No. 801,048. PATENTED OCT. 3, 1905.

G. W. RUTH.

SHIFTING MECHANISM FOR THE DIAL CAMS OF KNITTING MACHINES.

APPLICATION FILED FEB. 2, 1905.

FIG. I.

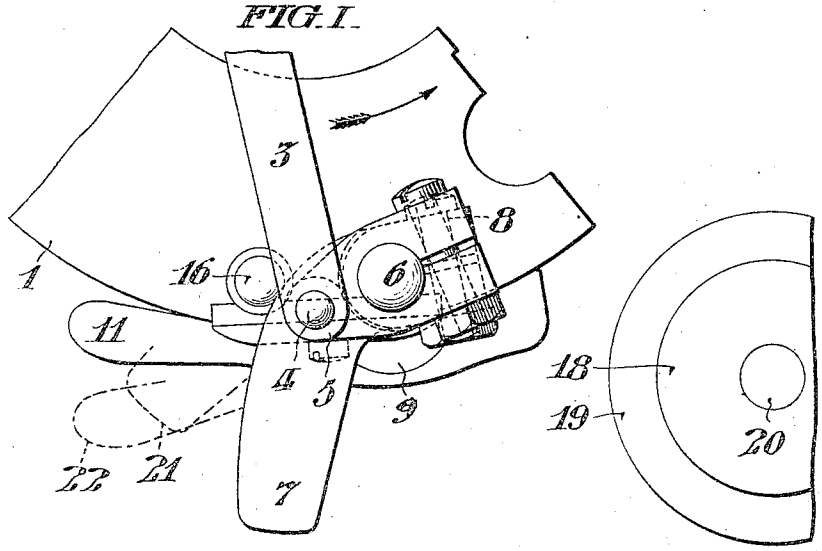


FIG. II.

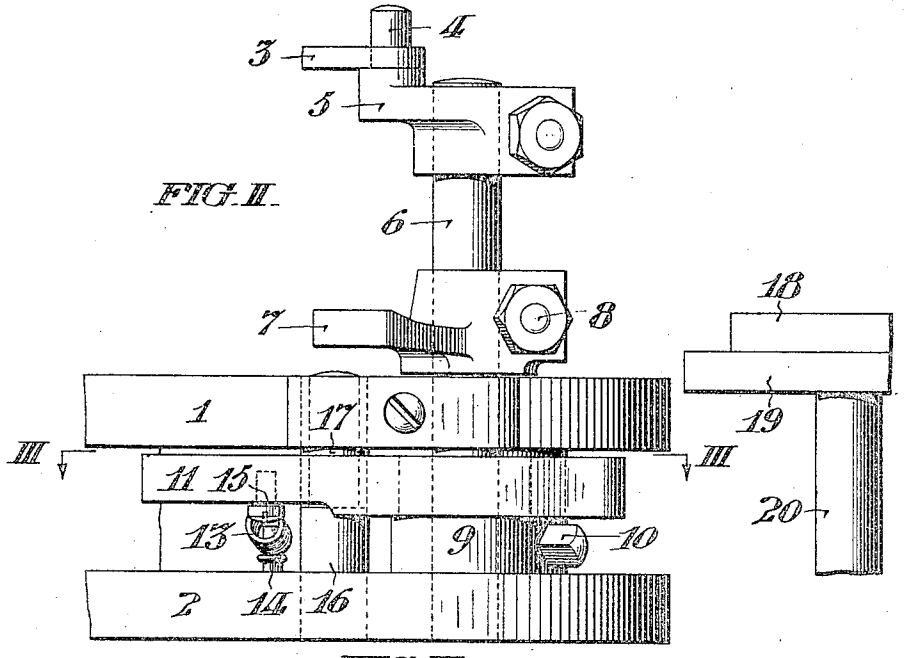
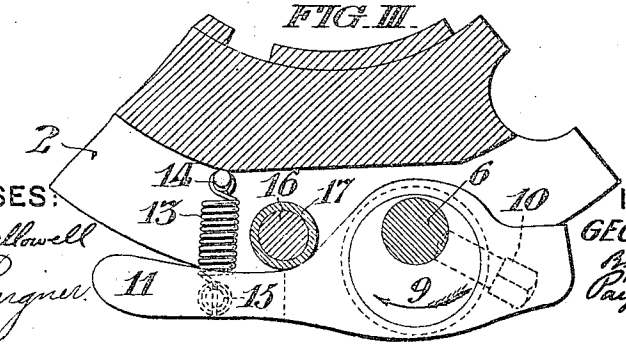


FIG. III.



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UNITED STATES PATENT OFFICE.

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SHIFTING MECHANISM FOR THE DIAL-CAMS OF KNITTING-MACHINES.

No. 801,048. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed February 2, 1905. Serial No. 243,813.

To all whom it may concern:

Be it known that I, GEORGE W. RUTH, of York, in the State of Pennsylvania, have invented certain new and useful Improvements in Shifting Mechanism for the Dial-Cams of Knitting-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

As is well known in this class of machines, the actuating-cams for the dial-needles are so mounted as to be adjustable at different radial distances from the axis of rotation in order to give the dial-needles a greater or less throw, the periods for thus shifting the dial-cams being determined by pattern mechanism.

As the general nature of the dial-cams and their relation to the other portions of the knitting mechanism are thoroughly understood by those skilled in the art, I have in the accompanying drawings only exhibited those portions of the mechanism to which my invention directly relates, it being obvious that the remaining portions can be of any of the ordinary types.

In said drawings, Figure I represents a plan view of a portion of the cam-ring of a knitting-machine, showing the shifting devices to which the invention relates and showing also a portion of the connecting-rod whereby motion is transmitted from said shifting devices to the dial-cam in the ordinary manner. Fig. II is a view in front elevation of the parts shown in Fig. I. Fig. III is a sectional view on a plane passing through a line III III of Fig. II.

The upper cam-ring 1 and its corresponding lower member 2 are represented as of the ordinary sectional construction common in these machines, the portion shown being that adjacent to the end of one section of the cam-ring. The connecting-rod which leads from the shifting mechanism to the dial-cam (not shown) is indicated at 3, and this rod by longitudinal reciprocation actuates said dial-cam in the well-known manner. The outer end of the connecting-rod 3 is pivotally attached to the crank-pin 4 of a crank 5, adjustably secured to the upper end of a vertical rock-shaft 6, suitably mounted in bearings formed in the upper and lower members of the cam-ring. An arm 7 is rigidly but adjustably clamped to said shaft by means of the screw-bolt 8 passing through the split end of the arm which embraces the shaft 6. Said arm 7 is mounted with relation to the plane of rotation of the cam-ring at a level proper for engagement with pattern mechanism hereinafter set forth.

At a point between the two cam-rings there is mounted upon the shaft 6 an eccentric 9, rigidly secured thereto by means of the set-screw 10. A second arm 11, arranged between the upper and lower members of the cam-ring at a level proper for engagement with said pattern mechanism, is operatively mounted upon said eccentric 9, fitting snugly, but so as to move freely, therein. A spring 13, attached at 14 to a portion of the cam-ring and at 15 to the arm 11, normally tends to pull the outer or protruding end of the arm 11 inward.

A vertical post 16, having a bushing 17, is mounted in the cam-ring in such relation to the inner face of the arm 11 as that when the eccentric 9 rotates said post shall act as a fulcrum, whereby the movement of the arm caused by the eccentric in throwing its portion of the greatest radius inward shall cause the outer end of the arm 11 to turn outward, so as to protrude beyond the cam-ring to a greater radial extent. Said outward movement of the arm 11 will of course be against the tension of the spring 13, which tends to hold the arm against the fulcrum 16, and hence as the rotation of the eccentric progresses to resume the position shown in Fig. III said spring will retract the outer end of the arm 11, so as to resume its original position. (Indicated in Fig. III.)

Referring to Fig. III, it may be observed that if the spring 13 were omitted there would be nothing to prevent the arm 11 from turning outwardly upon the eccentric 9. The tension of said spring is merely sufficient to hold the arm 11 against the fulcrum 16, with which it remains in contact throughout its range of movement from the position shown in full lines in Fig. I to the position shown in dotted lines in said figure. The tension of said spring is not sufficient to effect any movement of the eccentric 9.

The arms 7 and 11 being arranged at different vertical heights can readily be actuated by any appropriate pattern mechanism adapted to make contact with them as the cam-cylinder rotates; but in the instance selected for illustration I have shown said pattern mechanism as comprising two disks 18 19 of different diameters, mounted concentrically upon a vertical post 20. Said post and disks are common pattern mechanism in this class of machines, being actuated by means of a pattern-chain which engages operatively with the lower portion of the post, so as to raise

or lower the disks into the range of rotative movement of one or the other of the two arms or to throw the disks into an intermediate position where they will not come into contact with either arm.

Assuming that the parts are in the position shown in the figures, it will be noted that the arm 7 is protruded to its greatest radial distance from the axis of rotation of the cam-cylinder and that the arm 11 is retracted into its innermost position with reference to the periphery of the cam-cylinder. The position of the crank-shaft and the connecting-rod 3 corresponds at this time with one extremity of the path of the movement through which the dial-cam is to be adjusted. Assuming now that the pattern mechanism has raised the disk 18 to the proper level for contact with the arm 7, as the cam-cylinder rotates in the direction of the arrow shown in Fig. I said arm 7 will strike against the periphery of the disk 18 and in passing will be turned into the position indicated by the dotted lines at 21. This motion of the arm will turn the rock-shaft 6 through an arc of corresponding extent and will, by means of the crank 5, shift the connecting-rod 3 to the other extreme position of the path through which the dial-cam is to be shifted. The rotation of the rock-shaft 6 through said arc will of course turn the eccentric 9 in the direction of the arrow through a corresponding arc, bringing the portion of greater radius of the eccentric into such a position as to shift the outer end of the arm 11 outward or into the position indicated by the dotted lines at 22 in Fig. I. The rock-shaft 6 (and consequently the connecting-rod 3) remain in the position thus attained during the desired interval. Let it now be assumed that the pattern mechanism has operated to withdraw the disk 18 from the level of the arm 7 and bring the larger disk 19 to a level adapted to cause operative engagement between its periphery and the now protruded lower arm in the position shown by the dotted lines at 22. As the cam-ring rotates and carries the arm 11 past said disk the arm will be turned inward by contact with the periphery of the disk, and by reason of the fulcrum formed by the post 16 the leverage exerted by the arm upon the eccentric 9 will rotate the eccentric in a direction opposite to that of its former movement and by such rotation will shift the rock-shaft 6 back to its original position, thus also throwing the arm 7 out again into a position of readiness to reëngage at the proper time with the disk 18 when the latter has been shifted to the proper level. Thus the movement of each arm not only effects the shifting of the connecting-rod to the proper extent for actuating the desired movement of the dial-cam, but sets the other arm so that it shall be in the proper position to be actuated for effecting the next movement.

I am aware that it is not new to utilize a vertical rock-shaft and connecting-rod for shifting the dial-cams of this class of knitting-machines, and I am also aware that it is not new to actuate such rock-shaft by means of gears, one of which is mounted thereon while another is mounted upon a counter-shaft, said shafts being respectively provided with projecting arms arranged at different levels and engaging pattern mechanism. I therefore do not broadly claim the use of such rock-shaft or of such arms. In my invention only a single shaft is employed, and both of the arms are operatively mounted thereon. Thus a simple and compact arrangement is afforded which dispenses with the use of gears and their attendant disadvantages, the required movements being effected with great accuracy and without the danger of breakage of teeth or accidental entanglement of substances thereby.

Having thus described my invention, I claim—

The combination with the cam-ring, the rock-shaft mounted therein, the crank secured to said rock-shaft and the connecting-rod attached to said crank; of a projecting arm rigidly secured to the rock-shaft at a predetermined level with relation to the cam-ring; an eccentric mounted upon said rock-shaft; a second projecting arm operatively engaging said eccentric and arranged at a different level from the first-mentioned arm; a fulcrum arranged in the described relation to said second arm; a spring normally tending to hold said arm against said fulcrum; and pattern mechanism, substantially as set forth, adapted to engage said arms alternately at predetermined intervals.

In testimony whereof I have hereunto signed my name, at the city of York, in the State of Pennsylvania, this 30th day of January, 1905.

GEORGE W. RUTH.

Witnesses:

HARRY F. ALLISON,

G. W. BRILLINGER.