F. B. WILDMAN & G. L. BALLARD.

PATTERN MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED SEPT. 9, 1914.

1,194,584.

Patented Aug. 15, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

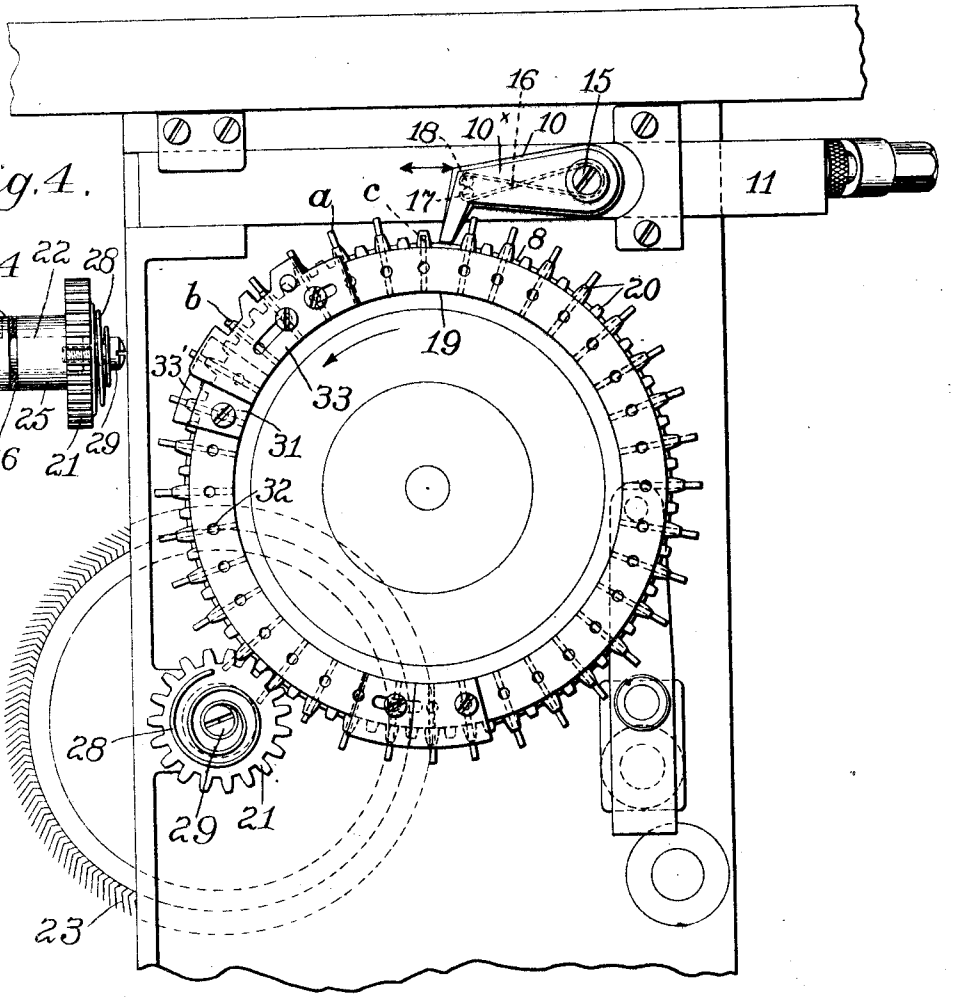


Fig. 4.

Fig. 2.

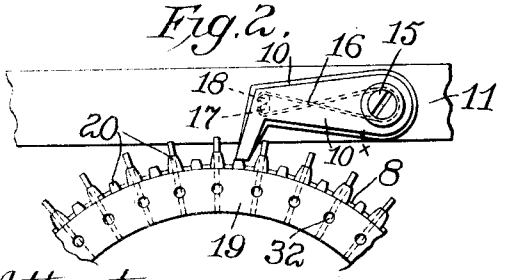
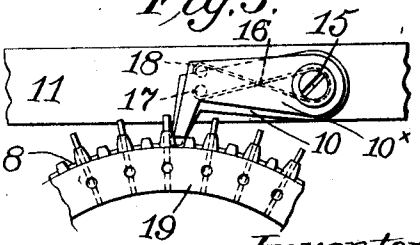


Fig. 3.



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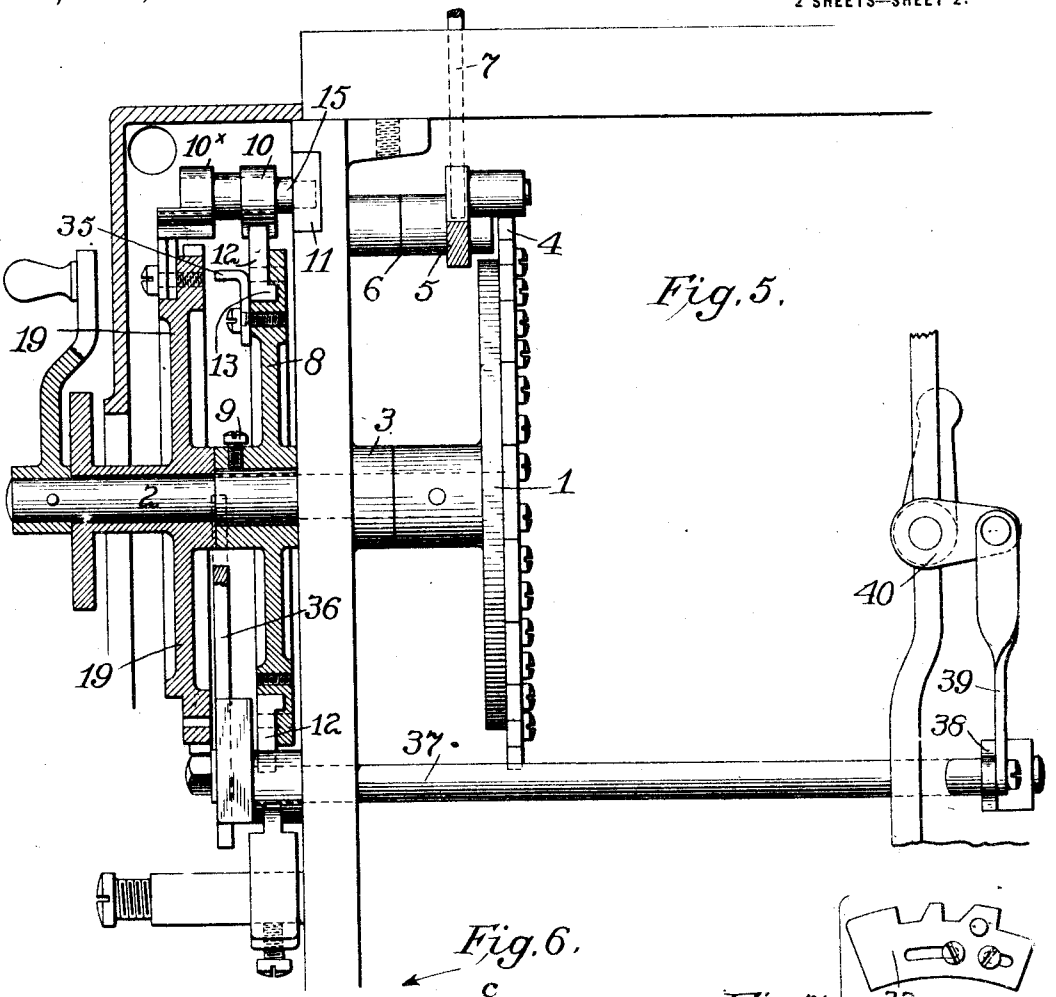


Fig. 5.

Fig. 6.

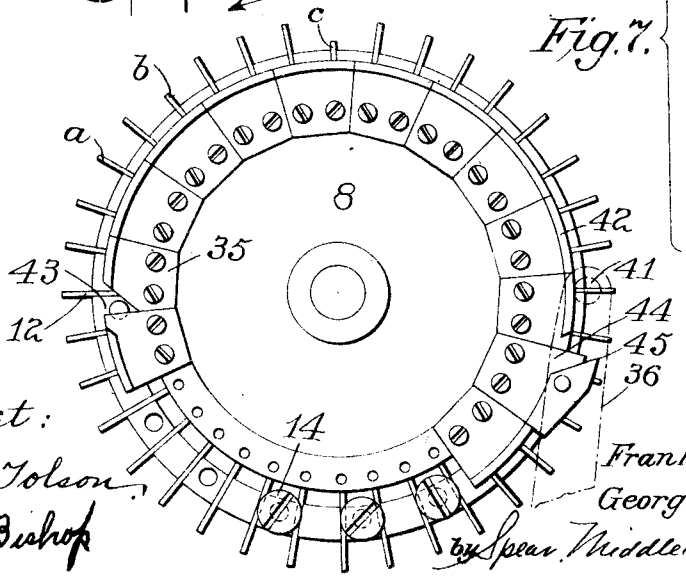
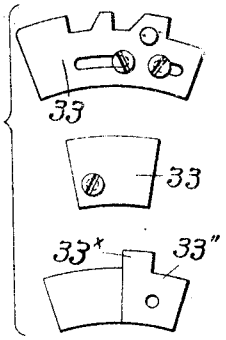


Fig. 7.



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UNITED STATES PATENT OFFICE.

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PATTERN MECHANISM FOR KNITTING-MACHINES.

1,194,584. Specification of Letters Patent. Patented Aug. 15, 1916.

Application filed September 9, 1914. Serial No. 860,917.

To all whom it may concern:

Be it known that we, FRANK B. WILDMAN and GEORGE L. BALLARD, a citizen of the United States and a subject of the King of Great Britain, respectively, residing at Norristown, Pennsylvania, have invented certain new and useful Improvements in Pattern Mechanism for Knitting-Machines, of which the following is a specification.

Our invention relates to pattern mechanism for circular knitting machines of the type in which a pattern ratchet is employed to operate the pattern member, preferably a wheel, said ratchet being operated at intervals by a constantly reciprocating pawl, which is controlled by a second pawl in turn controlled by a measuring wheel operated from the fabric roller of the machine, the measuring pawl reciprocating with the pattern ratchet pawl and exerting control over the measuring wheel. Such general type of pattern mechanism is well known in connection with the Wildman ribber, and is shown, for instance, in Letters Patent of the United States granted to F. B. Wildman, #613,346, November 1, 1898.

Our present invention consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a front view of the pattern mechanism embodying our invention; Fig. 2 is a front view of the measuring and pattern ratchet pawls in relation to the measuring wheel; Fig. 3 is a view similar to Fig. 2 with the pawls moved forward part way ready to turn the pattern ratchet wheel; Fig. 4 is a detail view of friction drive between the measuring wheel and the fabric roller; Fig. 5 is a vertical sectional view of Fig. 1 along the shaft of the pattern mechanism; Fig. 6 is a front view of the pattern ratchet; Fig. 7 shows different forms of measuring plates.

In carrying out the invention, different forms of pattern members may be employed, but in the particular construction shown we use a pattern wheel 1 fixed to a shaft 2 journaled in the frame at 3. This pattern member has plates 4 fixed thereto which operate a lever 5 pivoted to the frame at 6, said lever operating a rod 7 vertically which carries a tappet device or roller (not shown but well known in the Wildman machine), which roller operates certain devices to make changes in the knitting.

For driving the pattern member 1 step by step, a pattern ratchet 8 is fixed to the shaft 2 by a set screw 9, and this ratchet is moved step by step by a pawl 10 pivotally mounted on a slide 11 guided in the frame of the machine, said slide being operated in any suitable manner from the moving parts of the machine, so that its reciprocations are properly timed to the machine's revolutions. This ratchet, instead of having teeth of the usual ratchet formation cut therein, has teeth of a different form from those ordinarily employed, and these teeth are removably mounted. They consist of thin plates 12 seated in transverse slots formed in the periphery, and one side face of the ratchet wheel, said slots extending partly across the ratchet wheel, each tooth having a right angular extension 13 seated in a lateral extension of the slot. The teeth are held in place by the heads of screws 14 which overlie them, and by removing these screws the teeth may be removed and replaced, and by removing these teeth at desired points the production of the pattern can be regulated, as will be referred to more fully hereinafter.

The ratchet teeth 12 are of different lengths, long ones being indicated at *a*, intermediate length teeth as at *b*, and a short tooth is shown at position *c*. The pattern ratchet pawl 10 is controlled to miss contact with some of these teeth by a second pawl 10^x, which we will term the measuring pawl. This is pivoted on the same pin 15 to which the pattern ratchet pawl 10 is pivoted, these two pawls having independent pivotal movement at times, and joint pivotal movement at other times, these actions being secured by a spring connection between the said pawls. This spring connection consists of the spring wire 16 extending around the pivot pin 15, the upper arm of the spring extending down beneath a pin 17 on the pattern ratchet pawl 10, while the lower arm of the spring wire extends over a pin 18 on the measuring pawl 10^x.

It will now be seen that when the pawl 10^x is lifted the pawl 10 also will be lifted through the spring wire connection, but this connection will allow the pattern ratchet pawl to have up and down movement independently of the measuring pawl 10^x. This

pawl coöperates with a measuring wheel 19 which is loosely mounted on the shaft 2. It has teeth 20 performing a two-fold purpose; one function of the teeth being to mesh with a driving gear 21, on the shaft 22, which shaft carries the card clothed fabric roller or wheel 23. This shaft is journaled in the frame at 24.

The other function of the teeth is to be engaged by the measuring ratchet 10^x so that the measuring wheel will be given a step by step forward movement and in advance of the slow measuring movement imparted by the drive gear 21. in order that this step by step movement may be imparted to the measuring wheel in advance of the slow measuring movement derived from the gear 21, said drive gear is operated from the fabric roller by a slip connection, Figs. 1 and 4. For this purpose the gear 21 is not fixed to its shaft, but its hub 25 bears against a fiber washer 26 which, in turn, bears against a collar 27 fixed on the shaft 22. A coil spring 28 of conical form adjustable by a screw 29 presses the gear so that its hub will bear frictionally upon the washer to be driven thereby, and thus the slow measuring movement will be imparted to the measuring wheel through the gear teeth. When, however, the measuring pawl engages the teeth of the measuring wheel and moves it, the gear 21 will, of course, be turned also, but its hub will slip around on the fiber washer without affecting the fabric wheel, the resistance of which will be in excess of the resistance existing between the fiber washer and the parts in contact therewith. The measuring pawl is designed to act only upon every other tooth of the measuring gear, and for this purpose alternate teeth are long ones to receive the thrust of the pawl. The measuring wheel carries measuring plates 33 which may be disposed thereon at different points, being capable of being set at three different positions in the instance illustrated on the face of the plate by screws 31 and holes 32, there being one of the latter in line radially with each tooth of the pattern ratchet. These measuring plates at predetermined intervals, according to their positions on the measuring wheel, come under the measuring pawl and lift it so that in its reciprocations it will not turn the measuring wheel step by step forward until allowed to do so by the plate. The lifting of the measuring pawl also lifts the pattern ratchet pawl so that it will miss the low teeth thereof and so long as this pattern ratchet pawl is held up and an intermediate length or low tooth is present within the range of its reciprocations, no movement will be imparted to the pattern ratchet and the pattern wheel, but when in the slow measuring movement of the measuring wheel imparted thereto by the gear 21 the measuring plate is brought from beneath the measuring pawl, or a low notch is brought under the pawl, this pawl will fall and allow the pattern ratchet pawl 10 to engage the intermediate or low tooth of the pattern ratchet and the measuring pawl will be permitted to drop into engagement with the long teeth 20 of the measuring wheel to secure a step by step measuring movement in advance of that derived from the gear 21. The measuring pawl, as stated, acts against the alternate long teeth 20 in moving the measuring wheel step by step, but not on the short teeth, its end being too wide to pass down in the space between a short and a long tooth.

The pattern ratchet pawl 10 acts against the long teeth of the pattern ratchet whenever any of these long teeth are within its range. When so acting the pawl 10 will strike the long tooth toward the outer end thereof, and its point will slide down along the face of this tooth to the base thereof, where it is seated in the wheel, and where the tooth can receive the pushing force of the pawl without liability of bending the tooth. This lowering of the point of the pattern ratchet pawl is allowed by the spring connection 16 between the two pawls, and another effect of this yielding connection is that while under the action just described the measuring pawl is held down in engagement with the edge of the measuring plate, or in engagement with the top of the teeth 20, the pressure, due to the yielding of the spring 16, is not sufficient to cause the measuring pawl to turn the measuring wheel by frictional engagement therewith, but it requires the engagement of the measuring pawl with the side of the long tooth 20 to effect the step movement of the measuring wheel.

The pattern ratchet 8 is provided with teeth of three lengths, as before stated, *i. e.*, long teeth which, when they are within range of the stroke of the pawl 10, will be engaged thereby to turn the ratchet and therefore the pattern wheel. The intermediate length tooth or series of such teeth will cause the stoppage of the pattern ratchet when one of the measuring plates on the measuring wheel engages and lifts the measuring pawl 10^x, for the lifting of this pawl will, through the spring 16, lift the pattern ratchet pawl also above the line of movement of the intermediate length teeth, and the pattern ratchet pawl 10 therefore, in its reciprocation, will miss the intermediate length tooth and the pattern ratchet and pattern wheel will now remain at rest until the measuring wheel, in slow measuring movement derived from the fabric roll and gear 21, carries the measuring plate from under the measuring pawl, allowing this to fall, together with the pawl 10, which thus engages the intermediate tooth of the ratchet

and turns the same. Both pawls now being down, the turning of both the pattern wheel and the measuring wheel step by step will now take place until the next measuring plate comes around and lifts the pawl 10^x and through it and the spring the pawl 10. The pattern ratchet and pattern wheel will now remain at rest while the slow measuring movement of the measuring wheel is going on and the measuring plate is being carried past the measuring pawl. At this time an intermediate length ratchet tooth is in position to be taken by the pawl 10 were this in its low position. The low tooth c' is the starting point of the fabric.

The measuring plate shown at 33 has a number of measuring surfaces or edges with notches between them with which the measuring pawl may engage to compensate for any out of time relation that may exist between the measuring wheel and the stroke of the pawl. For instance, should the measuring wheel for any reason become slightly displaced circumferentially and therefore slightly out of time, the measuring pawl will, through the notches of the measuring plate, bring the measuring wheel, together with its measuring plates, back into time, so that all the measuring plates will then be in proper time with the stroke of the pawl and with the pattern ratchet wheel. The teeth of the pattern ratchet are individually removable as above mentioned, so that the said teeth can be arranged in any desired order to make various changes in the fabric, and this can be done without using up much extent of the ratchet's surface or that of the pattern wheel.

We have provided means for operating a change speed drive mechanism for the knitting head so that at times the knitting head will run at one speed and at times at another speed, so that plain fabric may be made under high speed and the pattern fabric under a low speed. For this purpose we utilize the pattern ratchet wheel 8 and place thereon plates or blocks 35 held removably by screws. These plates are flanged at 42 to provide a track or runway for a roller on a lever 36 mounted on a shaft 37 journaled in the frame and connected by an arm 38, link 39, and bell crank 40 to a change speed clutch member which connects the head through either a high speed gearing or a low speed gearing with the drive shaft.

The roller or pin 41 of the lever is shifted to either one side or the other of the flange 42 through the gates at 43, 44, the latter gate having a cam portion 45 to direct the pin or roller from the outside to the inner side of the flange and the gate 43 will allow the pin or roller to pass from inside to outside of the flange, each shifting movement of the lever effecting through the connections described a change in the speed of revolution of the head. Some of the plates or blocks 35 are shown removed in Fig. 6 for convenience of illustration.

In Fig. 7 is shown a group of plates for measuring adapted to be fixed to the measuring wheel. The plate 33 is slotted as shown for adjustment. It may be associated as shown in Fig. 1 with another plate 33′ fixed to the measuring wheel, and also with a filler plate 33″ which may be set behind the plate 33, and the plate 33′ may extend partly in back of the plate 33. By adjusting the plate 33 the length of the combined measuring edge formed by the plates 33 and 33′ may be increased or decreased. The filler plate 33″ also may have a measuring edge at 33^x and the adjustment of the plate 33 with its measuring edge will effect a lengthening or a shortening of the measuring edge here.

We claim as our invention:—

1. In a pattern mechanism for knitting machines and in combination, a pattern member, a pattern ratchet for driving the pattern member, a pawl for moving the pattern ratchet, a measuring pawl connected to the pattern ratchet pawl for controlling its engagement at times with said pattern ratchet, a measuring wheel having teeth with which the measuring pawl engages, and a drive gear for the measuring wheel meshing with the same teeth with which the measuring pawl engages, substantially as described.

2. In a pattern mechanism for knitting machines and in combination, a pattern member, a pattern ratchet for driving the pattern member, a pawl for moving the pattern ratchet, a measuring pawl connected to the pattern ratchet pawl for controlling its engagement at times with said pattern ratchet, a measuring wheel having teeth with which the measuring pawl engages, a drive gear for the measuring wheel meshing with the same teeth with which the measuring pawl engages, and a yielding driving connection for said driving gear, substantially as described.

3. In combination in a pattern mechanism for knitting machines, a pattern member, a measuring wheel exerting control on the pattern member, said measuring wheel having gear teeth, a measuring pawl engaging said teeth, a drive gear wheel also engaging said teeth, and means for driving the gear wheel, substantially as described.

4. In combination in a pattern mechanism for knitting machines, a pattern member, a measuring wheel exerting control on the pattern member, said measuring wheel having gear teeth, a measuring pawl engaging said teeth, a drive gear wheel also engaging said teeth, means for driving the gear wheel consisting of a fabric roller and a yielding connection between the same and the drive gear, substantially as described.

5. In combination in a pattern mechanism for knitting machines, a pattern member, means for operating the same, a measuring wheel exerting control on said operating means, said wheel having long and short gear teeth, a pawl engaging the long teeth to operate the wheel step by step, and a gear wheel meshing with the long and short gear teeth to give the wheel a slow measuring movement, substantially as described.

6. In combination in a pattern mechanism for knitting machines, a pattern member, means for operating the same, a measuring wheel exerting control on said operating means, a pawl for operating the measuring wheel step by step, a gear for giving slow movement to the measuring wheel and meshing directly therewith, a fabric roller, a shaft carrying the same, said gear being mounted directly on said fabric roller shaft, a friction drive connection between the shaft and gear, and an adjustable spring for varying the frictional contact, substantially as described.

7. In combination a pattern member, a pattern ratchet connected thereto, a pawl for operating the pattern ratchet, a measuring wheel, a pawl for operating the said wheel step by step, and a spring connection between the pawls lifting the pattern ratchet pawl when the measuring pawl is lifted and permitting the pattern ratchet pawl to have movement about its pivot independent of the measuring pawl, substantially as described.

8. In combination in a pattern mechanism for knitting machines, a pattern member, means for operating the same, including a pawl and ratchet, a measuring wheel, a pawl for operating the measuring wheel, plates on the measuring wheel for lifting the measuring pawl out of operation, and a cross spring wire connecting the two pawls to lift the ratchet pawl when the measuring pawl is lifted, and to allow the ratchet pawl to move downwardly independently of the measuring pawl, substantially as described.

9. In combination a pattern wheel, a ratchet having teeth in the form of thin blades, a pawl to engage said teeth, a measuring wheel, a measuring pawl, measuring plates on a measuring wheel to lift the measuring pawl, and a spring connection between the two pawls to lift the ratchet pawl when the measuring pawl is lifted, and to allow the ratchet pawl to slide down along the face of its tooth to engage the lower portion of said tooth for turning the ratchet, said sliding movement being independent of any downward movement of the measuring pawl, substantially as described.

10. In combination a pattern wheel, a pawl and ratchet mechanism for operating the same, a series of plates removably secured to said ratchet mechanism, said plates having track portions and certain of the plates having gates, said plates being interchangeable so that the gates may be located at different points about the ratchet, and a change speed lever controlled by the said plates, substantially as described.

11. In combination in a pattern mechanism for knitting machines, a change speed lever, a rotary member carrying a series of interchangeable plates forming a track for said change speed lever, said track having gates at intervals to change the position of the lever and thereby effect a change of speed, the said gates being adjustable to different points about the rotary member by interchanging the plates, substantially as described.

In testimony whereof, we affix our signatures in presence of two witnesses.

FRANK B. WILDMAN.
GEORGE L. BALLARD.

Witnesses:
CORA T. FELTON,
OWEN BALLARD.