G. S. WEEPER.

YARN GUIDE CONTROLLING MECHANISM FOR TRAVERSE WARP KNITTING MACHINES.

APPLICATION FILED JAN. 11, 1909.

966,875.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

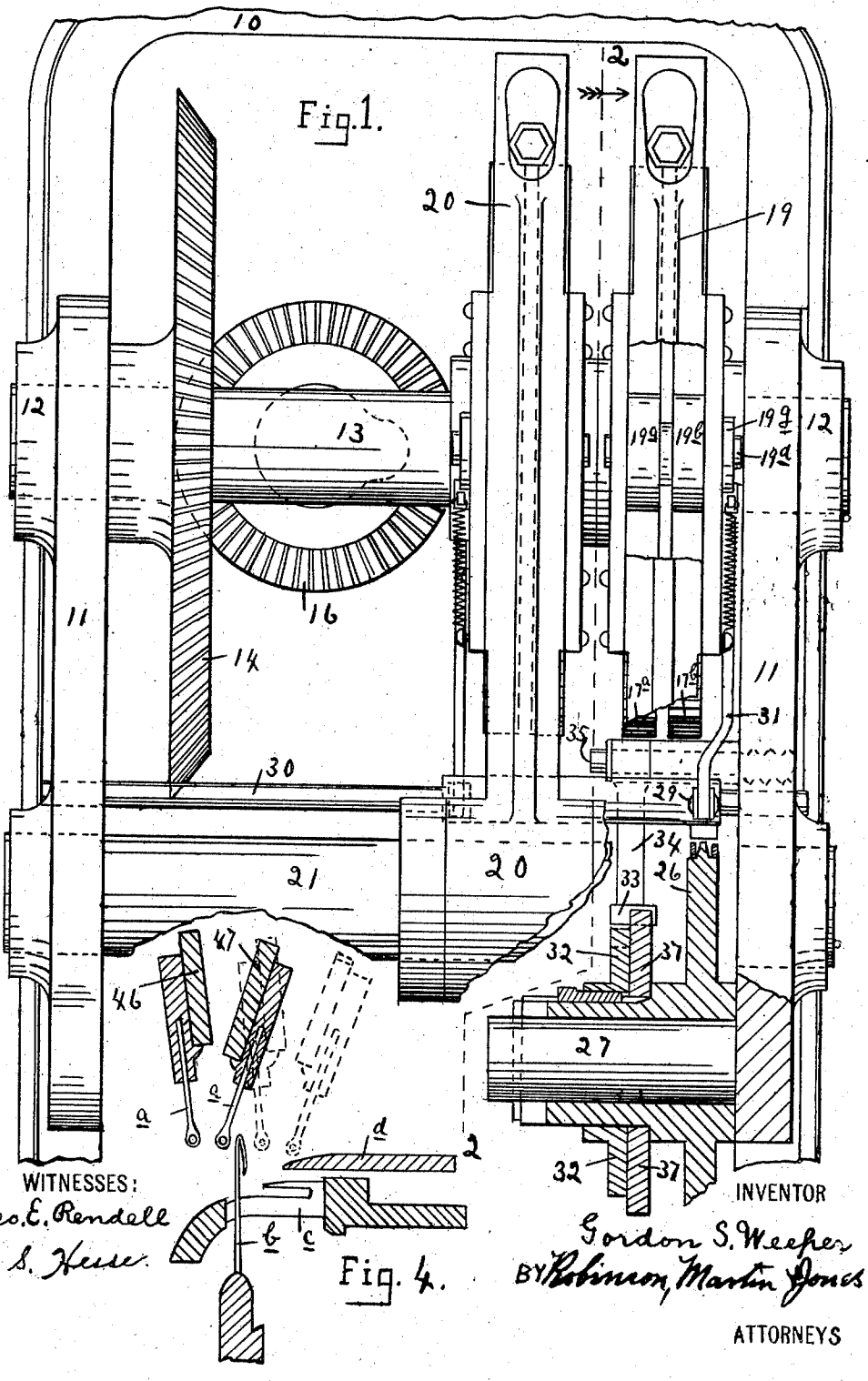

Fig. 4.

WITNESSES:

Geo. E. Rendell

E. S. Keese

INVENTOR

Gordon S. Weeper

BY Robinson, Martin & Jones

ATTORNEYS

THE NORRIS PETERS CO., WASHINGTON, D. C.

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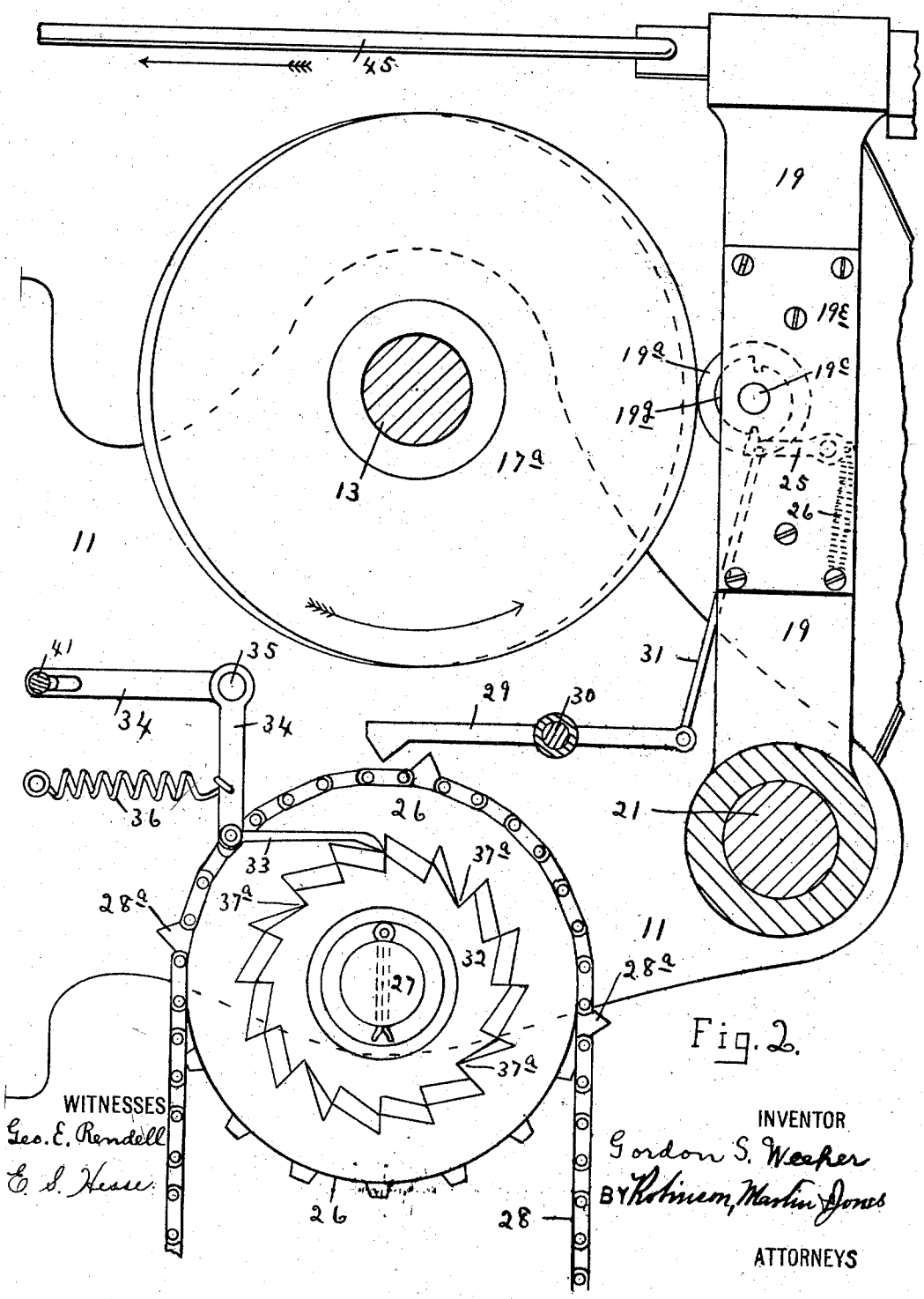

Fig. 2.

WITNESSES

Geo. E. Rendell

E. S. Hesse

INVENTOR

Gordon S. Weeper

BY Robinson, Martin & Jones

ATTORNEYS

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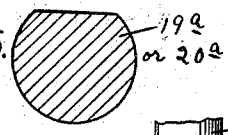
3 SHEETS—SHEET 3.

Fig. 5.



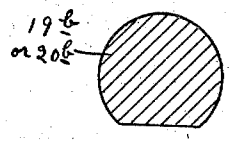


Fig. 6.

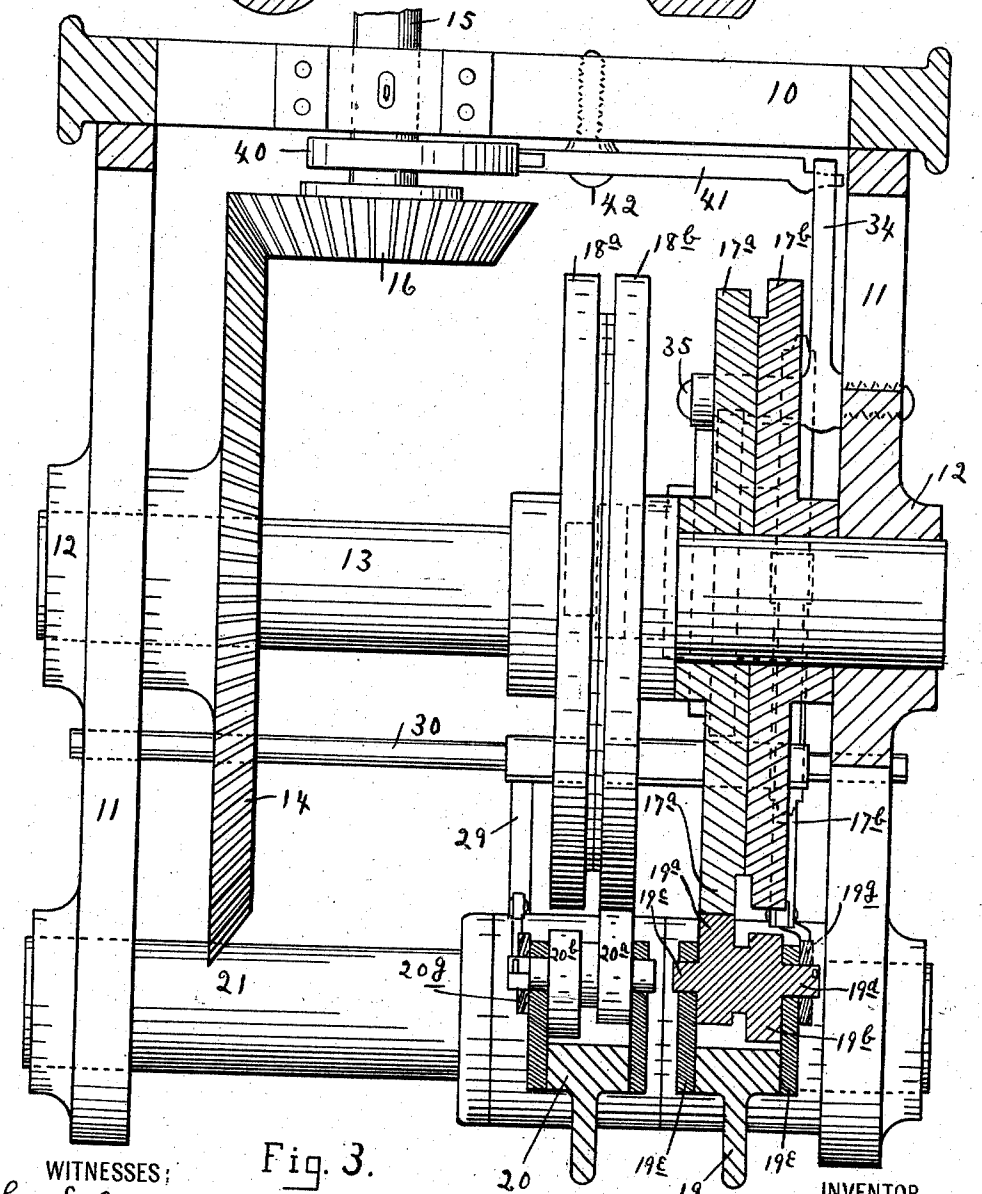


Fig. 3.

WITNESSES;

Geo E. Rendell

E. S. Hesse.

INVENTOR

Gordon S. Weeper

BY Robinson, Martin & Jones

ATTORNEYS

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GORDON S. WEEPER, OF FULTONVILLE, NEW YORK.

YARN-GUIDE-CONTROLLING MECHANISM FOR TRAVERSE WARP-KNITTING MACHINES.

966,875. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed January 11, 1909. Serial No. 471,562.

To all whom it may concern:

Be it known that I, GORDON S. WEEPER, of Fultonville, in the county of Montgomery and State of New York, have invented certain new and useful Improvements in Yarn-Guide-Controlling Mechanism for Traverse Warp-Knitting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The object of my invention is to provide an improved thread or yarn guide bar operating mechanism, particularly adapted for straight traverse warp knitting machines knitting silk fabric, and I employ the improvements in changing the stitch to reinforce the fabric, particularly as adapted to finger tips in silk glove material, although it is obvious that my improvements are not restricted to such use.

The drawings are restricted mainly to the improvements and only sufficient of the knitting machine to illustrate the relation of the improvements thereto is shown.

Figure 1 shows in the main an end view of the improvements as applied to the end frame of a knitting machine with certain parts broken and shown in section to more fully illustrate the construction. Fig. 2 shows parts in side elevation and others in section on line 2—2 of Fig. 1. Fig. 3 is in the main a plan view of the improvements, and in part a sectional plan view thereof. Fig. 4 is a diagrammatical view of the knitting instrumentalities. Figs. 5 and 6 are sectional detail views.

Referring to the reference letters and figures in a more particular description, 10 indicates an end frame of such a knitting machine as my improvements are shown particularly adapted to. For the purpose of mounting and supporting my improvements, there are provided a pair of bracket pieces 11—11 rigidly secured to the frame 10. Mounted in the bearings 12—12 in the bracket pieces 11 is a rotatable cam shaft 13 provided with a bevel gear wheel 14 by means of which it is driven from the main shaft 15 of the knitting machine through bevel gear pinion 16. In the construction as shown two pairs of cams are shown mounted on the shaft 13. These are marked 17^a and 17^b, 18^a and 18^b. Located in the planes and just outside of the peripheries of the cams are a pair of cam levers 19 and 20 mounted on a fixed shaft or rod 21 extending between and supported in the bracket pieces 11. About at the middle of the cam lever 19 there is mounted on bearings 19^c 19^d in the cam lever plates 19^e, a rotatable cam roller consisting of the parts 19^a and 19^b preferably all formed in one piece. The forms of these parts 19^a and 19^b are shown in cross section in Figs. 5 and 6. They consist in the main of a disk with a circular periphery as to about three-fourths thereof and a flat side as to the other fourth. These parts 19^a and 19^b are located opposite and adapted respectively to engage with the peripheries of the cams 17^a and 17^b. The journal 19^d of the cam roller is extended and provided at the outside of the holding plate 19^e with a two-toothed ratchet wheel 19^g secured to the journal to control the rotation of the cam roller. The flat sides on the roller parts 19^a and 19^b are arranged on opposite sides of the roller, so that when one part of the roller presents the middle portion of its rounded side to one of the cams, the other part of the cam roller will present the flat side to the other cam, thereby being out of operative contact or engagement therewith.

The cams 17^a and 17^b may properly each be referred to, collectively, as a double or plural cam, as may also the cams 18^a and 18^b. Each of these two-part or plural cams, the eccentric portions of which are out of register with each other, coöperates with a double or plural cam roller which is rotated by frictional contact with its respective plural cam, and which cam roller has plural flattened or cut-away portions which are out of register with each other. From this it results that each eccentric part of a double or plural cam is adapted to act at proper times on the yarn or thread guide bar with which it is connected through the moving parts or levers 19 and 20 and a rod, as 45, connected with said guide bar.

In connection with the cam lever 20 there

is provided similar to those just described a cam roller having parts 20^a and 20^b and the holding ratchet wheel 20^g. For securing the cam roller against rotation, there is provided pivotally secured on one side of the cam lever 19 a pawl shown in dotted lines in Fig. 2 and indicated by 25. For throwing this pawl into engagement with the ratchet wheel 19^g, there is provided a spring shown in dotted lines and indicated by 26^a. For releasing the pawl 25 periodically, there is provided a sprocket wheel 26 mounted to rotate freely on a fixed stud 27 projecting inwardly from one of the brackets 11 and carrying a sprocket chain 28, having provided at suitable intervals thereon teeth or projections 28^a. These projections as they pass are adapted to engage with the tooth-like end of the tripping lever 29 mounted on a fixed rod 30 in the brackets 11 and connected by a connecting link 31 with the pawl 25 before mentioned. For feeding the sprocket tripping chain 28, there is provided, secured to the hub portion of the sprocket wheel 26, a ratchet wheel 32. This wheel is adapted to be engaged by and operated by a pawl 33 mounted on one arm of a bell crank lever 34, which is mounted on a fixed stud pin 35 secured in one of the bracket pieces 11. For returning the pawl 33 to its normal position, as well as the lever 34 and other parts, there is provided a spring 36. In order to obviate the use of an excessively long chain 28, there is provided besides the ratchet wheel 32 a loose ratchet wheel 37 of somewhat larger diameter than 32. This ratchet wheel 37 may have one or more deep notches between its teeth, as indicated at 37^a. It is obvious that in the main the pawl 33 will be operating on the normal shallow teeth of the wheel 37, and that only occasionally, as the active end of the pawl drops into one of the deep notches 37^a, will the same be enabled to engage the ratchet teeth of the operative ratchet wheel 32 and move the sprocket wheel and chain 28 forward a point.

For operating the bell crank lever 34 and its connected parts as described, there is provided on the main shaft 15 a cam 40, the face of which is adapted to operate on one of the bell crank arms of the lever 41, which is pivoted to the frame 10 at 42. The other bell crank arm of the lever 41 engages in a slotted opening in the bell crank lever 34 before referred to. The upper ends of the cam levers 19 and 20 are connected by connecting rods, as 45, with the usual yarn guide operating bars 46, 47 provided in this class of machines, and which bars are mounted as usual for longitudinal movement in the machine. These yarn guide bars 46 and 47 carry the yarn guides as *a* which coöperate with the other knitting instrumentalities, consisting mainly of the needles *b*, the sinkers *c* and the presser bar *d*.

The guides *a* will, of course, be arranged and adapted to supply yarn, thread, or other material in accordance with the requirements of the work. For convenience, however, these parts will be hereinafter referred to merely as yarn guides, it being understood that the use of this phrase is in no wise to be considered as a limitation of the contemplated function of these devices.

While it is well understood, mention may be made of the fact that the yarn guides *a* are in the operation of the machine adapted to be shifted laterally through between the upper end of the needles from the position shown substantially in full lines in Fig. 4 to that shown in dotted lines in the same figure, and then moved longitudinally of the set of needles a greater or less distance, and then passed back through the line of needles and again operated a greater or less distance, according to the character of the work required.

The form of the periphery of the cams 17^a and 17^b, 18^a and 18^b may be varied to suit circumstances. The cam rollers are held up to the cams by the usual springs operating on the yarn guide bars 46 and 47 exerting a constant tension on the rods 45 in the direction indicated by the arrow in Fig. 2.

In the operation of these improvements, the cams will preferably be rotated in the direction indicated by the arrow *x* in Fig. 2. The periphery of the cams which are active will slide on the active face of the cam rollers, and the cam levers with the connected mechanism will be given such movements as the form of the periphery of the cam will determine while the cam rollers are held stationary. At intervals, to be determined by the character of the work required from the machine and the arrangement of the projections 28^a on the chain and the notches in the ratchet wheel 37, the holding catch or pawl 25 of the cam roller will be tripped. This tripping will be instantaneous, inasmuch as the projections 28^a will be timed or located with reference to the ratchet wheels so as to not stop under the tooth-like projection on the end of the trip lever 29. When released the cam rollers will be rotated by friction on the face of the cams. Provision is made, it will be noted, for only half a revolution of the cam roller at each tripping of the catch, when it will be again caught and secured. With the arrangement of active faces on the cam rollers, as heretofore described, a shift is made from one cam, as 17^a, to the other cam, 17^b, which may be a cam of a different cut or form on its active face. This shift takes place very quickly, which is a point of importance, and the cam lever is immediately under the influence of another operat-

ing mechanism. By making the cams carried by the cam shaft 13 of relatively large diameter, they serve to rotate the cam roller quickly and practically instantly, and still allow rollers of sufficient size to be used as not to be objectionable on account of their small size.

The tripping mechanism for the cam rollers may be made to release all the cam rollers or only one, according as circumstances may require.

While in the drawings there is shown a construction employing two pairs of cams and two cam levers operating in connection therewith and adapted to operate with two yarn guide bars in the knitting machine, it is obvious that the improvements could be confined simply to mechanism for operating one yarn guide bar or could be increased to operate more than two.

The feature of construction to which particular attention may be called is that two cams are provided for operating or controlling the operation of the yarn guide bar and provision made for instantly and automatically transferring the control of the yarn guide bar from one of said cams to the other.

It is evident that modifications and changes in the construction may be made without departing from the invention as intended to be covered by the claims hereto appended.

What I claim as new and desire to secure by Letters Patent is:

1. In a knitting machine, the combination with a movable thread or yarn guide bar, of a plural cam having eccentric portions which are out of register with each other, a movable part or lever connected with said thread or yarn guide bar, a cam roller mounted in said movable part or lever and adapted to be rotated by frictional contact with said cam, said cam roller having flattened or cut-away portions which are out of register with each other, means for holding said cam-roller stationary, and automatic means for releasing said holding means at intervals so that said cam roller may be partially rotated by said cam to bring one or the other of its operating parts into contact with one or the other parts of said plural cam.

2. In a knitting machine, the combination with a plurality of thread or yarn guide bars, of a plurality of simultaneously rotating plural cams each of which has eccentric portions out of register with each other, a plurality of movable parts or levers connected with said yarn guide bars, a cam roller mounted in each of said movable parts or levers and adapted to be rotated by frictional contact with said cams, each of said cam rollers having flattened or cut-away portions which are out of register with each other, means for holding said cam-rollers stationary, and automatic means for releasing said holding means at intervals, so that said cam-rollers may be partially rotated by said cams to change the timing of the operation of the said movable parts or levers connected with the said thread or yarn guide bars.

3. In a knitting machine, the combination with a movable thread or yarn guide bar, of a plural cam having eccentric portions which are out of register with each other, a movable part or lever connected with said thread or yarn guide bar, a cam-roller mounted in said movable part or lever and adapted to be rotated by frictional contact with said cam, said cam-roller having flattened or cut-away portions which are out of register with each other, means for holding said cam roller stationary, and automatic means for releasing said holding means at intervals so that said cam roller may be partially rotated by said cam to bring one or the other of its operating parts into contact with one or the other parts of said plural cam, said automatic means comprising a pattern-chain and a tripping lever connected with the holding means.

4. In a knitting machine, the combination with a movable thread or yarn guide bar, of a plural cam having eccentric portions which are out of register with each other, a movable part or lever connected with said thread or yarn guide bar, a cam roller mounted in said movable part or lever and adapted to be rotated by frictional contact with said cam, said cam roller having flattened or cut-away portions which are out of register with each other, means for holding said cam-roller stationary, automatic means for releasing said holding means at intervals, so that said cam roller may be partially rotated by said cam to bring one or the other of its operating parts into contact with one or the other parts of said plural cam, said automatic means comprising a pattern-chain and a tripping lever connected with the holding means, and feeding mechanism for said pattern chain comprising a sprocket wheel, a ratchet wheel fixed relative to said sprocket wheel, a second and somewhat larger ratchet wheel loose relative to said sprocket-wheel and having relatively deep teeth at intervals between relatively shallow teeth, a pawl engaging said ratchet-wheels and held out of engagement with the fixed ratchet wheel by said relatively shallow teeth, and means for operating said pawl.

5. The combination, in a knitting machine, of a plural cam, a moving part adapted to be operated by either part of said cam, a rotary cam roller carried by said part and adapted to contact with the different parts of said cam successively and to be rotated

thereby when in contact therewith, means for holding said roller stationary relative to said moving part, automatic means for releasing said holding means at intervals, and a thread or yarn guide bar operatively connected with said moving part.

In witness whereof, I have affixed my signature, in presence of two witnesses, this 24th day of December 1908.

GORDON S. WEEPER.

Witnesses:
HENRY W. HORNING,
GEORGE CLEMENS.