K. HOWIE AND W. O. TAYLOR.

CAM MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED FEB. 21, 1920.

1,424,725. Patented Aug. 1, 1922.

3 SHEETS—SHEET 1.

Fig. 1a.

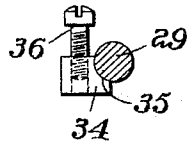


Fig. 1.

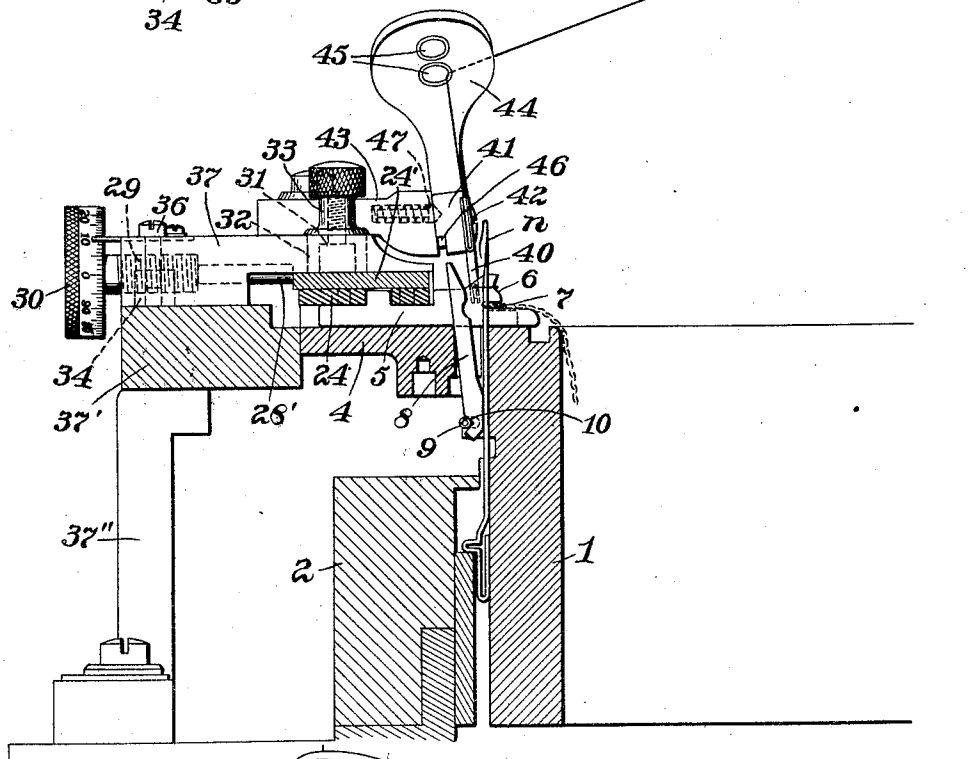


Fig. 3.

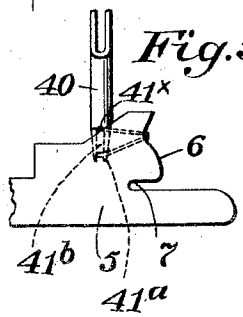


Fig. 2.

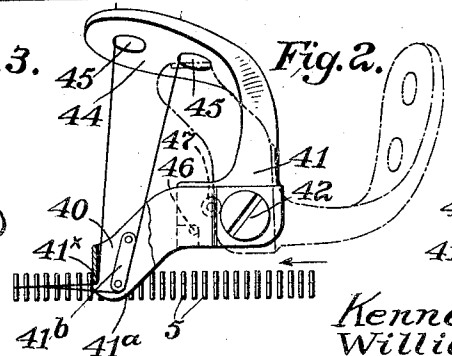
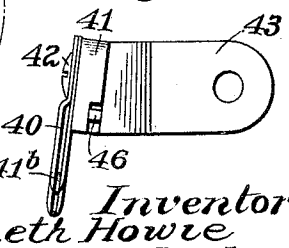


Fig. 2a.



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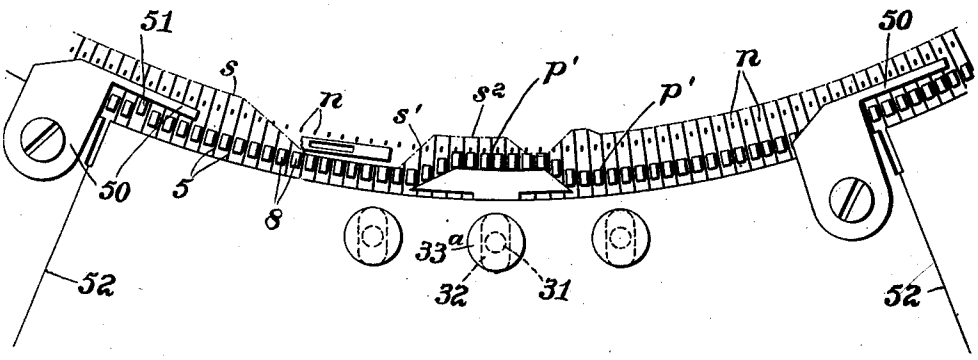
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3 SHEETS—SHEET 2.

Fig. 4.



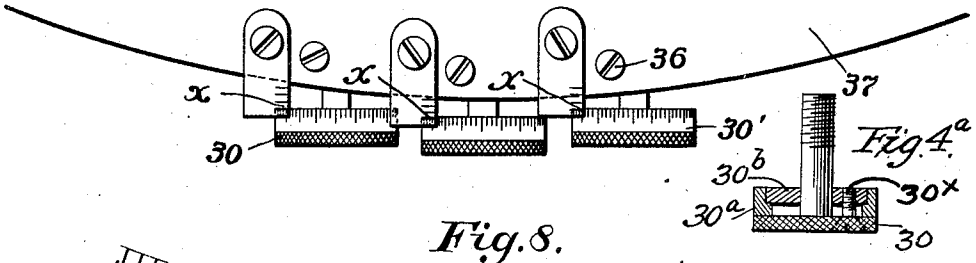


Fig. 4ª

Fig. 8.

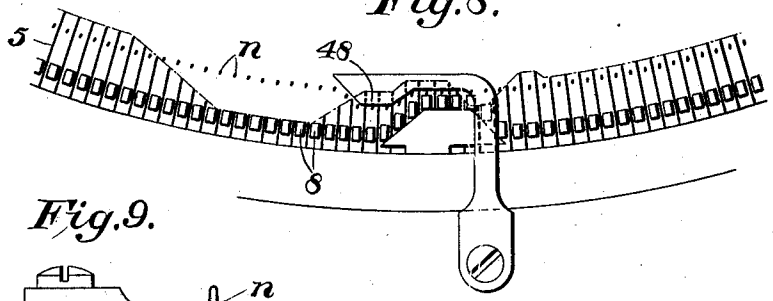
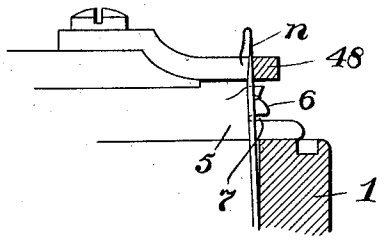


Fig. 9.



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3 SHEETS—SHEET 3.

Fig. 5.

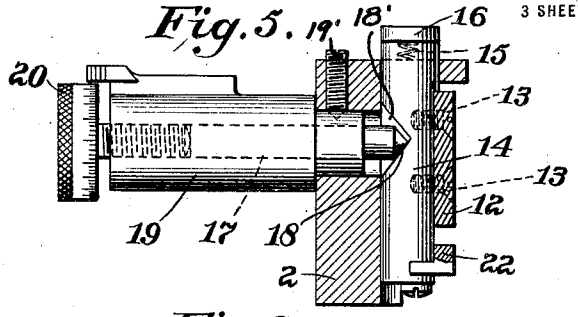


Fig. 6.

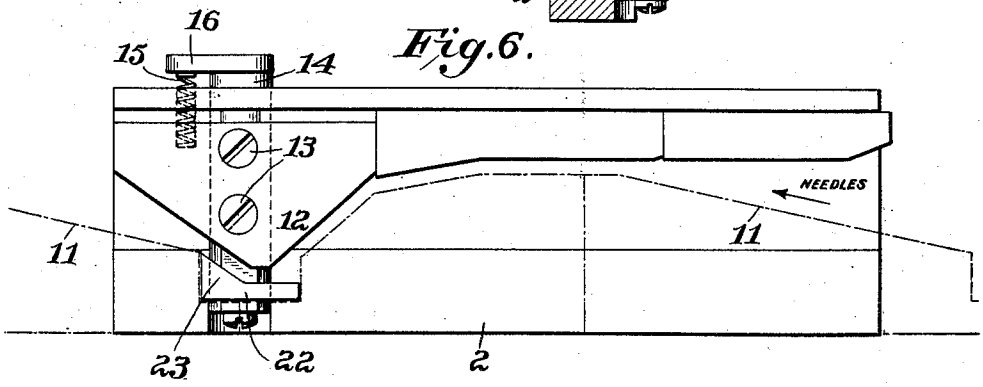
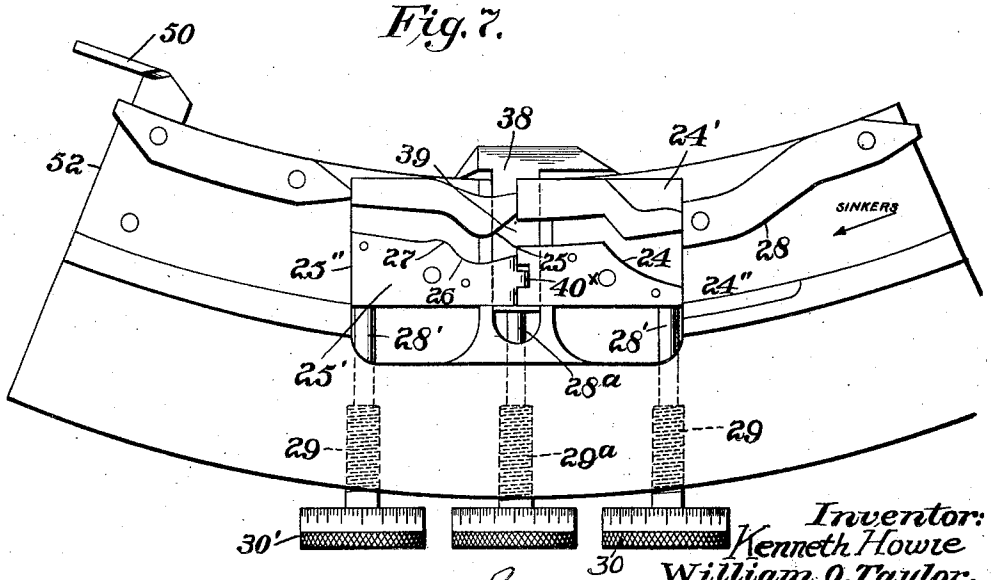


Fig. 7.



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UNITED STATES PATENT OFFICE.

KENNETH HOWIE, OF NORRISTOWN, AND WILLIAM O. TAYLOR, OF LIMERICK, PENNSYLVANIA, ASSIGNORS TO WILDMAN MFG. CO., OF NORRISTOWN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CAM MECHANISM FOR KNITTING MACHINES.

1,424,725. Specification of Letters Patent. Patented Aug. 1, 1922.

Application filed February 21, 1920. Serial No. 360,440.

To all whom it may concern:

Be it known that we, KENNETH HOWIE, resident of Norristown, Pennsylvania, and WILLIAM O. TAYLOR, resident of Limerick, county of Montgomery, State of Pennsylvania, both citizens of the United States, have invented certain new and useful Improvements in Cam Mechanism for Knitting Machines, of which the following is a specification.

The invention relates to circular knitting machines and it involves the features and combination arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings:—

Fig. 1 is a sectional view taken along the radius of the machine, parts being shown in elevation.

Fig. 1ª is a detail of clamping means.

Fig. 2 is a detail view of one of the yarn guides and the sinkers, showing the feeding of the yarn thereto.

Fig. 2ª is a bottom plan view of the yarn guide.

Fig. 3 is an enlarged detail view of the yarn guide and one of the sinkers.

Fig. 4 is a plan view of a section of the cam ring showing the waves of the sinkers and individual pressers.

Fig. 4ª is a detail.

Fig. 5 is a detail sectional view of the cam ring for the needles and means of adjustment.

Fig. 6 is a face view of the inner side of a section of the cylinder cam ring.

Fig. 7 is a bottom plan view of the cams for operating the sinkers, and pressers.

Fig. 8 is a diagrammatic plan view of a needle deflecting cam in its relation to the waves of the sinkers and pressers.

Fig. 9 is a detailed view of the needle deflecting cam.

In these drawings 1 is the needle cylinder which in the present illustration is the rotating part and 2 is the cylinder cam ring. The spring beard needles are shown at *n*, there being a single row of these. 4 is the sinker ring which is mounted on the needle cylinder and carries radially slidable instruments cooperating with the needles as sinkers 5, which also perform the function of web holders, being constructed for this two-fold purpose with a yarn engaging and sinking nose 6 and a web engaging and holding throat 7.

Individual needle beard pressers are shown at 8, held in place by a spring band 9 engaging their notches 10 so that the pressers can have rocking movement to advance to and retract from pressing position.

The needles are advanced to receive the yarn by their butts passing along a cam 11 in Fig. 6, and they are drawn down to draw the new loop through the old by the stitch cam 12. This stitch cam is fixed by screws 13 to a vertically movable post 14 mounted in the cam ring. The post is pressed upwardly by a spring 15 engaging the projection 16 on the post, and it is adjusted by a rod 17 having a bevelled or tapered end 18 engaging the inclined wall of a V-shaped notch 18′ formed in the post. This rod is movably mounted in a bracket 19 held to the cam ring by a set screw 19′. The rod is adjusted by a finger wheel 20 having a shank threaded into the bracket and bearing on the end of the rod.

The finger wheel is calibrated for micrometer adjustment, as shown, so that the stitch cam can be accurately adjusted to accord with the adjustment at other feeds, once the machine is set to get uniform knitting at all of the feeds.

The stitch cam 12 has a guard cam 22 associated therewith, attached to the same post 14. This guard prevents overthrow of the needles as they are drawn down by the stitch cam and thus uniformity in the loop drawing actions is insured. The guard cam is formed in one piece with the needle raising cam 23 which latter initiates the upward movement of the needle immediately after the new loop is drawn through the old loop just cast off.

It is desirable to have the stitch cam and the needle raising cam 23 bear a fixed or definite relation to each other because the upward movement of the needle should begin in a definite relation to the stitch point of the cam 12.

In ordinary knitting practice, when the new loop length is drawn through the old loop, it is customary to advance the web

holders to press the fabric back and "knock over" the loop so that as the needle rises it will pass properly through the loop, while in its "knock over" position, and while the fabric is held down against the up thrust of the needles. It is therefore of importance that the advancing cam 23 in all the adjustments of the stitch cam 12 bear a fixed relation thereto, so that the needle will not drift unduly after passing the stitch point and fail to rise until after passing the "knock over" where the fabric is pushed back by the web holders to knock over the loop last formed.

In the present organization the sinkers 5 are advanced by the cam 24, Fig. 7, to sink the yarn between the needles and thus measure off the new loop lengths. They are retracted by the cam 25 to allow the measured loop lengths to be drawn down by the needles through the fabric loops, after which the sinkers are advanced by the cam 26 to cause their throats 7 to engage the fabric and hold it down and to effect the knock over action at the cam point 27. After passing this "knock over" point the sinkers are allowed to retract slightly but they still maintain their engagement with the fabric until they come around to the next yarn feeding point where they are retracted by the cam 28 to pass the yarn feeder. The sinker cams 24 and the group of cams 25, 26, 27 are mounted respectively upon slides or blocks 24′, 25′ which are slidably mounted in the cam ring to move in parallel slots. These two cam supporting slides or blocks are adjustable along their guide ways 24″, 25″ by rods 28′, mounted in the cam ring and operated upon by the screw stems 29 of the finger wheels 30, 30′ which are calibrated for micrometer adjustments. The turning of the finger wheels will move their screw stems in or out to determine the position of the rods 28′. The cam slides or blocks 24′, 25′ have studs or pins 31 extending up therefrom through slots 32 in the cam ring. The upper screw threaded ends of these studs are engaged by nuts 33 in the form of finger buttons. These nuts are loosened when the adjustment of the cam slide is to be made. If the finger wheel 30 or 30′ is adjusted to move its stem outwardly the cam is moved outward by the operator taking hold of the finger piece or nut 33 and moving it with the cam outward until stopped by the pin 28′ coming against the end of the screw stem 29 in its newly adjusted position and thereupon the cam slide with its cams can be set in this newly adjusted position by turning the clamp nut or finger piece 33 to draw the parts together.

Of course when the cam slide is to be adjusted inward, the clamp nut 33 is loosened and the finger wheel 30 or 30′ is turned to force the rod 28 inward and this will force the cam slide inward also into the position desired, whereupon it can be clamped by the nut 33. There is a separate adjustment, like that just described, for both of the cam slides 24′ and 25′.

The finger wheels 30, 30′ with their screw stems can be held in any of the positions to which they may be adjusted by clamps 34, Fig. 1ª, having a curved seat 35 to fit the stem 29, and a screw 36 by which the clamp may be drawn against the screw stem. This clamp, with its screw is arranged in the cam ring 37.

The two sinker cam plates 24′, 25′ are interconnected at 40ˣ by a tongue on one fitting in a recess in the other, the recess being somewhat wider than the tongue, so that the cam slides can have a certain amount of adjustment individually, the one independent of the other, but only to a limited extent. This is to prevent either cam being adjusted relative to the other to such an extent that a shoulder on one would be thrown out into the path of the sinker butts, which would result in a smash up. The two sets of cams on these plates 24′, 25′ therefore can not get out of their prescribed relations within certain limits.

This cam ring is supported upon a ring 37′ which in turn is supported by the standards 37″ from the base of the machine.

The cam 38 for the pressers is carried on or formed with a stem or plate 39 guided in the cam ring and this cam is adjustable radially by a set of devices like those above described consisting of a micrometer screw 29ª, a pin 28ª and a clamp nut or finger piece 33ª.

The presser cam operates upon the upper ends of the pressers and rocks them radially inward into position to press the needle beards and after passing the cam the pressers are rocked outwardly by the spring band.

The thread guide consists of a sheet metal member 40 bent back upon itself with a space between its two sides for the passage of the yarn.

This thread guide is carried by an arm or member 41, pivoted at 42 to a block 43 secured to the cam ring. The arm has a broadened upper end curved over at 44 and having guide eyes 45 for the yarns. The pivoted arm is held in position against a stop pin 46 by a spring pin 47 having a conical end engaging a corresponding recess in the arm. Pressure exerted upon the arm sufficient to overcome the holding force of the spring pin will throw the arm with its yarn guide backward and lift the yarn guide 41 from its yarn feeding position shown in Fig. 2. It will be noticed that the end of the yarn guide when in normal position is in the same horizontal plane in which the sinkers are arranged, but as shown in the

plan view, Fig. 4, when the sinkers arrive at the position where the yarn guide is located, they are retracted as indicated by the sinker wave s, s', in said Fig. 4, so as to pass outside of the said guide after which the sinkers are advanced as at s^2 to sink the yarn between the needles. The edge of the yarn guide is inclined downwardly at 41^a and should a sinker, by reason of breakage of its butt, not be retracted to proper position and therefore strike the yarn guide, the latter will be swung up into the position substantially as indicated in dotted lines in Fig. 2, and the yarn will be lifted from feeding position and its normal draft will be reduced and the stop motion therefor will be operated to stop the machine.

As an example of a suitable stop motion which may be used for this purpose, we would mention that disclosed in Letters Patent of the United States, No. 1,316,929, Sept. 23, 1919.

We have illustrated herein at A, Fig. 1, the ring and one of the yarn fingers of the said stop motion. When the draft on the yarn is materially reduced or ceases, this finger will drop and operate the stop motion connections to stop the machine.

The yarn guide is adapted to direct a main and a plating yarn to the needles as indicated in Fig. 2. One of these yarns is guided under the front wall 41^x of the yarn guide arm and the other yarn is directed below the division piece 41^b which lies between the sides of the yarn guide and is riveted or pinned thereto.

The relation of the yarn guide (when in operative position) to the sinkers is shown in Figs. 1, 2, and 3. The two yarns are kept widely separated as they emerge from the yarn guide arm and thus they will be positioned in definite relation in the recess of the sinker nose as indicated in Fig. 3. The yarn guide reaches down to a point where the upper yarn feeds at a slight angle downwardly to the sinker nose. The sinker nose is blunt and provided with a shallow recess. No special reliance is placed on the incline of the sinker nose to catch and direct the yarn down to the bottom of the recess in the nose because the yarn feed finger positions the yarn at about the level of the said sinker recess. By reason of this the length of stroke of the sinker is kept at a minimum. As shown in Fig. 1, the yarn guide is arranged at a slight inclination so that its lower end will be positioned close to the stem of the needle.

We may employ a needle deflecting cam 48 to engage the backs of the needles, Figs. 8 and 9, and press them slightly outward. This cam will true up any bent needles. It will also compensate for any irregularities in the needle cylinder by causing the needles to move in a definite path at the point where the yarn is being fed thereto and is being measured off by the sinkers across the needle stems.

This cam will divide the amount of sinking movement between the sinkers and the needles and we are thus enabled to employ a low angle cam for advancing the sinkers which do not have to be moved so far forward as would be the case were the needles not made to take upon themselves a portion of this yarn measuring duty. Furthermore, the loop lengths are uniform.

As shown in Fig. 8, the sinker wave is modified from that shown in Fig. 4 because of the deflection of the needle just mentioned. When the needle is deflected outwardly for the measuring action referred to above, the sinkers advance between the needles and measure off the loop lengths across the stems of these deflected needles. Then, as the needles go back to normal position, the sinkers follow them up so as to maintain control of the measured loop lengths until they are taken by the hook of the needle.

We provide means for insuring the return of the pressers to normal position before they reach the yarn guide so that there will be no presser in displaced position to strike the guide.

This consists of a plate 50 secured to the cam ring and slightly inclined in respect to the path of the pressers, as shown in Fig. 4, so that if any presser is displaced as shown at 51 it will be returned to normal position before reaching the yarn guide. The presser wave is indicated in Fig. 4 at p'. The needles are indicated at n.

Reverting to the means for adjusting the various cams it will be understood that in a machine having a number of feeds there will be a set of the micrometer adjusting devices at each feed. The cam rings will be composed of removable sections. One of these is indicated in Fig. 4 and the radial lines of division between the removable sections is indicated at 52. Each section carries a yarn guide, a set of sinker cams, a presser cam, a presser lining up or restoring plate and a needle deflecting plate, if this is used, and each section carries a set of micrometer adjusting devices, so that like adjustments at all the feeds can be made with precision, once the parts have been set to get uniform knitting at all of the feeds. For this purpose the finger wheels of the micrometer adjustments have their calibrated portions adapted to be adjusted so that all may be similarly set at the same scale mark when uniform knitting has been attained at all the feeds.

In other words, in setting the machine for uniform knitting, it may be found necessary to turn the micrometer device at one feed through a greater angle than that at an-

other feed, in order to compensate for irregularities in the manufacture of the parts so that the scale reading at one feed would be different from that at another feed when uniform knitting has been attained. Under these circumstances the operator will adjust the scales of all the micrometers to the same reading or mark and thereafter in making any adjustment for tight or loose knitting all of the feeds can be set so that under the new adjustment the work will be uniform throughout, by adjusting the micrometer device to register the same scale mark with the pointer members x, Fig. 4.

This micrometer adjustment involves the ring 30^a, Fig. 4^a, carrying the scale marks, a plate 30^b and a screw 30^x. By loosening the screw the ring 30^a can be turned to bring the desired scale mark to the pointer x so that all of the micrometers may be made to read alike. The screw is tightened to clamp the ring 30^a between the plate 30^b and the knurled flange.

To lengthen the stitch:—This is done by adjusting the cam 24 for which purpose the locking screw 36 belonging to this cam is loosened, and then the adjusting screw 29 belonging to this cam is turned in to the desired extent, and when the intended position is reached the locking screw 36 is again tightened up to set the adjusting screw in its new position. A similar procedure is gone through in connection with the knock over cam 27, and the needle pull down cam is also adjusted.

To shorten the stitch:—Loosen the locking screw 36 belonging to the cam 24 and turn back on the corresponding adjusting screw 29 and this outward adjustment of this screw is carried to more than the extent necessary for the exact position of the cam. Next loosen the knurled nut 33 belonging to this set of adjusting devices and pull out on this nut until the cam is arrested by the adjusting screw 29 or rather by coming against the pin 28′ associated with said screw, then tighten the knurled nut 33 and turn in on the adjusting screw 29 to the desired reading on the micrometer scale and then lock in place by turning the screw 36. Make corresponding adjustments with the knock over cam and the needle pull down cam.

For example, assume that the reading of the stitch cam adjusting screw is 80, and it is desired to shorten the stitch 10 graduations, we loosen the locking screw 36, turn the adjusting screw 29 back an excess amount, say to the reading 30, then loosen knurled nut 33 and pull it back as far as it will go, that is until the cam is arrested by the screw 29, or its pin 28′, then tighten nut 33 and turn in an adjusting screw 29 until it reads 70 and lock in place by screw 36.

Certain features disclosed herein have been made the subject of divisional applications, namely, detector and stop motion means, filed August 8th, 1921, Serial No. 490,647; yarn feeding means, filed August 8th, 1921, Serial No. 490,648; and yarn sinking mechanism, filed August 8th, 1921, Serial No. 490,649.

We claim as our invention:

1. A multiple feed knitting machine comprising needles, instruments co-operating with the needles in the knitting operation, cams for the needles, cams for said instruments and micrometer adjusting means at each feed for each of the said cams, said micrometer means being adjustable to present like indications after the parts are initially set, substantially as described.

2. A multiple feed knitting machine comprising needles, instruments co-operating therewith in the knitting operation, cams for the needles, cams for said instruments and micrometer adjusting means at each feed for each of the said cams, said micrometer means having their calibrate portions adjustable, so that all may be set at corresponding scale marks when the cams have been set to compensate for irregularities in the manufacture of the parts, substantially as described.

3. In combination in a knitting machine, needles, instruments co-operating with the needles in the knitting operation, cams for the needles, a cam ring, a cam for said instruments mounted on said ring and means for adjusting the latter cam, comprising a screw connected therewith and extending radially of the cam ring, and a clamp nut, the cam ring being slotted and the cam having a stud passing through the slot and engaged by the said nut, substantially as described.

4. In combination in a knitting machine, needles, instruments co-operating with the needles in the knitting operation, cams for the needles, a cam ring, a cam for said instruments and means for adjusting the latter cam, comprising a screw extending radially of the cam ring, and a clamp nut, the cam ring being slotted and the cam having a stud passing through the slot and engaged by the said nut, and a loose pin extending coaxially with and engaged by the screw and bearing on the cam, substantially as described.

5. In combination, needles, instruments co-operating with and reciprocating between the needles, a cam ring, a pair of cams for operating the instruments, said cams being interconnected whereby the adjusting movement of one is limited by the other and means whereby each cam may be adjusted relative to the other or both adjusted and their relation maintained to each other.

6. In combination, needles, instruments

co-operating with and reciprocating between the needles, a cam ring, a pair of cams for operating the instruments, said cams being interconnected whereby the adjusting movement of one is limited by the other and means whereby each cam may be adjusted relative to the other or both adjusted and their relation maintained to each other, said cams being interconnected by a projection on one fitting in a notch, wider than the projection, in the other, substantially as described.

7. In combination, spring beard needles, individual pressers therefor, instruments reciprocating between the needles, cams for operating the said instruments, a cam for the pressers having a stem, a cam ring, having a slot, said stem having a stud extending through the slot, a clamp nut on the stem, a micrometer screw extending in line with the stem and carried by the cam ring for adjusting the presser cam, substantially as described.

8. In combination in a circular multiple feed knitting machine, a sectional cam ring, cams carried by each section, horizontally extending micrometer screws mounted in the ring sections for adjusting the cams, means extending from the cams up through the sections for clamping the cams in adjusted position, said micrometer screws having their calibrated portions individually adjustable to be set to zero without turning the screws, and clamping means for the screws, substantially as described.

9. In combination in a circular multiple feed knitting machine, a sectional cam ring, cams carried by each section, horizontally extending micrometer screws mounted in the ring sections for adjusting the cams, clamping means for the screws extending up through the cam ring and having means at their upper ends by which they may be operated, said micrometer screws having their calibrated portions individually adjustable to be set to zero while said screws are held by the clamping means, substantially as described.

10. In combination in a multiple feed knitting machine, knitting instruments, cam means at each feed, micrometer screw adjusting means at each feed for the cam means, and clamping means for each micrometer screw, each micrometer screw being individually adjustable as to its indications, so that they may be set at zero after the cams are initially set and the screws clamped, substantially as described.

11. A multiple feed knitting machine comprising knitting instruments, cams at the several feeds for said knitting instruments, micrometer adjusting means at each feed for the cams, each of said micrometer means being adjustable as to its indications to present like readings after the cams are initially set.

12. A multiple feed knitting machine comprising knitting instruments, cams for the knitting instruments, a cam ring, movable clamping means in the cam ring for the cams and micrometer screws for adjusting the cams, said screws being capable of being adjusted outwardly without retracting the cams, said clamping means being accessible for manual operation from the exposed side of the cam ring and serving as handles for moving the cams in relation to the knitting instrument.

In testimony whereof, we affix our signatures.

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WILLIAM O. TAYLOR.