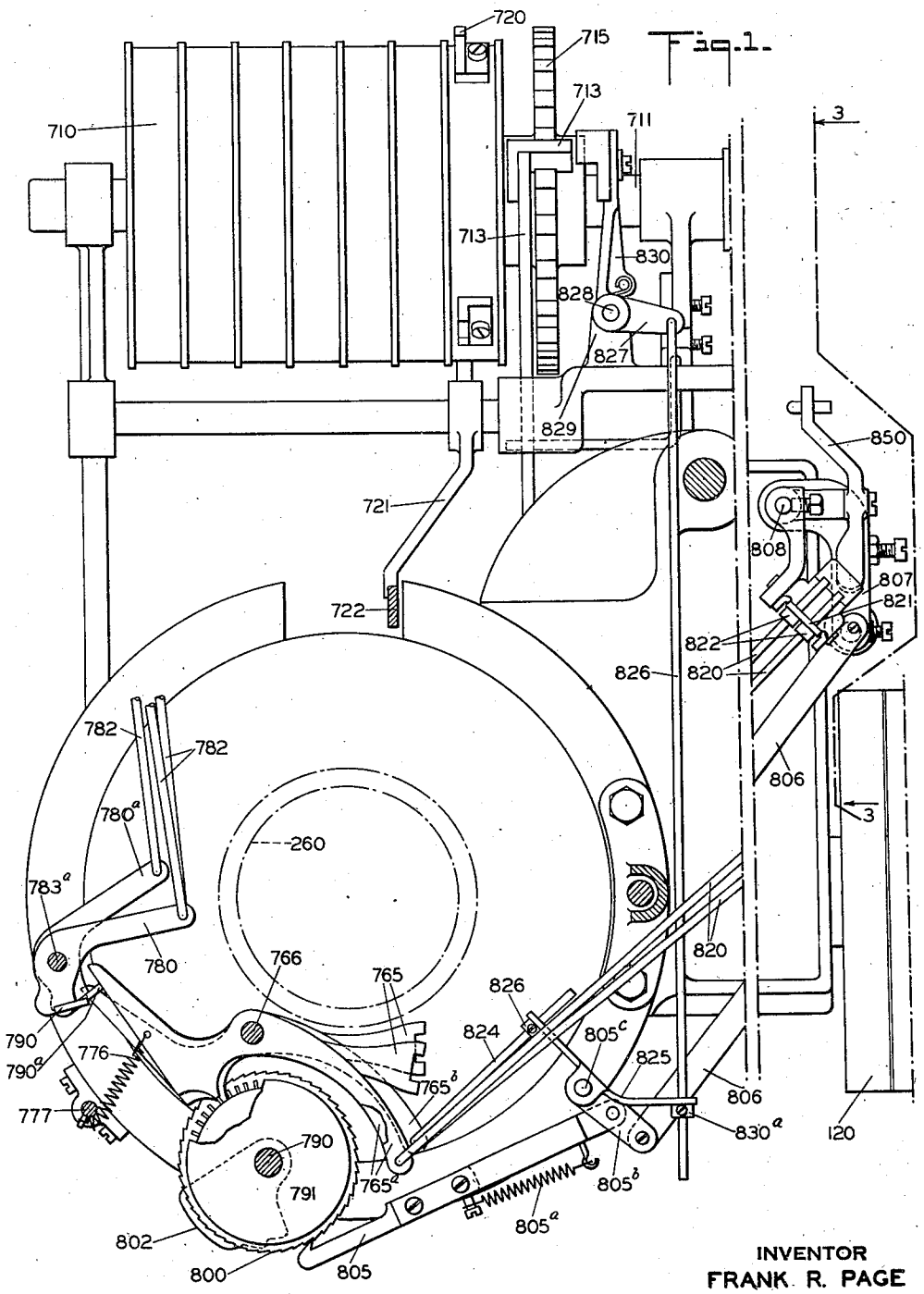
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KNITTING MACHINE

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Fig. 1.



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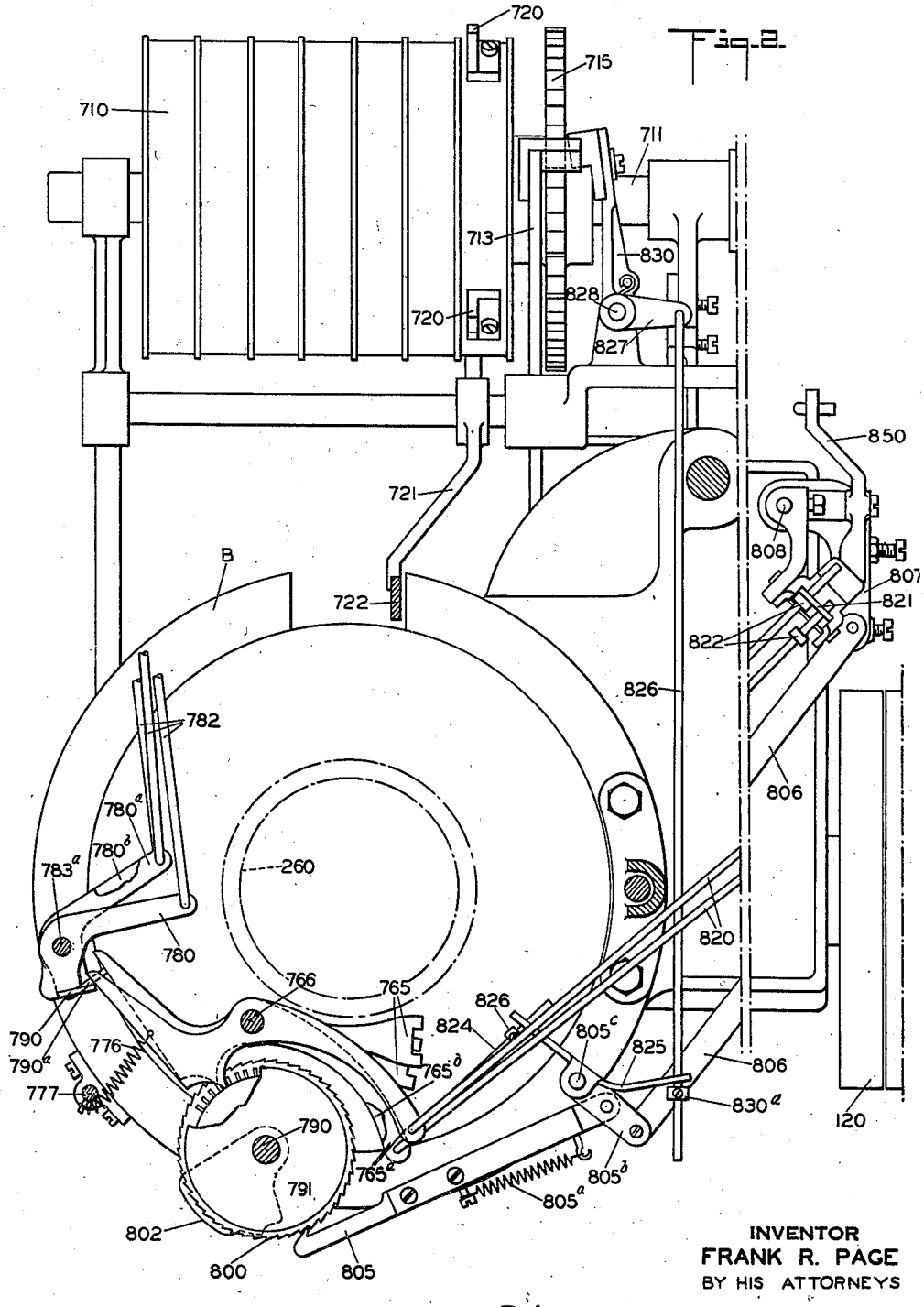
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Fig. 2.



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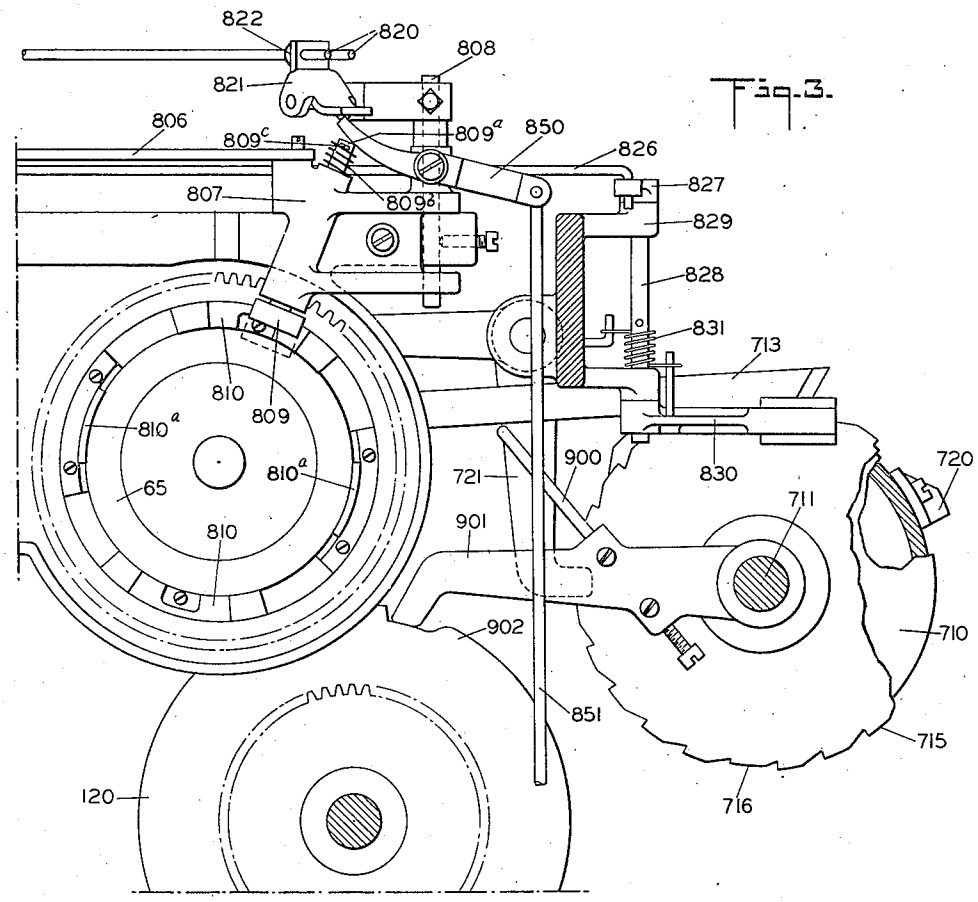


Fig. 3.

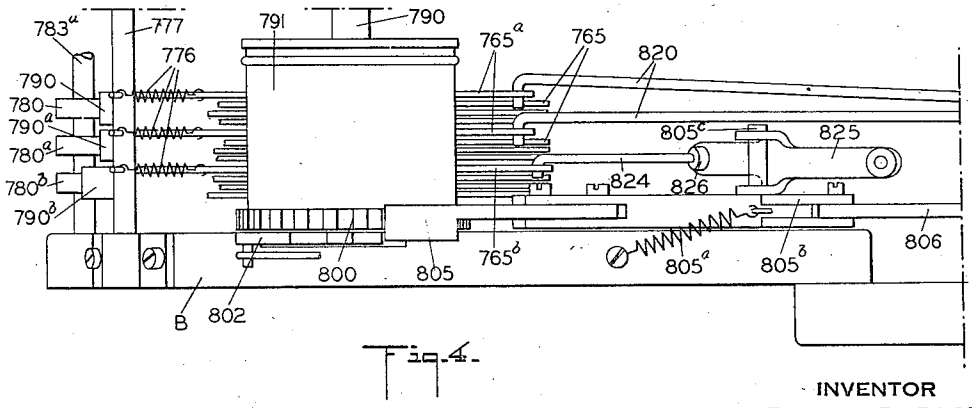


Fig. 4.

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UNITED STATES PATENT OFFICE

2,005,632

KNITTING MACHINE

Frank R. Page, Brooklyn, N. Y., assignor to Scott & Williams, Incorporated, New York, N. Y., a corporation of Massachusetts

Application August 2, 1933, Serial No. 683,378

10 Claims. (Cl. 66—50)

This invention relates to knitting machines and more particularly to knitting machines having pattern mechanisms and it is an object of this invention to provide improved controlling means for the pattern mechanisms such that the control of the pattern mechanisms is more flexible, and the number of courses which must intervene between pattern changes is reduced without materially restricting the number or variety of patterns which can be made upon the pattern mechanism of the machine to which the invention is applied.

It is also an object of this invention to provide in a circular knitting machine having pattern means controlling the formation of float stitches, means whereby change or racking of the pattern means is controlled by the pattern means, and it is also an object of this invention to provide in a circular knitting machine having pattern means controlling the formation of float stitches and pattern means controlling a plurality of yarn guides for forming horizontal stripes, means whereby the operation of the yarn guide controlling means is controlled by the pattern means governing the formation of the float stitches.

In the drawings:

Fig. 1 is a partial horizontal section through the head of a circular knitting machine constructed in accordance with this invention, some parts being broken away to show other parts more clearly and some of the parts being shown in operated positions;

Fig. 2 is a view similar to Fig. 1 with some of the operating parts in different positions;

Fig. 3 is a view in elevation of some of the parts shown in Figs. 1 and 2, parts being broken away to show other parts more clearly; and

Fig. 4 is a view in elevation of other of the parts shown in Figs. 1 and 2.

In the drawings the invention is shown in connection with a circular knitting machine of the Scott and Williams type, such as is shown in the application of Albert E. Page, Serial No. 359,962, filed May 2, 1929, Patent No. 1,969,853, issued Aug. 14, 1934 and it comprises a revolving needle cylinder **260** the needles of which are controlled by the usual knitting cams and pattern jacks (not shown). The jacks are selected in the usual manner by reader cams **765** pivotally mounted on a pin **766** secured in the bed plate B and operated in accordance with the presence or absence of butts on the selector bars in the slots of the auxiliary pattern drum or trick wheel **791** rotatably mounted on the pin **790** fixed in the bed plate B. The trick wheel **791** is operated step-by-step by means of a ratchet **800** formed on the lower portion of the drum and engaged by a pawl **805**. The pawl **805** is moved forward to engage a tooth of the ratchet **800** by a spring **805a** connected to the pawl and to the bed plate B and the pawl is operated to shift the ratchet wheel **800** by a lever **805b** to which the pawl is connected intermediate the ends of the lever **805b**. One end of the lever **805b** is pivotally mounted upon a pin **805c** fixed in the bed plate B and the other end of the lever is connected by link **806** to a bracket **807** which is pivotally supported on post **808** fixed to the bed plate B. Slidably mounted in the bracket **807** is a spindle **809a** having a roller **809** mounted on its lower end and having a spring **809b** surrounding its upper end and confined between the bracket **807** and a cotter-pin **809c** inserted in an opening in the spindle **809a**. Spring **809b** tends to hold the spindle in its upper position as shown in Fig. 3 but permits of the spindle being moved to a lower position. In the upper position of the spindle **809a** the roller **809** is positioned to engage cams on the high speed gear **65** at one distance from the center of the gear while in the lower position of the spindle **809a** the roller **809** engages cams closer to the center of the gear In the arrangement shown in Fig. 3 the cams **810** on the gear **65** are engaged with the roller in the upper position of the spindle and the cams **810a** as well as the cams **810** are engaged by the roller when the spindle is in its lower position. To operate the spindle there has been provided a lever **850** pivotally mounted on the bracket **807** and having one end positioned to engage the upper end of the spindle **809a** and its other end connected to a link or push rod **851** arranged to be operated in the usual manner from the main pattern or control mechanism (not shown). The engagement of the pawl **805** with the ratchet **800** may be controlled by a guard **802** operated from the pattern chain or drum as described in application Ser. No. 359,962, so that the pawl **805** may be prevented from operating the drum; allowed to operate the drum upon each reciprocation of the pawl or allowed to operate the drum only to the usual low tooth in the ratchet so as to position the drum for the starting of the pattern.

The machine to which this invention is applied is also provided with an auxiliary pattern or striper drum **710** mounted upon an axle **711** suitably supported in the machine frame and operated by the engagement of a pawl **713** operated by a cam on the main drive shaft with the teeth of a ratchet wheel **715** attached to one end of the drum. The striper drum **710** is provided with

cams 720 which engage and operate bell crank levers 721 and through push rods 722 control the usual yarn guides (not shown) and the yarns fed thereby to the needles. Operation of the drum 710 causes the insertion and removal of the various yarns in accordance with the pattern determined by the positions of the cams on the drum and may provide for the changing of the yarns at predetermined intervals so as to form horizontal stripes of yarns of different colors in the fabric knit. The operation of the drum 710 by the pawl 713 during those parts of the fabric when striping is not desired, as during the make-up, press-off, the heel and toe, is prevented by a plunger 900 mounted in a lever 901 which is operated by suitable cams 902 on the main drum 120, the plunger 900 engaging the pawl 713 and holding it raised to prevent the pawl engaging the teeth of ratchet wheel 715. At one point the cams 902 are of such a height that the pawl 713 will engage all of the teeth of the ratchet wheel 715 but tooth 716 which is of less height than the other teeth thus providing means for permitting of the racking of the striping drum 710 to a uniform or starting position in which the low tooth 716 of the ratchet wheel 715 is beneath the pawl 713.

The reader cams 765 pivoted on the pin 766 are arranged to be held in contact with the butts on the selector bars in the trick wheel or auxiliary pattern drum 791 or moved inwardly when the butts are not present on the bars by means of springs 776 secured to the cams 765 and to a pin or post 777 secured to the bed plate B. The cams 765 are arranged to be held in inactive or inoperative positions in which they are not operated in accordance with the presence or absence of the butts of the selector bars of the trick wheels in a plurality of groups, three such groups being shown in Fig. 4, by means of contacts 790, 790a, 790b, of sufficient width to span all of the cams of the group and carried by levers 780, 780a, 780b pivotally mounted upon a post 783a fixed in the bed plate B. Links 782 connect the levers 780, 780a and 780b to mechanism operating from the main drum in accordance with the pattern or other requirements of the fabric knit.

Associated with each of a plurality of the groups of cams 765 is a lever 765a, these levers being controlled by the levers 780, 780a and by the presence of absence of butts on the selector bars on the trick wheel 791 in the same manner as are the cams 765 but the ends of the levers 765a are bent away from the needle cylinder so that the levers do not contact with the jack butts. To the ends of levers 765a are connected ends of rods 820 the other ends of which extend through openings in one arm of a bell crank lever 821 which is pivotally mounted on a bracket fixed on post 808 and has its other arm in position to engage the arm of the lever 850 which contacts with the spindle 809a. Collars 822 fastened upon the rods 820 engage the bell crank lever 821 and operate the spindle 809a to its lower position when either of the levers 765a is moved inwardly by its spring 776 at those positions of the trick wheel in which there are no butts on the selector bar to contact with the lever 765a. Also associated with the cams 765 is a lever 765b pivotally mounted on the pin 766 and operated and controlled in the same manner as are the levers 765a. In the drawings a single lever 765b is shown associated with the cams 765 of the lowermost group but it will be understood that a different number of groups of cams 765 may be arranged and that a lever 765b may be associated with each group of cams 765, the arrangement shown being chosen for the purposes of illustration only. To one arm of the lever 765b is connected one end of a rod 824, the other end of which extends through an opening in one arm of a lever 825 pivotally mounted on the pin 805c. A collar 826 secured upon the rod 824 provides for the operation of the lever 825 upon movement of the lever 765b by its spring 776 when the trick wheel 791 is turned to a position in which the selector bar has no butt to be engaged by the lever 765b. In some pattern arrangements rod 824 can be operated by one of the levers 765a and the special lever 765b therefor omitted. Extending through an opening in the other end of lever 825 is one end of a rod 826, the other end of which is pivotally connected to the end of a crank arm 827 fixed upon a shaft 828 journalled in brackets 829 carried by the machine frame. A collar 830a secured to the rod 826 causes operation of the rod when the lever 825 is operated by the rod 824. Also fixed upon the shaft 828 is an arm 830 the outer end of which is adapted in one position of the arm 830 to engage beneath the pawl 713 which operates the striper drum 710 and prevent the operation of the striper drum by the pawl. A spring 831 mounted upon the shaft 828 and having its ends secured to the machine frame and arm 830 tends to hold the arm 830 with its end engaged beneath the pawl 713 in position to prevent operation of the drum 710 by the pawl. The arrangement of the levers and rods is such that when lever 765b is not engaged by a butt on a selector bar on the trick wheel 791 the arm 830 is withdrawn from beneath the pawl 713 and the pawl permitted to operate the striper drum, the spring 776 overcoming the spring 831.

In the knitting of a fabric the operation of the machine is as described in the Page application, Serial No. 359,962, except where modified by the mechanism described above. Where the machine has progressed on the fabric to a point where the pattern mechanism is operative each lever 765a when released by its detent 790, 790a or 790b will be operated by the butts on the selector bars of the trick wheel 791 to control the position of the roller 809 on spindle 809a and determine the rate at which the pawl 805 ratchets the auxiliary pattern drum and thus determines the length along the wale, that is, the number of courses comprised within each pattern determined by a group of the cams 765. With levers 765a in the different groups of cams 765 it is, of course, possible to have the patterns determined by the different groups of cams 765 of different lengths along the wale. Where a lever 765b is associated with each group of cams 765 having a lever 765a or where a rod 824 is connected to each lever 765a, the control by the drum 791 of the rate at which it is operated by the pawl 805 permits of a control of the width of the stripes, that is, the number of courses in each stripe by the striper drum 710 and this width may differ in the stripes formed while the striper drum 710 is operated in conjunction with the different groups of cams 765.

I claim—

1. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling the operation of said yarn guides, means for operating said drum, an auxiliary pattern drum controlling the operation of said pattern jacks, and means controlled by said auxiliary pattern drum controlling the operation of said pattern drum operating means.

2. In a knitting machine having a plurality

of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling the operation of said yarn guides, means for operating said drum, an auxiliary pattern drum controlling the operation of said pattern jacks, and means controlled by said auxiliary pattern drum controlling the operation of said pattern drum operating means and said auxiliary pattern drum.

3. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said yarn guides, an auxiliary pattern drum controlling said pattern jacks, a rotatable member having cams thereon arranged in a plurality of tracks, operating means for the auxiliary pattern drum operated by said cams and means controlled by said auxiliary pattern drum for controlling the operation of the pattern drum for the yarn guides and the operation of said operating means for the auxiliary pattern drum by the cams of either track.

4. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling the operation of said yarn guides, means for operating said drum, an auxiliary pattern drum controlling the operation of said pattern jacks, a rotatable member having cams thereon arranged in a plurality of tracks, means for operating said auxiliary pattern drum operated by the cams of either track and means operated by said auxiliary pattern drum for controlling the pattern drum operating means and to effect the engagement of the auxiliary pattern drum operating means with the cams of either track.

5. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said yarn guides, an auxiliary pattern drum controlling said pattern jacks and having a ratchet, a pawl engaging said ratchet to operate said auxiliary pattern drum, a rotatable member having cams thereon arranged in a plurality of tracks, means for operating said pawl arranged to engage the cams of either track and means controlled by said auxiliary pattern drum for controlling the operation of the pattern drum for the yarn guides and the operation of said pawl operating means by the cams of either track.

6. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said yarn guides, operating means for said pattern drum, means biased to prevent operation of said pattern drum by said operating means, an auxiliary pattern drum controlling said pattern jacks and having a ratchet, a pawl engaging said ratchet to operate said auxiliary pattern drum, a rotatable member having cams thereon arranged in a plurality of tracks, means for operating said pawl arranged to engage the cams of either track and means controlled by said auxiliary pattern drum for operating said biased means to permit operation of the pattern drum and to effect operation of said pawl operating means by the cams of either track.

7. In a knitting machine having pattern jacks cooperating with the knitting instrumentalities, pattern jack selecting means, a pawl and ratchet for operating said jack selecting means, a rotatable member having cams arranged in a plurality of tracks thereon, means for operating said pawl by said cams and means controlled by said jack selecting means for effecting operation of said pawl by the cams of any track.

8. In a knitting machine having pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said jacks, a rotatable member having cams thereon arranged in a plurality of tracks, operating means for said pattern drum arranged for operation by said cams and means operated by said pattern drum for effecting operation of said drum operating means by the cams of any track.

9. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said yarn guides, operating means for said pattern drum, means biased to prevent operation of said pattern drum by said operating means, an auxiliary pattern drum for controlling the pattern jacks and means controlled by said auxiliary pattern drum for operating said biased means to permit operation of the pattern drum for the yarn guides.

10. In a knitting machine having a plurality of yarn guides and pattern jacks cooperating with the knitting instrumentalities, a pattern drum controlling said yarn guides, operating means for said pattern drum, a main pattern drum, means operated by said main pattern drum controlling the operating means for the pattern drum for the yarn guides, an auxiliary pattern drum for controlling the pattern jacks and means controlled by said auxiliary pattern drum for controlling the operating means for the pattern drum for the yarn guides when said main pattern drum renders said operating means operative.

FRANK R. PAGE.