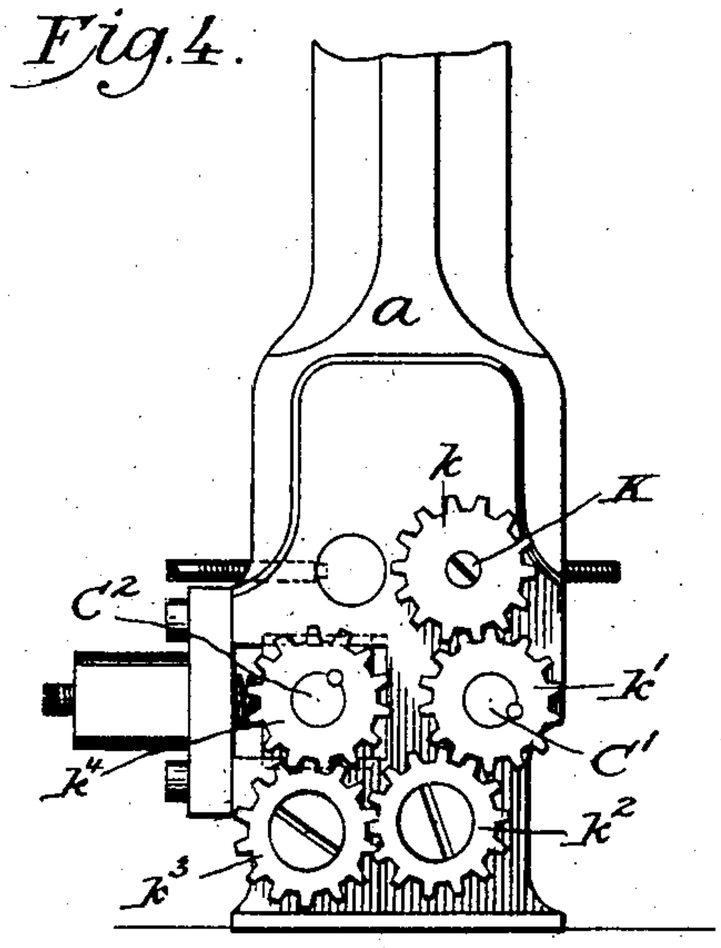
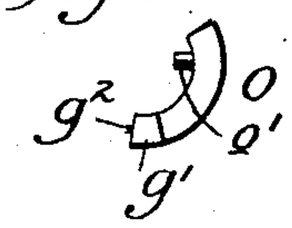


Fig. 5.



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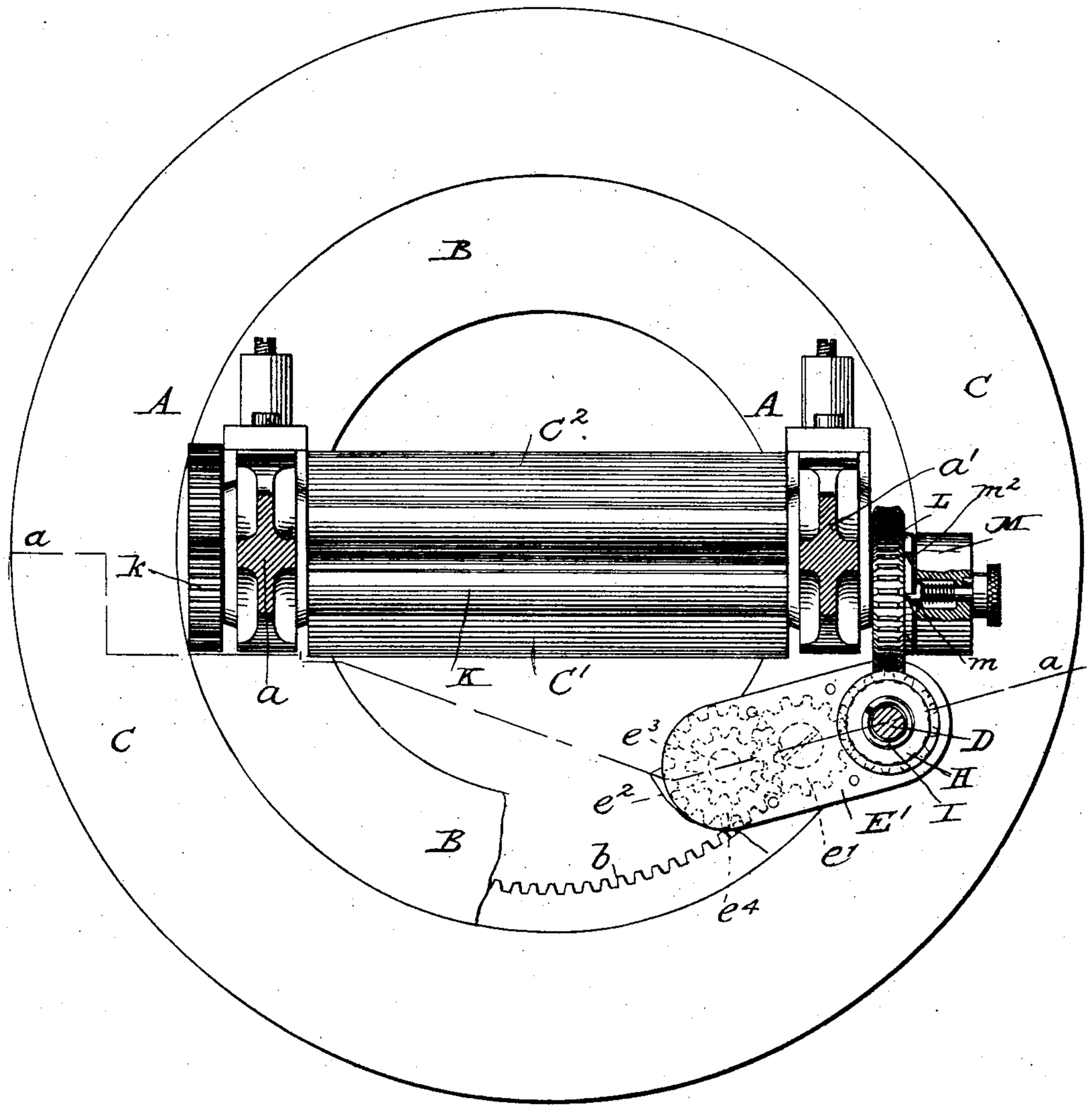
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN C. BREWIN, OF PHILADELPHIA, PENNSYLVANIA.

TAKE-UP MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 762,614, dated June 14, 1904.

Application file September 30, 1903. Serial No. 175,162. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BREWIN, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Take-Up Mechanism for Knitting-Machines, of which the following is a specification.

This invention has reference to work-take-up mechanisms designed for operation more particularly in connection with circular-knitting-machines of the type wherein the needle-cylinder revolves and the work as it is produced is carried around with the cylinder subject to the action of take-up rolls, partaking bodily of a like motion and acting to draw the work downward between them as it is formed by the needles.

The invention consists in automatically-operating mechanism of improved form and construction controlled in its action by the pull on the fabric exerted by the take-up rolls, so that in the event of the fabric not being produced in quantities commensurate with the capacity of the take-up rolls the undue resistance then offered to the rotary rolls will act through the automatic mechanism to arrest the motion of the rolls.

In the practical embodiment of my invention in a knitting-machine of the type referred I interpose between the take-up rolls and the mechanism from which they indirectly receive their driving power a transmitting-gearing including a clutch device of a form and construction which will be operated to disconnect the take-up rolls when they are subject to undue strain, such as would result if the work is not produced fast enough for the capacity of the rolls.

Referring to the drawings, Figure 1 is a vertical sectional elevation on the line *a a* of Figs. 2 and 3 through the lower portion of the take-up frame and adjacent parts. Fig. 2 is a side elevation of said parts as viewed in the direction of the arrow in Fig. 1. Fig. 3 is a sectional plan view looking downward on the line *b b* in Figs. 1 and 2, parts being broken away to better illustrate the internal construction. Fig. 4 is a side elevation of the device, showing the gearing for transmitting motion from the driving-shaft to the take-up rolls. Fig. 5 is a view of one of the clutch-teeth removed.

In the accompanying drawings, A represents the usual take-up frame, comprising two vertical bars *a a'*, connected at their upper ends with the revolving needle-cylinder (not shown) and at their lower ends with a ring B, mounted to rotate in a fixed annular bed-plate C, usually sustained by legs resting on the floor. Journaled side by side on the bars in the take-up frame are two horizontal take-up rolls C C', provided with roughened surfaces, which rollers are geared together so as to rotate in opposite directions and which are driven by the revolving motion of the take-up frame in the manner presently to be described, their action being to positively draw the fabric from the needle-cylinder downward between them.

The foregoing parts are of the usual and customary construction, and except in so far as hereinafter indicated they form no part of the present invention.

In applying my invention to a machine of this character I erect on the rotary ring B, adjacent to the bar *a'* of the take-up frame and just beyond its outer side, a vertical fixed cylindrical post D, its lower end passing through a base-plate E of an elongated casing formed with a cap-plate E', inclosing a train of gearing through the medium of which motion is imparted to the take-up rolls from a fixed internal rack *b* on the fixed bed-plate of the machine.

Mounted loosely on the post D is a sleeve G, having on its lower end gear-teeth *g*, forming a pinion which rests on the base-plate E of the elongated casing and receives support therefrom, and this pinion receives a rotary motion, which is imparted to the sleeve from an idler-pinion e', mounted in the elongated casing and driven from a pinion e^2, also mounted in the casing on the upper end of a short vertical shaft e^3, extending downward through the base-plate of the casing alongside of the fixed rack *b*, where it has fixed to it a driving-pinion e^4, engaging the rack. As a result of this construction the revolution of the take-up frame will cause the pinion e^4 to be revolved in engagement with the fixed rack, im-

parting to the pinion a rotary motion which, through the train of gearing just described, will be imparted to the sleeve G. The sleeve G extends upward loosely through the cap-plate of the casing and has formed on its upper end an upwardly-projecting tooth g', having a vertical active shoulder g^2, which is adapted to engage a vertical shoulder h on a tooth h', extending downward from the lower end of a worm H, which worm is mounted loosely on the post D, so as to rotate thereon, and is capable of a limited endwise motion in relation to the post. When the teeth g' and h' are in engagement, with the vertical shoulders overlapping, as shown in Fig. 2, the rotary motion of the sleeve will be imparted to the worm. When, however, the worm is moved endwise on the post a sufficient distance to cause the disengagement of the vertical shoulders of the teeth, the worm will come to a rest and the sleeve G will continue to rotate. The upper end of the worm is acted on by a spiral spring I, encircling the upper end of the post, which spring bears at its upper end on an adjusting nut or head J and at its lower end on a washer j, which in turn bears on a second washer j', ball-bearings j^2 being interposed between the two washers and between the lower washer and the upper end of the worm, so as to reduce the friction on the parts to a minimum. The spring thus applied tends to hold the clutch-teeth in engagement, the result being that they will be disengaged only when the worm is subjected to pressure sufficient to overcome the force of the spring. These parts thus arranged constitute a clutch comprising two rotary members, one, the worm, being movable endwise, subject to the restraining action of the spring, while the other, the sleeve, is fixed against endwise motion, and motion is imparted to the take-up rolls through this clutch device by means of a driving-shaft K, mounted in bearings on the take-up frame above the take-up rolls, with its ends extended beyond the bars of the frame. Mounted loosely on that end of the shaft nearest the worm is a vertical worm-wheel L, which is engaged and driven by the worm, and motion is imparted from the worm-wheel to the shaft through the medium of a sleeve M, fixed to the end of this shaft and adapted to be locked to the worm-wheel by a spring-actuated dog m, mounted in the sleeve, with its inner end in position to engage notches m^2 in the outer face of the worm-wheel, the purpose of which special construction is to admit of the release of the worm-wheel, so that the take-up rolls may be turned backward when the work is off the needles. At its opposite end the driving-shaft has fixed to it a spur-pinion k, which engages a pinion k' on the end of take-up roll C', thus imparting to this roll its rotary motion, which motion is in turn imparted to its companion take-up roll, but in the opposite direction, by two intermeshing idler-pinions k^2 k^3, the former being engaged by the pinion k' and the latter engaging a pinion k^4 on the end of take-up roll C.

From the construction described it will be seen that the take-up rolls are driven from a yielding member—the worm—which is held to its work by a spring, so as long as the resistance of the take-up rolls is not sufficient to overcome the spring the yielding member will continue to impart motion to the rolls. As soon, however, as the rolls are subjected to greater resistance and enough to overcome the spring this resistance will react through the intermediate gearing on the driving-shaft and through the worm-wheel on the worm, causing the latter to move upward against the resisting influence of the spring.

In the operation of the machine, with the fabric coming from the needles uniformly and the take-up rolls drawing the same between them without undue tension, the driving-worm is held to its work with the vertical shoulder of its tooth in the path of the vertical shoulder of the tooth on the upper end of the sleeve G and receiving motion from the sleeve. If now there is an interruption in the production of the fabric by the needles and it is not produced fast enough for the take-up rolls to take care of, the rolls will be subjected to undue strain, and this reacting on the worm the latter will be forced endwise on its post against the pressure of the spring, which action will automatically disconnect the clutch, and the worm and parts driven thereby will come to a rest. This inaction of the parts will continue so long as the strain on the rollers is great enough to overcome the spring; but just as soon as the tension on the work, and consequently on the rollers, decreases the spring will again come into action and will force the worm down again until the tooth on its lower end is in the path of the tooth on the sleeve G, whereupon the latter will again operate the worm and the action of the take-up rolls will be resumed.

The provision of the fixed post D with the movable parts of the mechanism mounted loosely thereon is of great advantage in that the number of bearing-surfaces is small, and consequently the friction reduced to a minimum. For instance, the friction caused by the constant pressure of the spring is confined to the upper end of the worm, at which single point it is reduced to a minimum by the ball-bearings j^2. Further, the post being fixed relatively to the rotary ring B and the adjusting-nut applied to said post, the tension of the spring may be varied in order to vary the degree of resistance necessary to overcome it without the necessity of stopping the machine or dealing with the moving parts. Again, the clutch-sleeve G is never subjected to endwise pressure from the spring. Hence its friction is due only to its weight on the

base-plate *e* of the casing. As a result of these advantages the mechanism as a whole is very sensitive in its action and will respond instantly and quickly to variations in the production in the work by the needles.

In order that the clutch-teeth may be renewed or repaired without disturbing the other parts of the mechanism, particularly the adjustment of the spring, I propose to so connect them with the sleeve and the worm that they may be removed at will. This may be conveniently accomplished in both cases by forming the tooth on the end of a segmental block O, which is applied to the cylindrical end of the worm in the one case and the sleeve in the other case and to which parts the block is removably held by a screw *o*, the block being further provided with a pin *o'*, adapted to enter a hole in the member to which it is to be applied, so as to maintain its proper relative position and effect a firm connection.

Having described my invention, what I claim is—

1. In a knitting-machine and in combination with rotary take-up rolls, a worm-wheel operatively connected with said rolls, a rotary worm movable endwise and engaging the worm-wheel, a spring acting endwise on the worm, a rotary driving-sleeve fixed against endwise movement and adapted to engage the worm in the direction of rotation only, said parts adapted to be disengaged by the endwise movement of the worm against the pressure of the spring, and a supporting member for said worm and driving-sleeve fixed with relation to said parts.

2. In a knitting-machine the combination with take-up rolls, of a worm-wheel operatively connected therewith, a fixed post adjacent to the worm-wheel, a driving-sleeve mounted loosely on the post to revolve thereon and fixed against endwise movement, means for rotating the sleeve, a worm mounted loosely on the post in position to engage the worm-wheel and adapted to be engaged and driven by the sleeve, and movable endwise out of engagement therewith, and means for holding the worm yieldingly in engagement with the sleeve but free from endwise pressure thereon.

3. In a knitting-machine the combination with take-up rolls, of a worm-wheel operatively connected therewith, a fixed post adjacent to the worm-wheel, a driving-sleeve mounted loosely thereon and fixed against endwise movement, means for driving said sleeve, a driving-shoulder on the sleeve, a worm mounted loosely on the post above the sleeve and engaging the worm-wheel, and provided with a shoulder adapted to be engaged and driven by the shoulder on the sleeve, said worm being movable endwise on its post to disengage the sleeve, a spring encircling the post above and the worm and bearing at its lower end thereon, and an adjusting-head applied to the post and against which the upper end of the spring bears.

4. In a knitting-machine, the combination with a revoluble take-up frame, of rotary take-up rolls mounted in said frame, a worm-wheel operatively connected with the take-up rolls, a vertical fixed post adjacent to the worm-wheel, a vertical clutch-sleeve mounted loosely on said post and fixed against endwise movement and having a spur-pinion connected with its lower end, a fixed rack, gearing driven by the rack and operatively connected with the pinion on the sleeve, a worm engaging the worm-wheel and mounted loosely on the post above the sleeve and movable endwise into and out of engagement therewith, and a spring mounted on the post and bearing on the sleeve.

5. In a knitting-machine and in combination with take-up rolls, a worm operatively connected with the same, a rotary sleeve, means for rotating the same, an endwise-movable worm engaging the worm-wheel, detachable driving-teeth on the sleeve and worm adapted to be engaged and disengaged by the endwise movement of the worm, a spring acting on the worm, and means for adjusting the tension of the spring.

In testimony whereof I hereunto set my hand, this 15th day of September, 1903, in the presence of two attesting witnesses.

JOHN C. BREWIN.

Witnesses:
JOSEPH B. GODSHALL,
GEO. H. RAPSON.