Sept. 22, 1931. W. BOCK 1,824,754

RECIPROCATING MECHANISM

Filed March 5, 1929

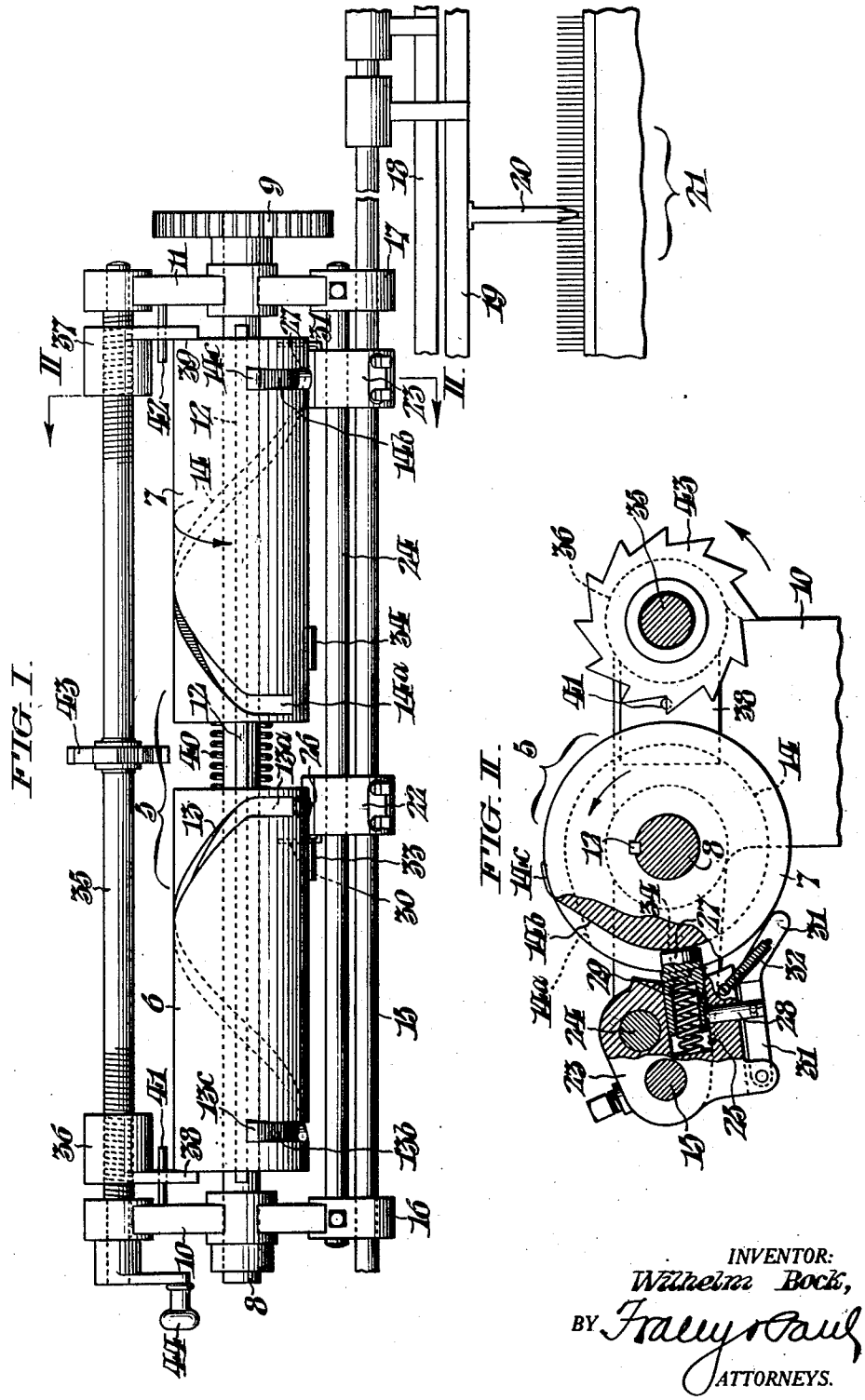


FIG. I.

FIG. II.

INVENTOR:
Wilhelm Bock,
BY Fraser & Paul
ATTORNEYS.

Patented Sept. 22, 1931 1,824,754

UNITED STATES PATENT OFFICE

WILHELM BOCK, OF GWYNEDD, PENNSYLVANIA, ASSIGNOR TO DEXDALE HOSIERY MILLS, OF LANSDALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

RECIPROCATING MECHANISM

Application filed March 5, 1929. Serial No. 344,550.

This invention relates to mechanism for inducing reciprocatory movement, and has more particular reference to reciprocating mechanism useful in connection with flat knitting machines of the kind employed in the manufacture of full fashioned hosiery. Such machines, as ordinarily constructed, embody a series of horizontally aligned needle banks, each with an associated group of yarn sinkers, a corresponding number of slur cocks to operate the sinker groups, carriers to simultaneously feed as many yarns to the several needle banks, and a means for imparting to and fro motion to the slur cocks and the yarn carriers consisting usually of a rocker arm and a cam to oscillate it. Now as a consequence of the multiplicity of parts requiring actuation and the friction to be overcome, the rocker arms of the reciprocating drive had, of necessity, to be made bulky and heavy, thereby precluding operation of the machines at high speeds and correspondingly limiting production of the hosiery.

My invention is directed toward over coming the above recited drawbacks of previous practice, that is to say, I aim to enable transmission of reciprocatory movement at higher speeds without attendant jarring or vibration likely to prove injurious to the parts being actuated.

In addition, I aim to provide for transmission of variable reciprocatory motion to the yarn carriers incidental to web fashioning operations without necessity for dependence upon stop means as in flat knitting machines constructed heretofore.

How the foregoing as well as other important advantages can be readily realized in practice will appear from the detailed description following of the typical embodiment of this invention shown in the drawings, whereof Fig. I is a plan view of my improved reciprocating mechanism illustrating its use in connection with flat knitting machines; and

Fig. II is a cross sectional view of the organization taken as indicated by the arrows II, II in Fig. I.

As herein delineated, the reciprocating mechanism of my invention comprises a cam rotor 5 which consists of a pair of aligned cylindric sections or components 6, 7, these being mounted on a continuously rotating shaft 8 having journal support in bearing brackets 10, 11 formed either as a part of, or secured to the frame of the knitting machine. The shaft 8 may be driven by any suitable means, for example, by a spur gear 9 capable of being coordinated, for actuation in proper time relation, with the drive mechanism (not shown) of the machine. Although obliged to rotate in unison with the shaft 8 by virtue of a spline connection at 12, the rotor components 6, 7 are axially shiftable along the shaft toward or away from each other as and for a purpose later on disclosed. As shown in Fig. I, the rotor components 6, 7 have spiral surface grooves 13, 14 extending over their lengths. Except for being reversely pitched, the grooves 13, 14 are exact counterparts of one another in that they are both of a single turn in extent and terminate in non-helical, longitudinally aligned, entrant and exit slopes 13*a*, 13*b*, and 14*a*, 14*b* that vanish into the cylindric surfaces of the aforesaid rotor components.

The element, in this case the actuator rod of the knitting machine, through which the reciprocatory movement is to be transmitted, is designated by the numeral 15 and shown as slidably engaged in bearings 16, 17 afforded by the brackets 10, 11. As is customary in flat stocking knitting machines, this rod 15 extends longitudinally of the machine and serves as a common actuator for the slur cock bar, indicated at 18 in Fig. I, and the guide bars for the carriers by which the yarns are simultaneously laid across the several banks of the needles, one of such guide bars being shown in part at 19, one of the yarn carriers at 20, and one of the needle banks at 21. Secured in definitely spaced relation on the actuator rod 15, in the interval between the brackets 10, 11, for respective cooperation with the components 6, 7 of the rotor 5, are follower blocks 22, 23 which are supported against turning as a consequence of being slidingly engaged with a guide rod 24 having anchorage at the ends in said brackets. Spring urged outwardly within

sockets 25 (Fig. II) of the follower blocks 22, 23 toward the rotor 5 for capacity to automatically enter the spiral grooves 13, 14 of the rotor components 6, 7, are projections in the form of lug pins 26, 27. These lug pins 26, 27 are designed to function in alternation, and to this end, I provide at the exit terminals 13*b*, 14*b* of the rotor grooves 13, 14, rises 13*c*, 14*c* by which said pins are pushed, concurrently with displacement from said grooves, into the follower blocks 22, 23 in opposition to their springs, and held temporarily retracted, away from the rotor surface, by detents 28 (Fig. II) that engage notches 29 in their sides. The detents 28 are lodged in lateral apertures of the follower blocks 22, 23, and have pivotal connection with trip latches 30, 31, the latter being fulcrumed on said blocks and subject, in each instance, to a helical spring 32. The tails of the trip latches 30, 31 (Fig. II) extend into close proximity to the surfaces of the rotor components 6, 7 so as to be trippable by longitudinal ridges 33, 34 (Fig. I) on said components adjacent the entrant terminals 13*a*, 14*a* of the grooves 13, 14.

In order to alter the throw induced in the actuator bar 15 I provide for varying the spacing of the rotor components 6, 7. The means by which this is accomplished includes a shaft 35 with its ends journalled in the brackets 10, 11, and having inward of its ends, reverse screw threads to engage nut collars 36, 37. These nut collars 36, 37 are respectively formed with fingers 38, 39 to contact with the ends of the rotor components 6, 7, the contact being yieldingly maintained by a coiled compression spring 40 surrounding the rotor shaft 8 between said components. The collars 36, 37 are held against rotation by pins 41, 42 that extend inward from the brackets 10, 11 and engage apertures in the fingers 38, 39 of said collars. To step about the shaft 35, I mount thereon a ratchet wheel 43 which may be picked by automatic pawling means such as is ordinarily used in the narrowing mechanism of flat knitting machines. I also provide a handle 44 by which the shaft 35 may be turned manually when required.

The operation of my invention is as follows: With the parts positioned as shown in Fig. I, the lug pin 27 is about to leave the groove 14 of the rotor component 7. As rotation continues in the indicated direction, it will be seen that the pin 27 is gradually depressed into the follower block 23 as it rides up the slope of the exit terminal 14*b* of said groove, and is finally engaged by the detent 28 when said pin rides over the rise 14*c*. Concurrently with these events, the ridge 33 on the rotor component 6 engages the tail of the trip latch 30, thereby to release the lug pin 26 just before it is reached by the entrant end 13*a* of the cam groove 13. Then, upon entry of the lug pin 26 into the groove 13 as rotor movement continues, the actuator rod 15 will obviously be moved to the left; the pin 27, retracted as previously explained, moving idly along the rotor component 7 out of contact however with the surface of the latter.

After a complete revolution of the rotor component 6, in riding out of the exit terminal 13*b* of the groove 13 the pin 26 will be depressed into its follower block 22 and locked in retracted position, in a manner identical to that described of the pin 27, while at the same time, the latter pin 27 will be released to re-enter the groove 14 of the rotor component 7 through tripping of its latch 31 by the ridge 34, for impartation of reverse movement to the actuator rod 15, i. e., toward the right in Fig. I. In this way it will be seen that the rod 15 is continuously shifted back and forth through a distance equal to the length of the cam grooves 13, 14, and the movement communicated in like degree to the slur cock bar 18 and the yarn carrier rod 19 with attendant operation of the sinkers by which the yarn is pressed between the needles of the several banks and the carriers by which yarn is laid across the full width of said needle banks.

Incidental to fashioning operations, the ratchet wheel 43 is intermittently picked to progressively rotate the shaft 35 in the direction of the arrow in Fig. II. In following the dictates of the reverse screw threads on the shaft 35, the nut collars 36, 37 obviously cause the rotor components 6, 7 to progressively approach each other with attendant graduated decrease in the amplitude of the throw communicated to the actuator rod 15 and the yarn carriers, as required in fashioning of the webs produced on the several needle banks, the lug pins 26, 27 on the followers 22, 23 being obliged, under these conditions, to drop into the rotor grooves 13, 14 at points inwards of their entrant terminals 13*a*, 14*a*, their exit being however always by way of the groove terminals 13*b*, 14*b*.

The detailed disclosure thus verifies the statements made as regards the advantages obtainable through my invention. My improved mechanism is moreover compact, inexpensive to construct and apply to knitting machines, while free from liability to easy derangement in operation over long periods.

While I have particularly described my invention with reference to flat knitting machines, it is of course to be understood that its use is not so limited since it may be adapted with equal advantages in other connections where high speed reciprocatory movement is desired or required.

Having thus described my invention, I claim:

1. In mechanism for effecting reciprocatory movement, a rotor embodying aligned

relatively shiftable rotary components respectively having reversely pitched single turn spiral cam grooves; and projections on the element to be reciprocated adapted to alternately engage said cam grooves.

2. In mechanism for effecting reciprocatory movement, a rotor embodying two aligned opposingly-shiftable rotary components respectively having reversely pitched single turn spiral cam grooves influential in moving the element to be reciprocated in opposite directions; projections on said element adapted to respectively engage said rotor grooves; and means to control alternate functioning of the projections in determining operation as aforesaid.

3. In mechanism for effecting reciprocatory movement, a rotor embodying aligned longitudinally-adjustable rotary components respectively with reversely pitched single turn spiral cam grooves influential in moving the element to be reciprocated in opposite directions; projections on said element adapted to respectively engage the cam grooves of the rotor; and means controlled by rotor movement to withdraw the projections after having travelled along the respective reversely-pitched cam grooves in alternative sequence.

4. In mechanism for effecting reciprocatory movement, a rotor embodying two aligned opposingly-movable rotary components respectively with reversely pitched single turn spiral cam grooves influential in moving the element to be reciprocated in opposite directions, said grooves having non-helical exit terminals with sloping rises vanishing into the cylindric rotor surface; and spring urged projections on said element automatically withdrawable through the action of said terminal rises after having travelled along the respective reversely-pitched cam grooves in alternative sequence.

5. In mechanism for effecting reciprocatory movement a direct-driven rotor embodying two aligned opposingly-shiftable rotary components respectively with reversely pitched single turn spiral cam grooves influential in moving the element to be reciprocated in opposite directions; projections on said element adapted to respectively engage the cam grooves of the rotor; means controlled by rotor movement to withdraw the projections and to hold them temporarily in inactive position after having travelled along the respective reversely pitched cam grooves in alternative sequence; and means likewise controlled by rotor movement to subsequently restore said projections alternately into activity.

6. In mechanism for effecting reciprocatory movement described, a rotor embodying two coaxially mounted components respectively with reversely pitched single turn spiral cam grooves influential in moving the element to be reciprocated in opposite directions; spring urged projections on said element adapted to respectively engage the cam grooves of the rotor; means on the rotor to withdraw the projections after having travelled along the respective reversely pitched cam grooves in alternative sequence; latches to temporarily lock the projections retracted out of contact with the rotor; and means on the rotor to subsequently trip the latches and release the projections for reentry into the cam grooves likewise in alternative sequence in determining operation as aforesaid.

7. In mechanism for effecting reciprocatory movement, a cam rotor embodying two coaxially mounted components functional respectively in moving the element to be reciprocated in opposite directions; and means for varying the spacing of said rotor components to correspondingly vary the amplitude of the reciprocation imparted.

8. In mechanism for effecting reciprocatory movement, a cam rotor embodying two coaxially mounted components functional in respectively moving the element to be reciprocated in opposite directions; and screw means for varying the spacing of said rotor components in opposition to an interposed compression spring that correspondingly varies the amplitude of reciprocation to a contrary degree from the variations caused by said screw means.

9. In mechanism for reciprocating the actuator rod by which to and fro motion is communicated to the slur cocks and yarn carriers of flat knitting machines, a direct-driven rotor embodying two aligned opposingly-shiftable components respectively having reversely pitched single turn spiral cam grooves; and projections on the actuator rod adapted to alternately engage said rotor grooves.

10. In mechanism for reciprocating the yarn carriers of flat knitting machines, a rotor embodying two co-axially mounted components functional respectively in moving the actuator rod for the yarn carrier in opposite directions; and means for varying the spacing of said rotor components to correspondingly vary the amplitude of reciprocation imparted to the yarn carriers incidental to fashioning operations.

11. In mechanism for reciprocating the yarn carriers of flat knitting machines, a rotor embodying two co-axially mounted components functional respectively in moving the actuator rod for the yarn carrier in opposite directions; and ratchet operated screw means for progressively varying the spacing of said rotor components to correspondingly vary the amplitude imparted to the yarn carriers incidental to fashioning operations.

12. In mechanism for inducing reciprocatory movement by rotary components, means

to adjust the relation of said components to vary the amplitude of reciprocative movement.

13. In mechanism for inducing reciprocatory movement by rotary components, means for adjusting said components to vary the space therebetween to variably control the amplitude of reciprocative movement.

14. Mechanism for inducing reciprocatory movement comprising direct-driven aligned axially-shiftable rotary components, and means for spacially shifting said components axially to vary the amplitude of the reciprocative movements.

In testimony whereof, I have hereunto signed my name at Lansdale, Pennsylvania, this 12th day of Feb. 1929.

WILHELM BOCK.