Nov. 3, 1925.

1,559,648

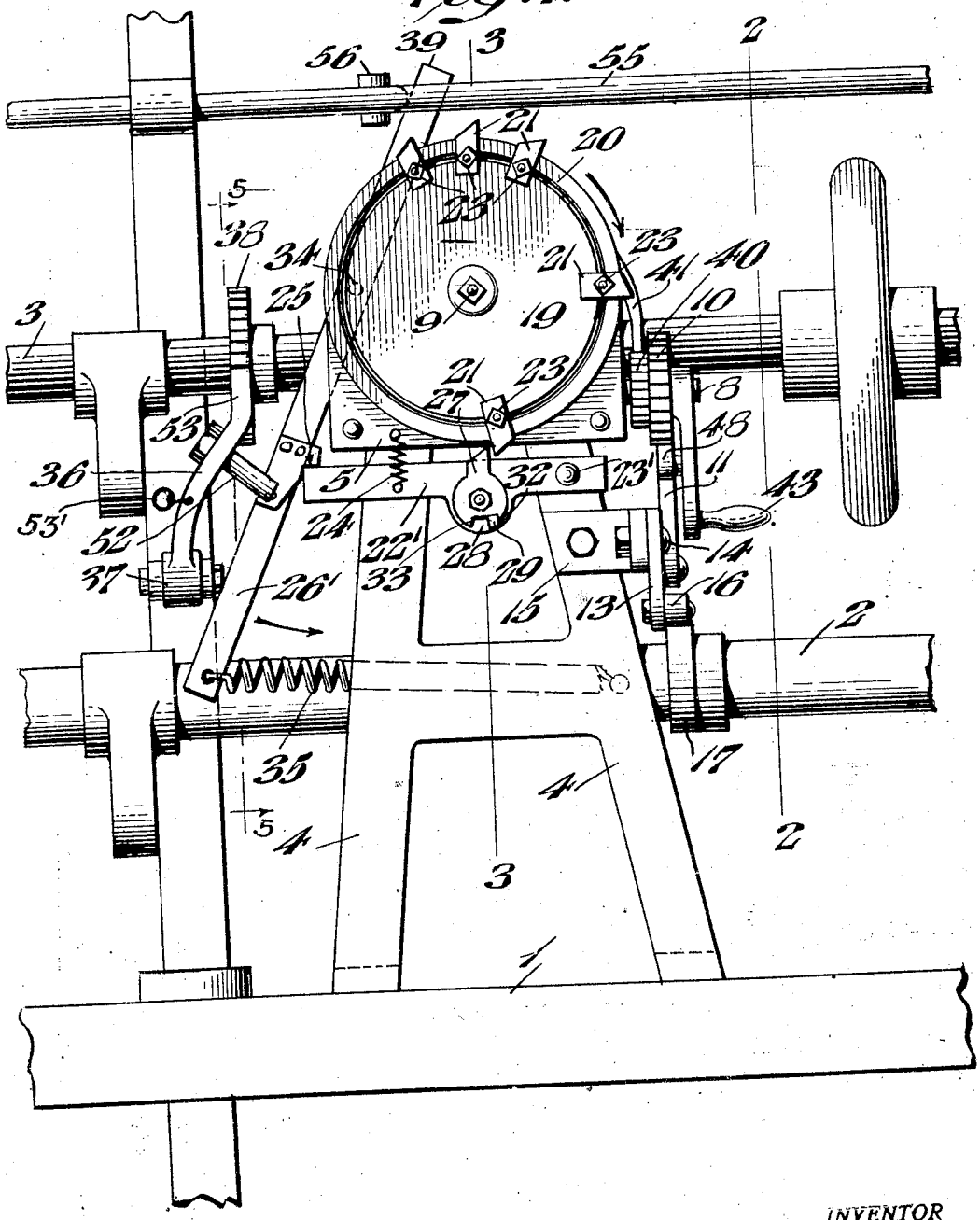
F. E. SCHULZ

AUTOMATIC STOP FOR KNITTING MACHINES

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3 Sheets-Sheet 1

Fig. 1.



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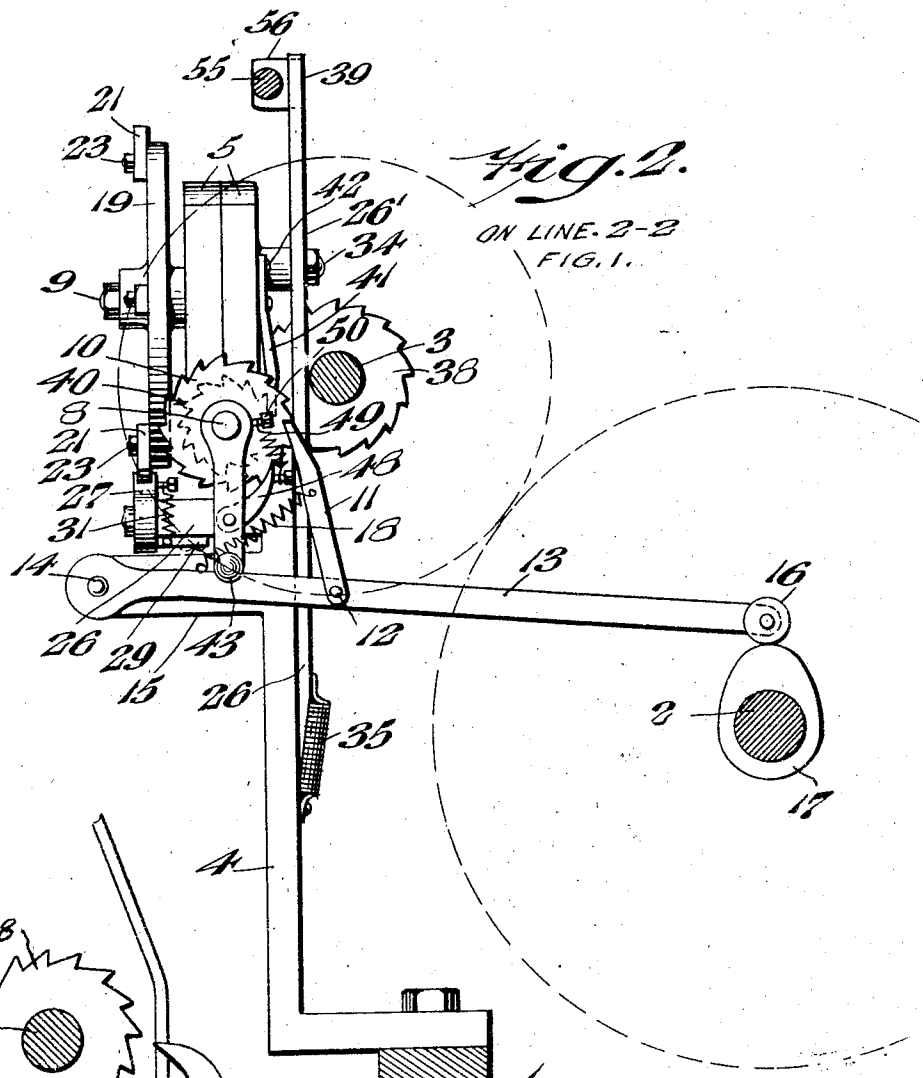


Fig. 2.

ON LINE 2-2 FIG. 1.

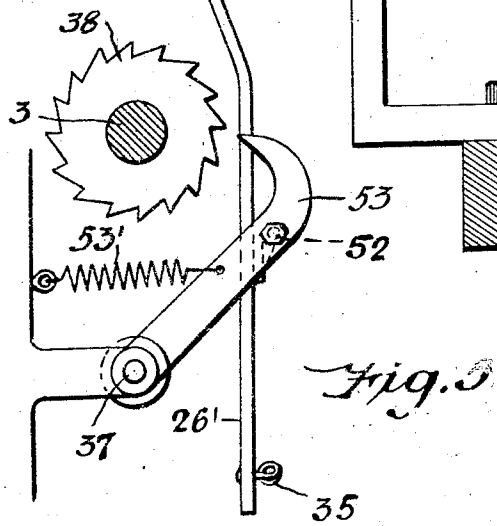


Fig. 3

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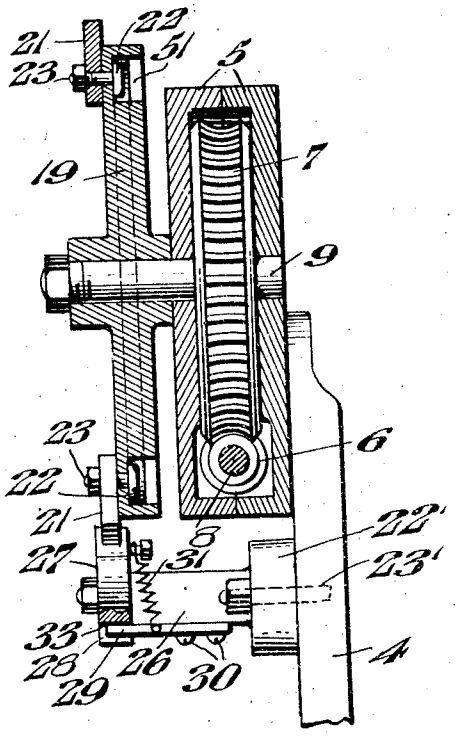


Fig. 3.

ON LINE 3-3 FIG. 1.

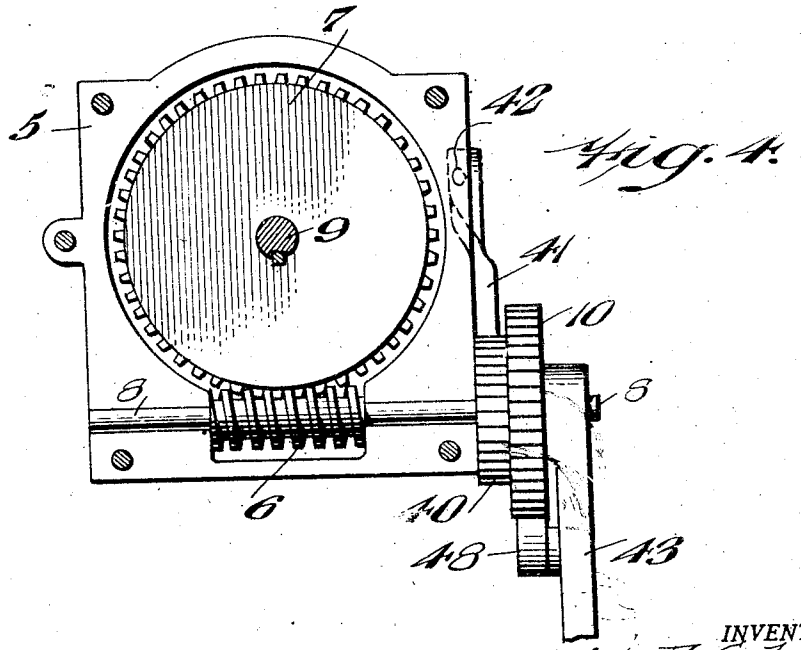


Fig. 4.

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UNITED STATES PATENT OFFICE.

FRITZ E. SCHULZ, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCHLETTER & ZANDER INC., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC STOP FOR KNITTING MACHINES.

Application filed June 10, 1924. Serial No. 719,043.

To all whom it may concern:

Be it known that I, FRITZ E. SCHULZ, a citizen of the Republic of Germany, residing in the city of Philadelphia, county of Philadelphia, State of Pennsylvania, United States of America, have invented a certain new and useful Automatic Stop for Knitting Machines, of which the following is a specification.

This invention, broadly stated, relates to straight-bar or flat knitting machines and has more especial relation to an attachment therefor for automatically stopping, at predetermined intervals, both forward and retrograde movement of the main driving shaft thereof.

In the manufacture of hosiery upon straight-bar or flat knitting machines it is customary to knit simultaneously, side by side, a plurality of stocking legs including heels. As commonly practiced it is necessary during the formation or fabrication of such leg and heel portions to frequently stop the machine parts. As an example, in full fashioned silk hosiery having a high spliced heel and an upper leg portion of cotton it is necessary to stop the operating mechanism six times as follows: at the finish of the welt; at the finish of the cotton portion; at the commencement of the narrowing operation; at the beginning of the high spliced heel part; at the heel part; and when the loose course is introduced in the heel. It is therefore compulsory upon the part of the operator to nicely calculate when to stop the machine, and what is more to guard against retrograde movement of the main driving shaft at the time of machine stoppage. This is not only difficult to do, but, if it is not timely and correctly done a plurality of stocking webs are detrimentally affected.

The leading object of the present invention is to overcome the above described disadvantageous features and provide means whereby not only is the operator relieved of all responsibility as to machine stoppage but is assured of automatic stoppage of the machine and no retrograde movement of the main driving shaft, with the result that perfect stocking webs may be produced in less time and at less cost than at present practiced. A further object resides in the provision of a simple, efficient and comparatively inexpensive attachment for application to a conventional straight-bar or flat knitting machine without change of structural parts, whereby, the main driving shaft, at predetermined intervals, is automatically stopped and positively held against rearward movement. Other objects reside in the provision of general arrangements, connections and combinations of parts for attaining the results sought by the foregoing objects. Still further objects not at this time particularly pointed out will appear hereinafter.

The invention consists of the novel construction hereinafter described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, and in which:

Fig. 1, is a fragmentary view, in front elevation of a straight-bar or flat knitting machine, illustrating the attachment of the invention in application thereto.

Fig. 2, is a view in section taken upon the line 2—2 of Fig. 1.

Fig. 3 is a similar view taken upon the line 3—3 of Fig. 1.

Fig. 4, is a view in elevation of the internal, wormdrive for the rotary disc shown in Fig. 1, and;

Fig. 5, is a view in section taken approximately upon the line 5—5 of Fig. 1.

For the purpose of illustrating my invention I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

Referring now to the drawings in detail only so much of a conventional straight-bar or flat knitting machine is illustrated as is necessary to an understanding of the application of the stop mechanism embodying the present invention. The numeral 1 designates the lower frame of a straight-bar or

flat knitting machine, 2 designates the cam shaft, and 3 designates the main driving shaft which operates said cam shaft in a manner well understood in the art. According to the present invention the stop mechanism is operatively connected between said cam shaft 2 and main driving shaft 3, and motion is imparted to the stop mechanism parts by said cam shaft to trip certain of said stop mechanism parts at predetermined intervals to interrupt main driving shaft rotation. Supported in fixed manner by lower frame 1, is a vertically disposed standard 4, carrying at its top a two part worm and worm-gear containing housing or casing 5, the worm being designated 6 and the worm-gear 7. The worm 6 is mounted upon shaft 8 which is arranged in parallelism with the cam shaft 2 and the worm-gear 7 is mounted upon a shaft 9 at right angles to cam-shaft 2. Shaft 8 is operated by cam-shaft 2 and a description of these parts will now be given. Fixed to shaft 8 is a ratchet-wheel 10, step by step motion being imparted thereto by a pawl 11, pivoted as at 12 to a lever 13, best seen in Fig. 2. This lever 13 is pivoted at one end as at 14 to a bracket 15 fixed to standard 4 and is provided at its free end with a roller 16 which rides upon a cam 17 carried by the cam-shaft 2. Thus rotation of cam 17 imparts a rocking motion to lever 13 which in turn causes pawl 11 to function for step by step rotation of the shaft 8 and worm 6 and thereafter the worm-gear and its shaft 9. Pawl 11 is maintained in proper position with respect to ratchet-wheel 10 by means of a spring 18 connected between said pawl and lever 13. Fixed to worm-gear shaft 9 is a disc 19 adapted for rotation in the direction of the arrow in Fig. 1. This disc 19 upon its front face is provided with an annular groove 20 to adjustably accommodate a plurality of trip-fingers 21, of which there is one for every desired number of machine stops, five being shown for illustrative purposes. Each trip-finger 21 is clamped to disc 19 by means of a bolt having a head 22 to engage the inner face of groove 20 and a nut 23 for abutting against the outer face of a trip-finger 21. In the rotation of disc 19 each trip-finger 21 actuates, at predetermined intervals, a trip-lever 22′, pivoted at one end, as at 23′, to standard 4, and arranged at its other end to normally engage trippable, main shaft stopping mechanism, to be presently referred to. The trip-lever 22′ is normally maintained in horizontal position by means of spring 24, in which position said lever engages the notched part 25 of a vertically disposed, pivotal lever 26′. The trip-lever 22′ is provided with a laterally extended, fixed stud 26, carrying at its outer end a pivotal finger 27 which is positioned in the path of travel of the trip-fingers 21. This finger 27 is slotted at 28 within which slotted part is accommodated a stop 29 fixed as at 30 to the underside of stud 26. A spring 31 connects finger 27 with stop 29 and normally causes the end 32 of slot 28 to abut against stop 29. Thus as disc 19 in its rotation causes a trip-finger 21 to impinge against finger 27 the latter is moved about its pivot point freely until end 33 of slot 28 contacts with stop 29 whereupon further movement of finger 27 causes trip-lever 22′ to move about its pivot point and release the free end of said lever from catch 25 of lever 26′. By having finger 27 loose upon stud 26, as described, the contacting fingers are prevented from causing the parts to jamb. Lever 26′ is pivoted at 34 to the rear of casing 5, near its upper end, and its lower end is connected to standard 4 by means of a spring 35. Pivotally carried at 37 by the frame of the machine is a detent or a dog 36 the lower end of which is connected by spring 53′ with said machine frame, and the upper end 53 of which is adapted to engage with the teeth of a wheel 38 fixed to the main drive shaft 3, upon operation of lever 26′. The dog 36 has fixed thereto a pin 52 which normally lies in front of the lever 26′ to prevent the upper end 53 of said dog 36 from engaging with wheel 38. As trip-lever 22′ functions, lever 26′ moves in the direction of the arrow in Fig. 1 thus freeing pin 52, whereupon detent or dog 36 is caused by spring 53′ to engage a tooth of wheel 38 and thus prevent retrograde movement of the main drive shaft 3, it being understood that said main drive shaft 3 is stopped in the usual manner by the usual mechanism when starting rod 55 is shifted to the left in Fig. 1. Thus according to the present invention, not only is the machine stopping mechanism operated but retrograde movement of the main drive shaft is also accomplished. To reset the parts the dog 36 is moved out of engagement with wheel 38 and pin 52 placed in position before lever 26′ which latter lever is again caused to engage with lever 22′, the upper end of lever 26′ being moved about its pivotal point 34 to the right in Fig. 1 in said resetting of parts. The starting rod 55 is provided with a stop 56 with which the end 39 of lever 26′ is in engagement so that tripping of the lever 22′ releases lever 26′ to cause shifting of rod 55 to the left in Fig. 1 to stop the operation of the machine. In order to prevent retrograde movement of shaft 8 there is fixed thereto a ratchet wheel 40 engaging with which is a spring detent 41 fixed to the casing or housing 5 as at 42. In order to rotate shaft 8 by hand if necessary to procure proper adjustment of parts a handle 43 is loosely mounted upon shaft 8 and is provided with a pawl 48 which is held in contact with the ratchet wheel 10 by

means of a spring 49 which is connected to the handle 43 as at 50. Thus, in normal rotation of shaft 8 said pawl 48 merely rides loosely over ratchet wheel 10, but when handle 43 is operated by hand said pawl 48 functions to rotate shaft 8. The rear wall of disc 19 is apertured at 51 for the introduction of the finger parts 21 within the annular recess 20 of said casing.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a disc rotatably carried by a fixed part of the machine, trip-fingers carried by said disc, means operative between said cam shaft and disc for step-by-step movement of said disc, a toothed wheel fixed to said main driving shaft and trip-mechanism including a detent to engage said wheel and a pivotal finger arranged in the path of travel of said trip-fingers for stopping retrograde movement of said main driving shaft.

2. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a disc rotatably carried by a fixed part of the machine, said disc having an annular recess in the face thereof, trip-fingers carried by said disc, and adjustably arranged with respect to said recess, means operative between said cam shaft and disc for step-by-step movement of said disc, a toothed wheel fixed to said main driving shaft and trip-mechanism including a detent to engage said wheel and a pivotal finger arranged in the path of travel of said trip-fingers for stopping retrograde movement of said main driving shaft.

3. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a disc rotatably carried by a fixed part of the machine, trip-fingers carried by said disc, means including a worm-gear drive and pawling means operative between said cam shaft and disc for step-by-step movement of said disc, a toothed wheel fixed to said main driving shaft and trip-mechanism including a detent to engage said wheel and a pivotal finger arranged in the path of travel of said trip-fingers for stopping retrograde movement of said main driving shaft.

4. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a disc rotatably carried by a fixed part of the machine, trip-fingers carried by said disc, means operative between said cam shaft and disc for step-by-step movement of said disc, a toothed wheel fixed to said main driving shaft, trip-mechanism including a detent to engage said wheel and a pivotal finger arranged in the path of travel of retrograde movement of said trip-fingers for stopping said main driving shaft, and means operative to prevent retrograde movement of said disc.

5. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a standard carried by a fixed part of the machine, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for operating said disc, a plurality of trip-fingers secured to said disc, means operative between said cam shaft and worm-gear drive for imparting a step-by-step movement to said disc, a toothed wheel fixed to the main driving shaft and trip-mechanism including a detent to engage said toothed wheel and a pivotal finger arranged in the path of travel of said trip-fingers to stop retrograde movement of said driving shaft.

6. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a standard carried by a fixed part of the machine, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for operating said disc, a plurality of trip-fingers secured to said disc, means including a pawl and ratchet operative between said cam shaft and worm-gear drive for imparting a step-by-step movement to said disc, a toothed wheel fixed to the main driving shaft and trip-mechanism including a detent to engage said toothed wheel and a pivotal finger arranged in the path of travel of retrograde movement of said trip-fingers to stop said driving shaft.

7. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a standard carried by a fixed part of the machine, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for operating said disc, a plurality of trip-fingers secured to said disc, means operative between said cam shaft and worm-gear drive for imparting a step-by-step movement to said disc, a toothed wheel fixed to the main driving shaft, trip-mechanism including a detent to engage said toothed wheel and a plurality of pivotal levers including a pivotal finger arranged in the path of travel of retrograde movement of said trip-fingers to stop said driving shaft.

8. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a standard carried by a fixed part of the machine, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for operating said disc, a plurality of radially disposed, adjustable trip-fingers secured to said disc, means operative between said cam shaft and worm-

gear drive for imparting a step-by-step movement to said disc, a toothed wheel fixed to the main driving shaft, and trip mechanism including a detent to engage said toothed wheel and a pivotal finger arranged in the path of travel of retrograde movement of said trip-fingers to stop said driving shaft.

9. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for rotating said disc, a plurality of fixed trip-fingers carried by said disc, means operative between said cam-shaft and worm-gear for actuating said disc by a step-by-step action, a lever pivoted to said standard and provided with spring pressed, pivotal fingers arranged in the path of travel of said trip-fingers, a lever pivoted to said casing and normally rendered inactive by said pivotal arm, a toothed wheel fixed to the main shaft and a detent carried by said pivotal lever and adapted to co-act with said toothed wheel to stop said main shaft upon tripping of retrograde movement of said pivotal trip to release said lever.

10. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for rotating said disc, a plurality of fixed trip-fingers carried by said disc, means operative between said cam-shaft and worm-gear for actuating said disc by a step-by-step action, a lever pivoted to said standard and provided with a laterally extended stud having a spring pressed, pivotal finger arranged in the path of travel of said trip-fingers, said pivotal trip having limited free movement upon said stud when a trip-finger engages therewith, a lever pivoted to said casing and normally rendered inactive by said pivotal arm, a toothed wheel fixed to the main shaft and a detent carried by said pivotal lever and adapted to co-act with said toothed wheel to stop retrograde movement of said main shaft upon tripping of said pivotal trip to release said lever.

11. In a straight-bar knitting machine the combination of a main driving shaft, a cam shaft operated thereby, a casing supported upon said standard, a disc rotatably supported by said casing, a worm-gear drive arranged in said casing for rotating said disc, a plurality of fixed trip-fingers carried by said disc, means operative between said cam-shaft and worm-gear for actuating said disc by a step-by-step action, a lever pivoted to said standard and provided with spring pressed, pivotal fingers arranged in the path of travel of said trip-fingers, a lever pivoted to said casing and normally rendered inactive by said pivotal arm said arm having a notched portion to engage with the free end of said arm and having a spring connecting its lower end to said standard, a toothed wheel fixed to the main shaft and a detent carried by said pivotal lever and adapted to co-act with said toothed wheel to stop retrograde movement of said main shaft upon tripping of said pivotal trip to release said lever.

In testimony whereof, I have hereunto signed my name.

FRITZ E. SCHULZ.