(No Model.)

H. C. RIGHTMIRE.

REVERSING MECHANISM FOR KNITTING MACHINES.

No. 385,322. Patented June 26, 1888.

FIG. 1.

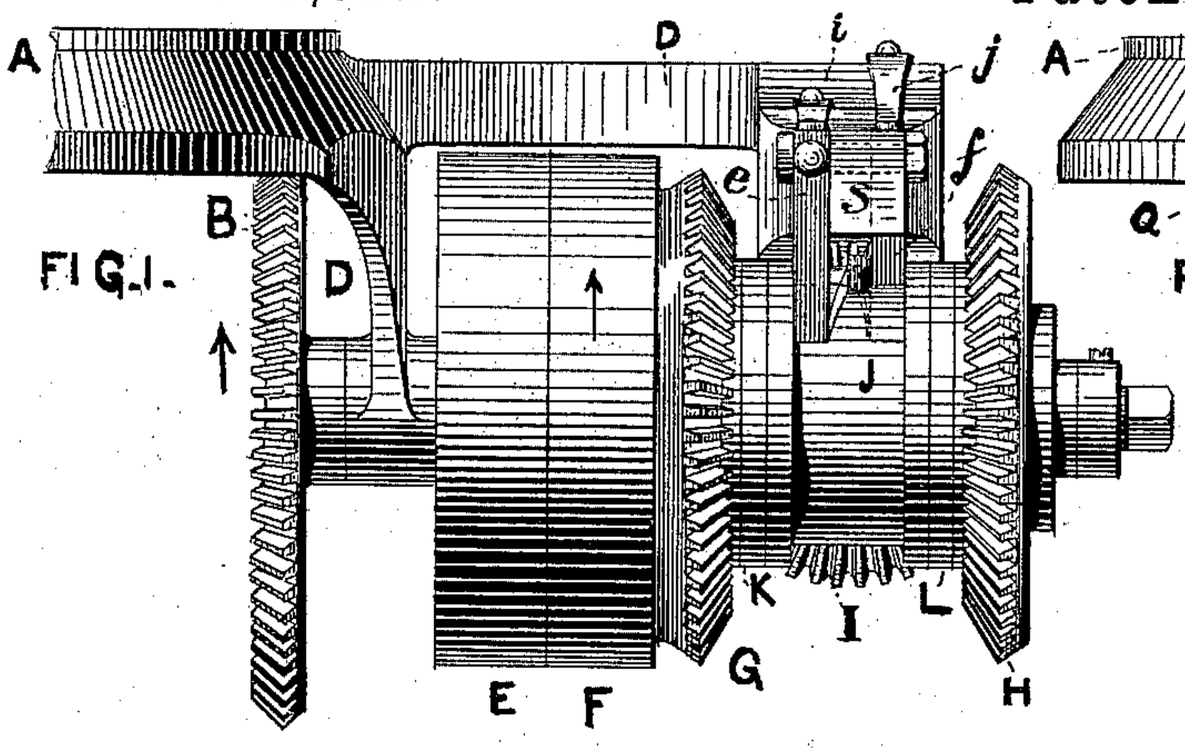


FIG. 2.

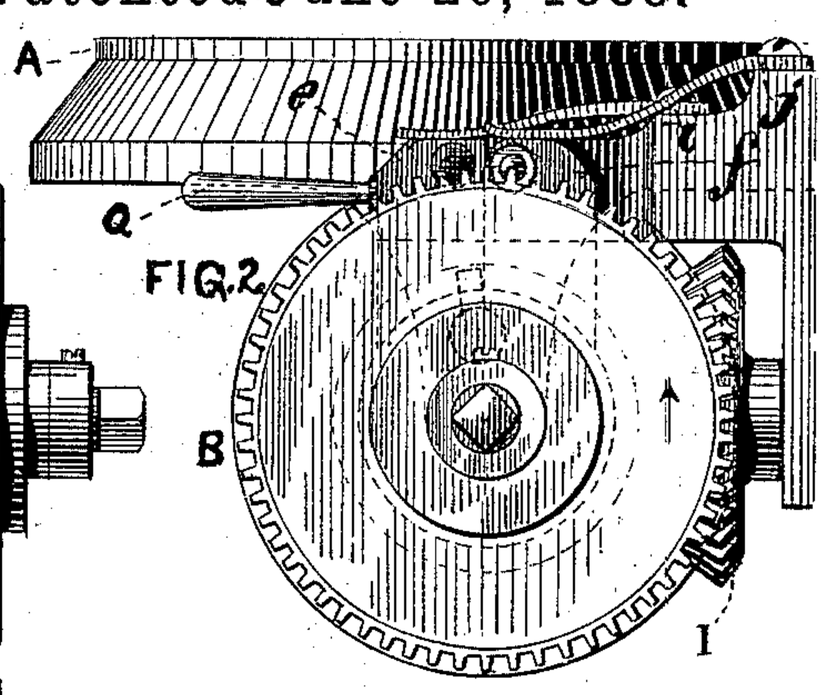


FIG. 3.

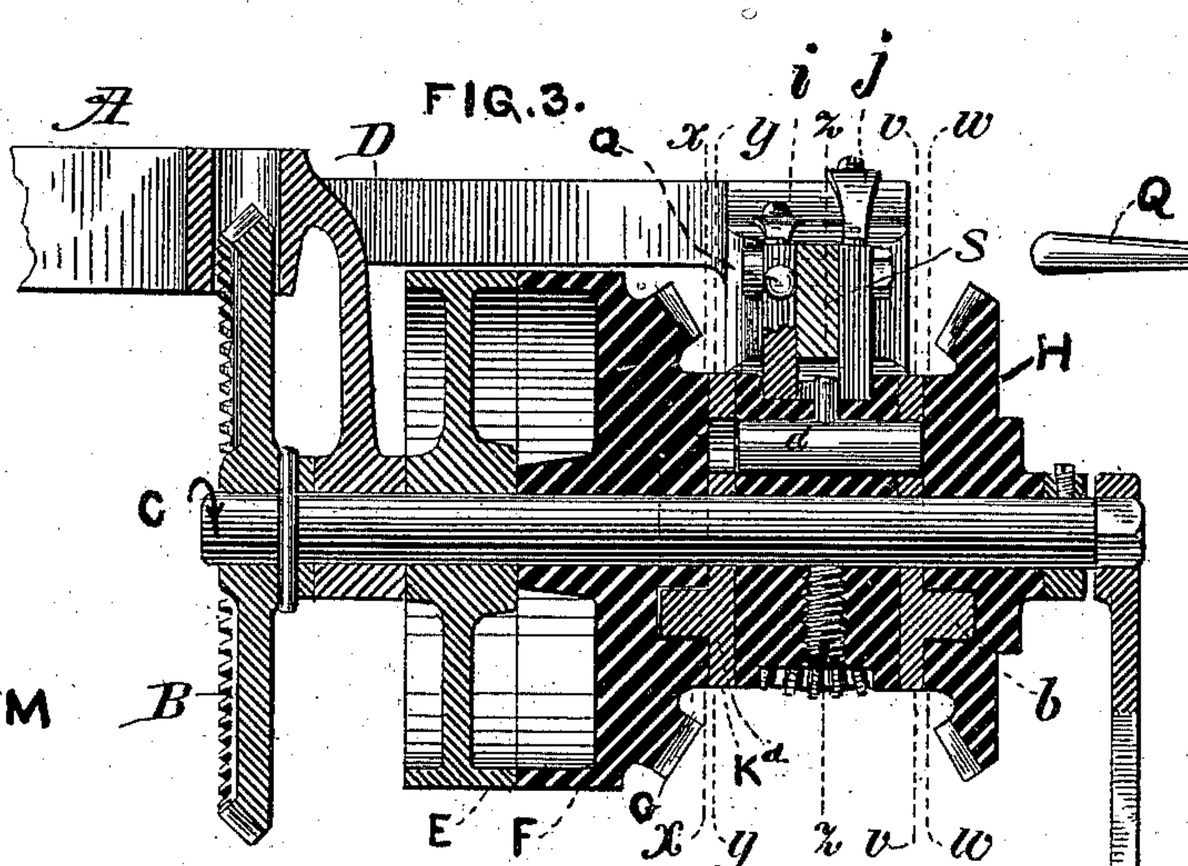


FIG. 4.

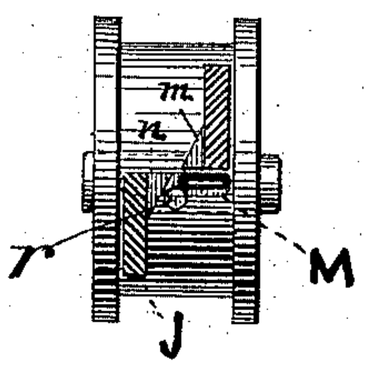


FIG. 5.

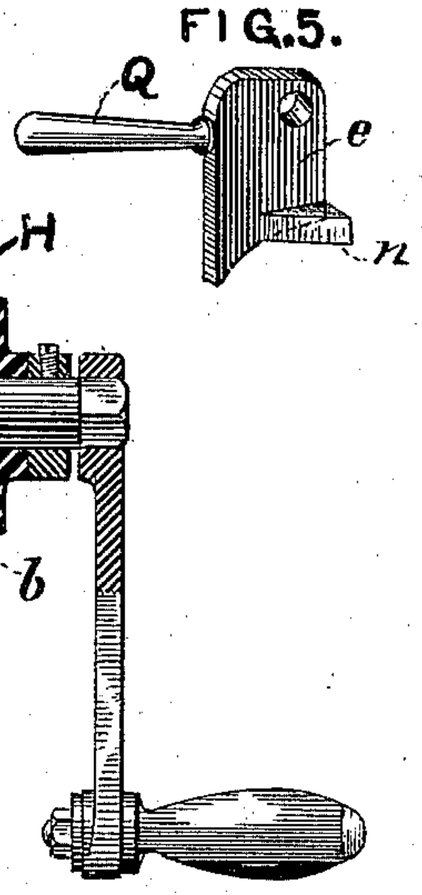


FIG. 6.

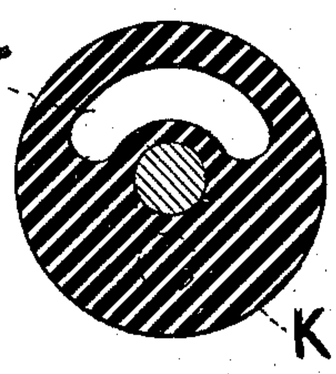


FIG. 7.

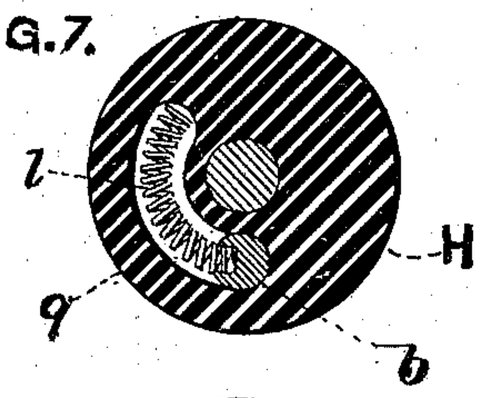


FIG. 8.

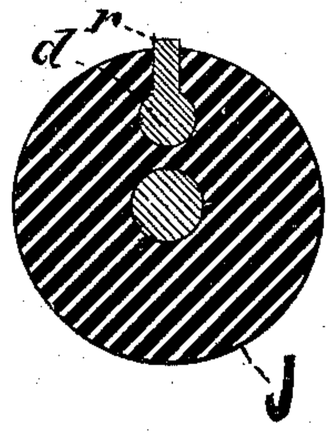


FIG. 9.

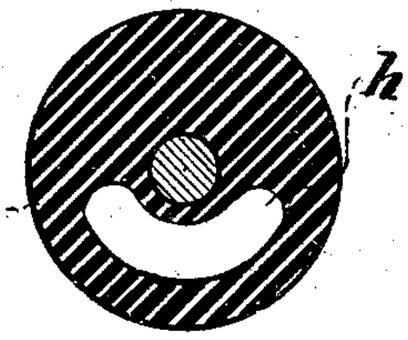
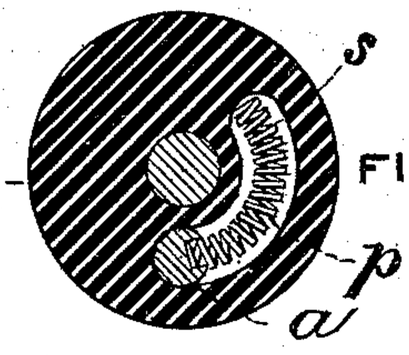


FIG. 10.



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UNITED STATES PATENT OFFICE.

HARRY C. RIGHTMIRE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS A. PEARCE, OF SAME PLACE.

REVERSING MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 385,322, dated June 26, 1888.

Application filed May 24, 1887. Serial No. 239,251. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. RIGHTMIRE, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Reversing Mechanism for Knitting-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

My invention is especially adapted to effect the reciprocating rotary movement of the needle-cylinder required for narrowing and widening in knitting stockings, and I have therefore in the present case illustrated the improvements as thus applied. It must be understood, however, that I do not limit my claim to this particular employment of the mechanism, as it may be useful in other connections.

Referring to the drawings, Figure 1 represents a front elevation of the reversing mechanism, showing in connection therewith a portion of the base of an ordinary knitting-machine and its bevel-gear for driving the cam-cylinder. Fig. 2 is an end view of the same; Fig. 3, a vertical section of the same on a plane passing through the center of the driving-shaft. Figs. 4 and 5 are detail views of certain detached parts. Figs. 6, 7, 8, 9, and 10 are partial sectional views, the respective section-lines being indicated in Fig. 3, as follows: Fig. 6 on *y y*, Fig. 7 on *w w*, Fig. 8 on *z z*, Fig. 9 on *v v*, and Fig. 10 on *x x*.

As before stated, my invention is adapted to effect the movement of knitting-machine cylinders in narrowing or widening, such movements consisting in a complete rotation of the needle-cylinder in one direction, then a momentary pause, then a complete rotation in a reverse direction, and so on. While reversing mechanisms have been used to effect these movements automatically, they have not, so far as I am aware, been successful in practice, owing chiefly to the shock or jar produced by the machine in reversing and to the complication of the parts and the resulting increase of friction.

My invention is intended to overcome these difficulties, and to that end I construct the device as follows:

Referring to the drawings, A represents the circular base of an ordinary knitting-machine, whose other parts are not shown, as their construction is well understood.

B represents the usual bevel-gear for driving the cam-cylinder. (Not shown.) This bevel-gear is secured to the shaft C, mounted in bearings which are suspended from the bracket D, preferably cast in one piece with the base A. Upon said shaft are two pulleys, E F, neither of which is directly attached to said shaft. The pulley E serves as the ordinary loose pulley, while the pulley F, though running free upon the shaft, is made to operate as the driving-pulley through the interposition of parts now about to be described.

In the sectional view of Fig. 3 it will be seen that the pulley F is dish-shaped, and around what may be termed the "bottom" of the dish a series of teeth are cut, so as to form a bevel-gear, G. A second bevel-gear, H, facing the gear G, is mounted loosely near the outer end of the shaft C, and each of these gears engages with a somewhat smaller bevel-gear, I, whose axis of rotation is at right angles to the shaft C. Thus, when the pulley F is rotated, the bevel-gear G will, through the gear I, turn the gear H in an opposite direction to its own movement. Obviously, therefore, if means be provided whereby alternately either one of the gears G H can be coupled to the shaft C and the other uncoupled, said shaft can be driven in either direction by a constant rotation of the driving-pulley.

The alternate coupling devices are thus constructed: Midway between the two gears G and H is a cylinder, J, rigidly secured to the shaft C, and on each side of said cylinder J are disks K L, mounted loosely upon the shaft C and fitting snugly between the cylinder and the two gears. These disks have arc-shaped slots *g* and *h*, respectively, (see Figs. 6 and 9,) which extend somewhat more than a quadrant, and they are also provided with projecting pins *a b*, respectively, which pins enter into arc-shaped slots *q s*, (see Figs. 7 and 10,) formed in the proximate faces of the gear-wheels G and H. The pins *a b* are provided, respectively, with coiled springs *l p*, which fit snugly within the slots *q s*, as shown in the sectional views

of Figs. 7 and 10, said springs bearing with considerable pressure against the end surface of the slots.

The cylinder J has a longitudinal hole formed in it to admit a bolt, *d*, slightly longer than the cylinder, so that when one end is flush with the end surface of the cylinder the other protrudes into the slot *g* or *h* of the disk upon the other side. This movement of the bolt *d* from side to side is effected by means of a pin, *r*, working in a longitudinal slot, M, (see Fig. 4,) in the periphery of the cylinder J.

The connection, as thus far described, is as follows: The disk K is coupled (with a certain amount of yielding, due to the elasticity of the spring *l*) to the gear G, while the disk L is coupled (with a similar yield) to the gear H. Either one of these disks may be coupled at will to the cylinder J by means of the bolt *d*, there being, however, in each case a range of freedom in said coupling equal to the length of the slot *g* or *h*. The cylinder J being rigidly secured to the shaft C, it will be seen that said shaft will be caused to rotate either in the direction of the gear G or of the gear H, according as the bolt *d* is at one extreme position or the other. During the shifting of the bolt *d* from one side to the other there is, of course, a time when it has entered the one slot, but has not cleared the other; hence it is that I provide the range of freedom above described, which must compensate for the extreme length of the transition movement. The bolt *d* could of course be shifted from side to side by hand; but to render the movement automatic I provide the following devices:

Upon the arm S, which projects from the frame above the cylinder, I mount two downwardly-depending pieces, *e f*, respectively. These pieces are in different planes, and are pivoted upon each side of the arm S in such manner as to be free to move in one direction, but not in the other, the direction of freedom of each piece, however, being opposite to that of the other. The lower ends of the pieces *e f* are made concave, so as to ride upon the cylinder. (See detail view of Fig. 5.) Springs *i j* bear upon the tops of the pieces *e f*, so as to maintain their lower ends in contact with the cylinder J, and the piece *e* is provided with a handle, Q, whereby it may be turned back so as to be entirely clear of the cylinder. Wedge-shaped cams *n m* (see Figs. 4 and 5) project laterally from the lower ends of these pieces *e f*, the points of the wedges being in opposite directions, as shown, and their rear ends being opposite to one another. The height or extent of incline of each cam is sufficient to throw the pin *r* from one end of the slot M to the other, and thus completely shift the bolt *d*, as the latter, in rotating with the cylinder J, passes up the incline, and, moreover, as each piece *e* or *f* is free to move in one direction, it is obvious that should the pin *r* strike against the rear end of either cam *n* or *m* the latter can yield sufficiently to prevent any shock, and will spring back into place upon the departure of the pin.

The operation of the mechanism is as follows: When the knitting-machine is to run constantly in one direction, the piece *e* is raised by means of the handle Q and turned back, so as to throw the cam *n* entirely clear of the path of rotation of the pin *r*, then at that end of the slot. Such a position of the bolt *d* would couple the disk K and gear G to the cylinder J, and thus cause the constant rotation of the shaft C in the direction of the arrow in Fig. 1. When it is desired that the reciprocating movement of the cylinder should commence, the piece *e* is turned down by means of the handle Q, so as to ride upon the cylinder J, and thus bring the cam *n* into position. When the pin *r*, in rotating, strikes against the incline of the cam *n*, it is shifted along the slot M until it reaches the end thereof. This movement carries the bolt *d* across and into the slot *h* of the disk L; but during almost the entire period of transition it still remains coupled to the disk K, so that the rotation of the shaft C continues. By the time, however, that the transition movement is complete the range of freedom of the bolt *d* in the slot *h* of the disk L has been exhausted, and as the gear H is rotating in a direction opposite to that of the cylinder J and bolt *d*, the latter, on reaching the end of the slot *h*, is struck and turned in a reverse direction to its former movement. The coupling, however, between the disk L and the gear H, being elastic, as before explained, (by reason of the interposition of spring *l*,) no jar takes place upon this reversal; but a momentary pause occurs during the compression of said spring *l*, and as soon as the limit of compression has been reached the reverse movement attains a positive character. This position is shown in Fig. 3. When the cylinder J has nearly completed one revolution in this reverse direction, the pin *r* strikes against the incline of the cam *m* and is shifted in a manner similar to that already described toward the other end of the slot, when a repetition of the movements just described occurs. The bolt *d* enters the slot *g* of the disk K, and when the range of the freedom of that slot has been exhausted commences to bear against the end of the slot. So soon as the limit of compression of the spring *l* upon that side has been reached, the positive coupling of the gear G, disk K, and cylinder J is attained, and the shaft C is then rotated in the opposite direction.

Each time that the pin *r* is shifted it strikes momentarily against the butt or rear end of the cam upon the side toward which it is traveling; but as each wedge is capable of movement in that direction, though not in the other, there is a sufficient yielding to prevent shock during the moment that precedes the reversal of the cylinder J, after which the displaced cam returns to its former position.

The foregoing specification is intended to

describe the best form now known to me for embodying the several elements which go to make up the new device; but I wish it to be understood that in using the terms "gear," "disk," and "cylinder" for indicating said elements I do not limit myself to the exact forms which these words literally imply; nor, as before suggested, do I limit my claim to the use of my reversing mechanism in connection with any particular machine or class of machines.

I claim—

1. The combination of a shaft, a pair of wheels running freely thereon, gearing, substantially as set forth, whereby said wheels are revolved in opposite directions, a pair of disks which engage with said wheels, respectively, by an elastic coupling device, and each of which is provided with a slot, a cylinder rigidly attached to said shaft between said disks, and a bolt sliding longitudinally in said cylinder and of sufficient length when flush at one end with the end of the cylinder to enter the opposite disk-slot and engage therewith.

2. The combination, with the hereinbefore-described reversing-mechanism, consisting of a pair of oppositely-running wheels loosely mounted upon a shaft, slotted disks coupled to said wheels, as described, an intermediate cylinder rigidly attached to the shaft, a bolt adapted to couple either of said disks to said cylinder, and a pin projecting from said slot, of a pair of oppositely-inclined cams arranged in the path of rotation of said pin, substantially as and for the purposes set forth.

3. The combination, with the hereinbefore-described reversing mechanism, consisting of a pair of oppositely-running wheels loosely mounted upon a shaft, slotted disks coupled to said wheels, as described, an intermediate cylinder rigidly attached to the shaft, a bolt adapted to couple either of said disks to said cylinder, and a pin projecting from said slot, of the pivoted cam-carriers *e* and *f*, whereby either or both of the reversing-cams may be thrown out of play, substantially as set forth.

4. The combination of the shaft C, bevel-gear I, bevel-gears G and H, having in their faces slots *q s*, respectively, disks K L, having pins which enter said slots, and springs *l p*, bearing therein, and having also arc-shaped slots *g h*, the cylinder J, rigidly secured to the shaft and having the longitudinally-movable bolt *d*, adapted to enter either of said slots *g h*, the pin *r*, attached to said bolt and projecting through a slot in the periphery of the cylinder, and the cams *n m*, arranged in the path of rotation of said pin, the whole operating substantially as and for the purposes set forth.

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Witnesses:
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J. H. BELL.