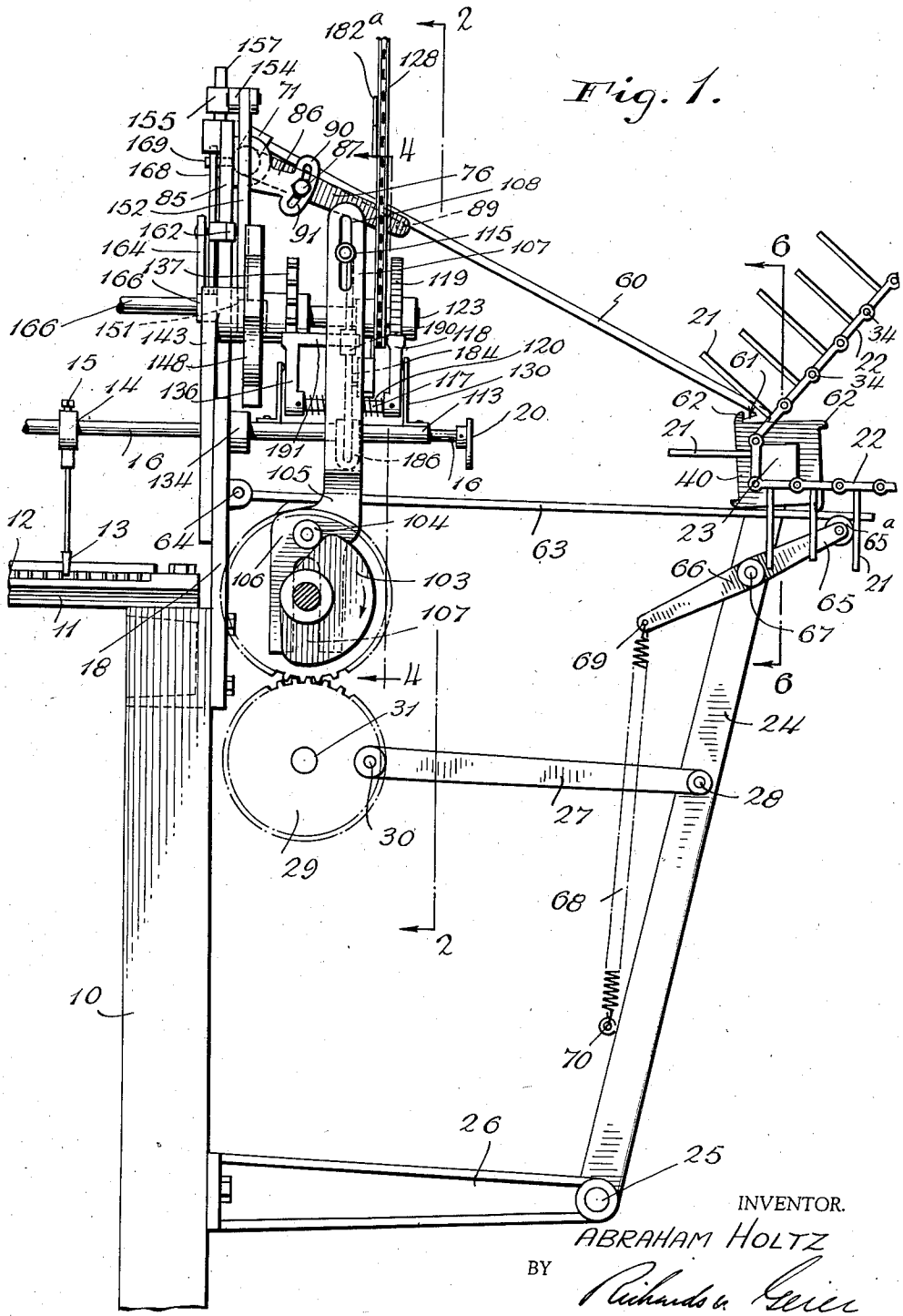
Oct. 5, 1937. A. HOLTZ 2,095,133

KNITTING MACHINE

Filed Feb. 13, 1935 5 Sheets-Sheet 1

Fig. 1.



INVENTOR.
ABRAHAM HOLTZ
BY
Richards & Geier
ATTORNEYS

Oct. 5, 1937. A. HOLTZ 2,095,133

KNITTING MACHINE

Filed Feb. 13, 1935 5 Sheets-Sheet 2

Fig. 2.

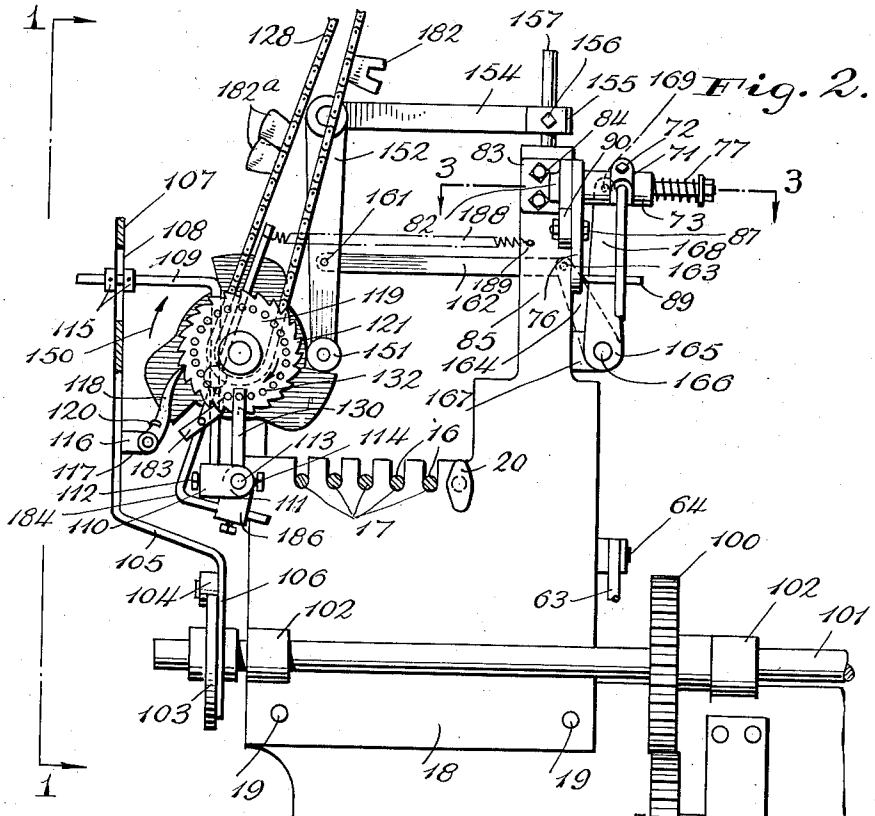
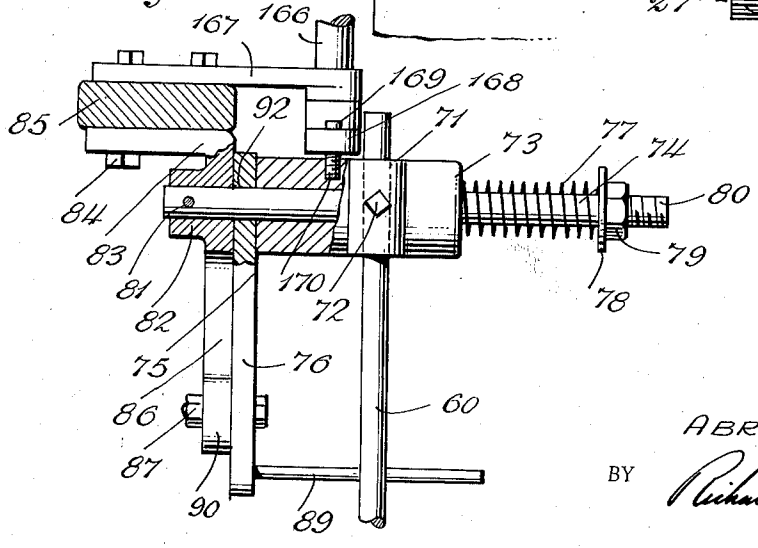


Fig. 3.



INVENTOR.
ABRAHAM HOLTZ

BY Richards & Geier

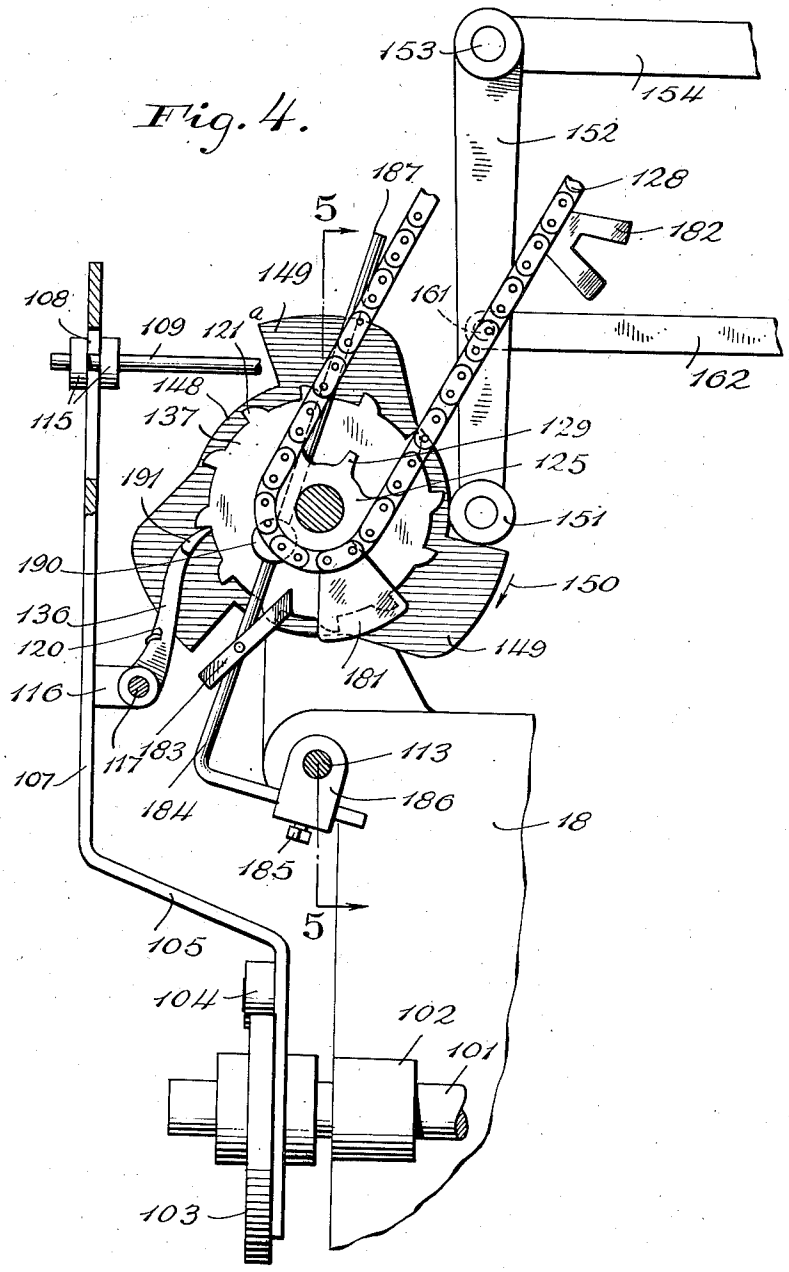
ATTORNEYS

Oct. 5, 1937. A. HOLTZ 2,095,133

KNITTING MACHINE

Filed Feb. 13, 1935 5 Sheets-Sheet 3

Fig. 4.



INVENTOR.
ABRAHAM HOLTZ
BY Richards & Geier
ATTORNEYS

Oct. 5, 1937. A. HOLTZ 2,095,133

KNITTING MACHINE

Filed Feb. 13, 1935 5 Sheets-Sheet 4

Fig. 5.

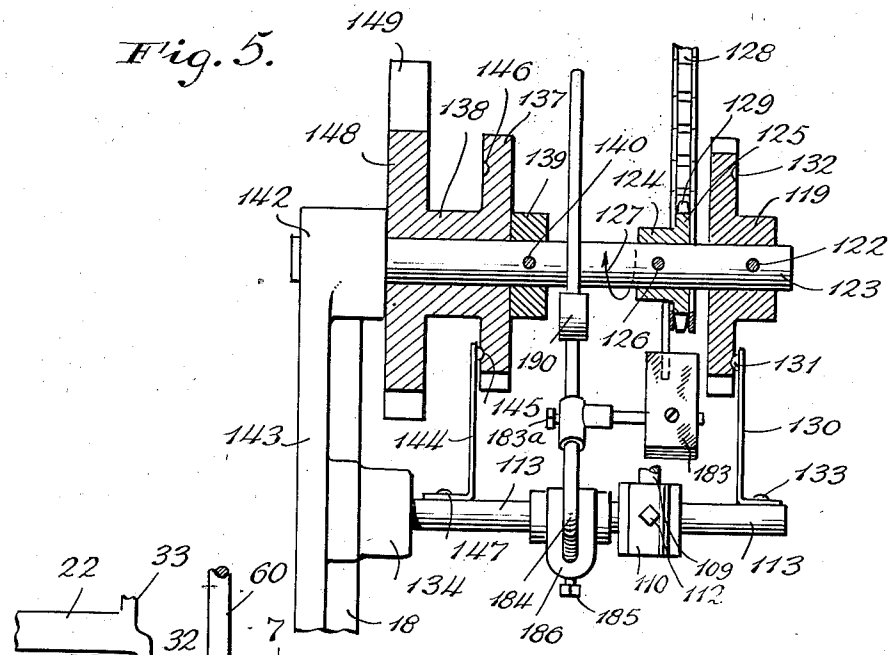


Fig. 6.

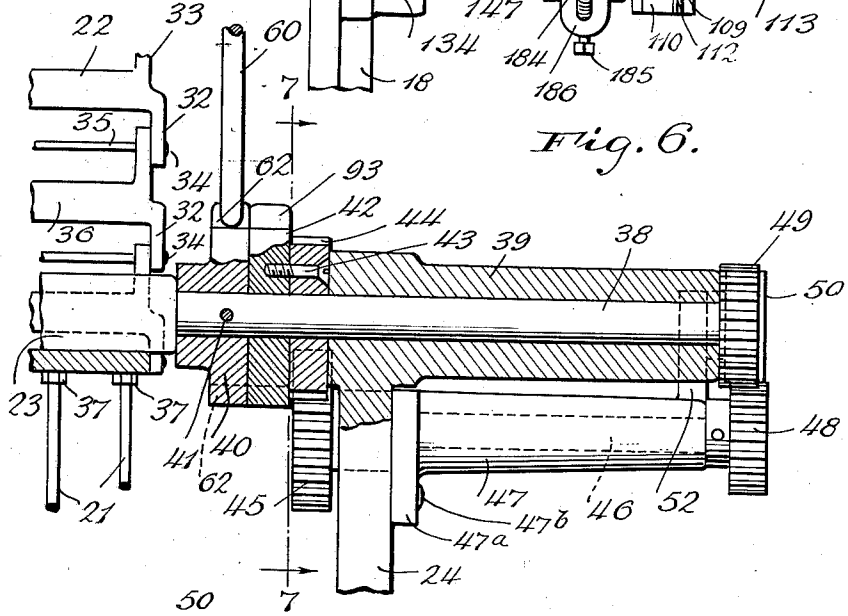
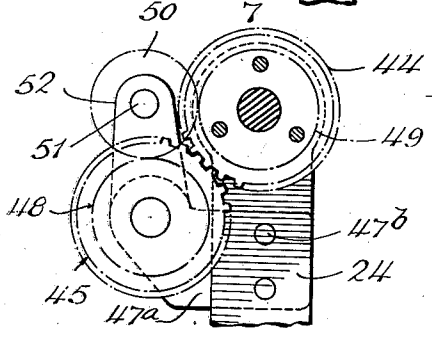


Fig. 7.



INVENTOR.
ABRAHAM HOLTZ
BY Richards & Geier
ATTORNEYS

Oct. 5, 1937. A. HOLTZ 2,095,133

KNITTING MACHINE

Filed Feb. 13, 1935 5 Sheets-Sheet 5

Fig. 8.

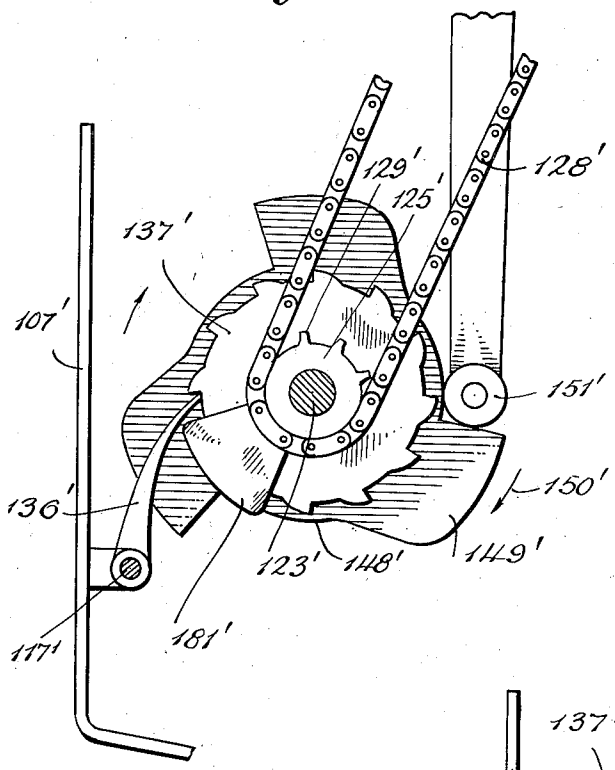
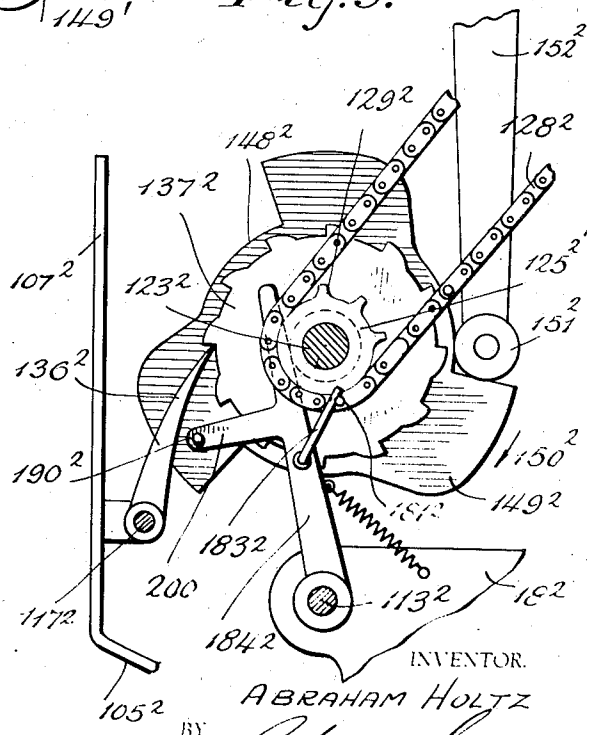


Fig. 9.



INVENTOR.
ABRAHAM HOLTZ
BY
Richards & Geier
ATTORNEYS

Patented Oct. 5, 1937 2,095,133

UNITED STATES PATENT OFFICE

2,095,133

KNITTING MACHINE

Abraham Holtz, New York, N. Y., assignor to Sadinoff & Wendroff, Inc., New York, N. Y., a corporation of New York

Application February 13, 1935, Serial No. 6,275

12 Claims. (Cl. 66—85)

The present invention relates to improvements in knitting machines and it particularly relates to improvements in the jacquard mechanisms associated with knitting machines.

Although the invention of the present application has a broad application to knitting machines generally, it will be specifically described in connection with its application to knitting machines of the flat type, which may be conveniently utilized for the knitting of curtains.

In machines of the above character it has been possible to knit various predetermined designs by the use of a jacquard mechanism consisting of an endless chain, the various links of which are provided with a plurality of actuating members for controlling the thread-guiding elements of the machine. Said actuating members are arranged on the chain in conformity with the particular design to be made and, as the chain is intermittently advanced in the direction of its length, said actuating members are successively brought into position to actuate the usual reciprocatory bars which carry said thread-guiding elements.

By suitable mechanism the chain is moved, after each operation of the knitting machine to cause said actuating members to engage one or more of the corresponding bar or bars so as to shift the same to position the thread-guiding elements properly thereon relative to the needle bar of the machine to cause the formation of certain stitches constituting a part of the complete design.

Heretofore, the jacquard chains, the entire length of which are employed in the formation of one repeat of the complete design, have each been advanced only in one direction and this has necessitated the use, in many instances, of extremely long chains and a correspondingly large number of actuating members for the thread-guiding elements.

Moreover, the variety of designs which may be obtained is quite limited by the difficulties of mechanical construction, and by the increased complication of the machinery necessary for more intricate and varied fabric constructions.

Among the objects of the present invention are to provide an improved jacquard mechanism for knitting machines of the character above described which will enable relative simplification of the mechanical structure with lessened cost in maintenance in operation and which at the same time will enable a greatly increased variety and range of designs by relatively simple manipulations.

Another object is to provide an improved knitting machine for curtains which will enable the production of a wide variety of designs thereupon with the employment of relatively compact simple machinery.

Other objects will appear during the course of the following specification.

In accordance with the present invention, an operating mechanism is provided for the jacquard chain which will permit of a considerable reduction in the length of said chain, thereby effecting an economy of material and space, and facilitating the assembly of the chain and the positioning of the actuating members thereon required to form any particular design.

To the end that this may be accomplished, the operating mechanism for the jacquard is designed to reverse the direction of movement of the same at predetermined intervals which may be uniform or varied, depending upon the design being formed. By thus intermittently reversing the movement of the jacquard chain, as distinguished from the customary movement thereof always in the same direction, many of the actuating members for the thread-guiding elements may be used repeatedly, during the formation of one repeat of the design, to make symmetrical or repeat portions thereof.

In the preferred form of the present invention the reversing mechanism preferably includes a controlling cam and a reverse control pattern chain, which control the main jacquard chain so that such reversing may take place at predetermined intervals, or continuously as may be desired.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for purpose of illustration, is shown in the accompanying drawings, in which:—

Figure 1 is a fragmentary front elevation of one end of a knitting machine of known construction, illustrating the reversing pattern mechanism of the present invention applied thereto from the line 1—1 of Fig. 2.

Figure 2 is an elevation taken at right angles to Figure 1 and substantially from the line 2—2 thereof, showing a part of the mechanism utilized to reverse the direction of movement of the jacquard chain.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 2 upon an enlarged scale.

Figure 4 is an enlarged elevational view from the line 4—4 of Fig. 1, partly in section, illustrating the aforesaid reversing mechanism and the control device therefor, said mechanism be-

ing shown in position just after its operation in reversing the direction of movement of the jacquard chain.

Figure 5 is a side sectional view upon the line 5—5 of Fig. 4.

Figure 6 is a fragmentary side elevational view upon an enlarged scale on the line 6—6 of Fig. 1.

Figure 7 is a side sectional view taken on the line 7—7 of Fig. 6, and

Figures 8 and 9 are fragmentary side elevational views similar to Fig. 4 illustrating other embodiments.

In the illustration of the present invention, only so much of a knitting machine of known construction is shown as will enable those skilled in the art to obtain a complete understanding of the application of the instant invention thereto.

Referring to Figs. 1 and 2 a flat bed knitting machine is provided with a frame 10 which carries a needle bar diagrammatically indicated at 11, which extends entirely across the machine. The needles of the machine are carried, as schematically indicated at 12.

Operated in conjunction with the needles of the machine and adapted to reciprocate transversely across the needle bed, are the thread or yarn guides 13, which are provided with the collars 14 fixed by the set-screws 15, on the reciprocatory bars 16. These reciprocatory bars are supported in slots or recesses 17, in the plate 18, which is bolted at 19 on the frame 10 of the machine.

As these bars 16 are intermittently shifted back and forth by the jacquard mechanism, they will cause the thread guides 13 to guide different threads to the various needles which will result in the formation of the pattern.

Each of the bars 16 (see Fig. 1) is provided with the end contact plates 20, which are adapted to be actuated by the pins or jacquard extensions 21. The pins 21 are carried by the links 22 of the jacquard chain and are arranged so as to project different distances and to cause varied reciprocating movements of the needle bars 16.

The jacquard chain 22—22 (see Fig. 1) rides upon and is advanced by the square or polygonal sprocket element 23, which is rotatably mounted on the upper end of the reciprocatory arm or holder 24. The reciprocatory holder 24 is pivotally mounted at 25 upon the fixed arm 26 extending out from the frame of the machine. The arm 24 is reciprocated by the link 27 which is pivotally connected to the gear wheel 29 at 30, the combination serving as a crank. The gear wheel 29 is driven by the shaft 31 of the main mechanism of the machine.

As best shown in Fig. 6 each of the links 22 is provided with outset forward arms 32 and rearwardly extending inset arms 33 at the ends thereof, which arms are pivotally connected at 34 by the pivot bars 35. The transverse members 36 of said links each carry the pins 21 as indicated at 37.

The transverse element 36 of the link 22 is preferably of sufficient width to carry a number of pins 21 which will cooperate with the needle bars 16.

The sprocket wheel or carrier 23, as shown in Fig. 6, is rigidly connected to the shaft 38, which bears in the sleeve member 39 carried on the upper end of the reciprocating arm 24. To the shaft 38 at the left side of the bearing sleeve 39 is pinned the ratchet wheel 40, as indicated at 41, which causes forward movement of the jacquard chain 22—22.

The reverse ratchet 42 rides loosely upon the shaft 38 and is bolted as indicated at 43 to the gear or pinion 44. The gear 44 meshes with the gear 45, fixed to the shaft 46. The shaft 46 bears in the sleeve 47 below and offset from the bearing sleeve 39.

The sleeve 47 is provided with a base flange 47*a* by which it is bolted to the arm 24 at 47*b*.

The gear 48 drives the pinion 49 fixed on the end of the shaft 38 through the intermediate gear 50 which is rotatably mounted at 51 in an arm 52 projecting outwardly from the bearing sleeve 47.

The gear train 44—45 and 48—50—49 will cause the ratchet wheel 42 to drive the sprocket 23 in the opposite direction from the ratchet 40 and reverse movement of the chain 22—22.

As appears from Fig. 1, upon each reciprocation of the arm 24 the ratchet 40 will be advanced one-quarter turn by the pawl member 60, the lower end of which is provided with the inturned catch or tooth 61 cooperating with the teeth 62 of the ratchet 40.

The detent rod 63 (see Fig. 1) is pivotally mounted at 64 upon the frame extension 18 and is pressed upwardly by the roller 65*a* on the right arm 65 of the lever 66 which is pivotally mounted at 67 upon the reciprocatory arm 24. The left end of said arm 66 is depressed by the coil spring 68, as indicated at 69. The other end of the coil spring 68 is connected at 70 to the lower portion of the reciprocating arm or lever 24.

As the ratchet 40 moves forwardly upon each reciprocation of the arm 24, the teeth 61 of the pawl 60 will slide rearwardly until it passes beyond the upper right tooth 62 of the ratchet. Then as the ratchet 40 is swung backwardly upon the return movement of the reciprocatory arm 24, the tooth 61 will catch said upper right tooth 62 and will advance the ratchet 40 one-quarter turn, advancing the chain so that the next set of pins 21 are in position to actuate the thread carrier bars 16, through the contact plates 20.

The detent rod acts to hold the ratchet 40 in each position (shown in Fig. 1) after it has been advanced one-quarter turn by the pawl 60.

The pawl 60 for the jacquard chain ratchet 40, as shown in Figs. 2 and 3, is received in the collar 71 and is adjustably fixed therein by the set-screw 72. The collar is provided with a sleeve member 73 which slides upon the rod 74 and is pressed against the face 75 of the arm 76 by the coil spring 77. The coil spring 77 reacts at its opposite end against the washer 78. The tension on the spring is maintained by the nut 79 which fits on the threaded end 80 of the rod 74. The arm 76 is pivotally mounted at 92 on the rod 74.

The end of the rod 74 is fixed at 81 in the boss 82 of the bracket 83. The bracket 83 is bolted at 84 to the vertical extension 85 from the frame plate 18. The forward arm 86 of the bracket 83 is bolted as indicated at 87 (see Fig. 1) to the arm 76 which carries the pin 89 serving as a bottom rest or stop for the jacquard pawl 60. The arm 86 is provided with an arcuate enlargement 90 having the slot 91 in which the bolt 87 is fitted, enabling convenient adjustment of the position of the arm 76 and the pin 89. The pin 89 will prevent said pawl 60 from dropping below its proper position to enable the tooth 61 to engage the next ratchet tooth 62 upon forward movement of the arm 24.

The reversal of movement of the jacquard chain

22—22 is caused by a shifting of the jacquard pawl 60 from engagement with the teeth 62 of the ratchet 40 to engagement with the teeth 93 of the ratchet 42 (see Fig. 6). The forward movement of the ratchet 42 by the pawl 60 will then drive the shaft 38 in a reverse direction through the gear train 44, 45, 48, 49 and 50.

This shifting of the pawl from the ratchet 40 to the ratchet 42 is accomplished through the mechanism best shown in Figs. 1, 2, 4 and 5.

The gear 29, as shown in Figs. 1 and 2, meshes with the gear 100 on the shaft 101, said shaft 101 being provided with the bearings 102—102 and extending across the plate 18 of the machine frame.

To the end of the shaft 101 is connected the cam 103 which cooperates with the follower roller 104 on the pawl actuator member or bar 105. The lower inset portion 106 of the bar 105 extends inside of the cam 103 and is slotted, as indicated at 107 in Fig. 1. The slotted portion 107 is received upon the shaft 101 and is thus guided in its reciprocatory vertical movement upon cooperation between the cam 103 and its follower 104.

The upper outset portion 107 of the bar 105 is provided with the slot 108, into which projects the arm 109 adjustably mounted by the set-screw 112 in the base 110 of the clevis 111. The clevis 111 is mounted on the rod 113 projecting from the side of the machine by the set-screw 114. The rod 109 is provided with the nuts or contact pieces 115, which maintain the rod in position in the slot 108 during the reciprocatory movement.

To the upper outset portion 107 of the bar 105 is connected the bearing mount 116 in which the pawl rod 117 is pivotally mounted. The rod 117 (see Figs. 1 and 2) carries the pawls 118 and 136, which are pressed in contact with the ratchet wheels 119 and 137 by the spring 120.

As the arm 105 is reciprocated by coaction of the cam 103 and the roller 104 the pawls 118 and 136 will advance the ratchet wheels 119 and 137 by one or two teeth 121 and 121*a* depending upon the throw of the pawls 118 and 136.

The pawl 118 may be set by a mechanism (not shown) to advance the wheel 119 one or two teeth 121 for each reciprocation, while the pawl advances the ratchet 137 one tooth 121*a*.

Referring to Figs. 2, 4 and 5 the ratchet 119 is pinned at 122 to the shaft 123, as is also the collar 124 of the sprocket 125 at 126. The ratchet 119 will turn the shaft 123 in the direction 127, upon actuation by the pawl 118 shown in Figs. 1 and 2, and the shaft 123 will rotate the sprocket wheel 125. The pattern chain 128 will mesh with the teeth 129 on the sprocket 125 and be continuously advanced upon rotation of the shaft 123.

The ratchet wheel 119 is retained in position by the detent 130, the end of which is provided with a boss 131 received in the recesses 132 in the side of the ratchet wheel 119, one of these recesses being provided for each tooth 121 of the ratchet 119 so that the ratchet will be retained in each position. The spring arm of the detent 130 is rigidly connected at 133 to the support arm 113, which arm is fixed at 134 to the frame 18.

As best shown in Fig. 5 the ratchet wheel 137, driven by the pawl 136, has a collar 138 loosely turning on the shaft 123 and held in position thereon by the washer 139. The washer 139 is pinned to the shaft 123 at 140. The end of the shaft 123 rides in the boss 142 in the frame member 143 at the rear of the plate 18.

The ratchet 137 is shown provided with one tooth for every two teeth of the ratchet 119, but, if desired, it may be provided with the same number of teeth. The reciprocation of the element 105 carrying the pawls 118 and 136 is sufficient to advance the ratchet 137 one tooth and the ratchet 119 one or two teeth for each revolution of the cam 103 and reciprocation of the follower bar 105.

The ratchet 137 is provided with the detent 144 having a boss 145 cooperating with the recesses 146 in the side of the ratchet 137, the lower end of the detent being mounted at 147 upon the support rod 113.

Rigidly connected to the collar 138 of the ratchet 137 is the cam 148 having the lobes 149, which as shown in Figs. 2 and 4 are symmetrically positioned around the periphery thereof and move in the direction indicated by the arrow 150 to cooperate with the roller 151 on the follower arm 152. The follower arm 152 is pivotally mounted at 153 on the bar 154.

The bar 154 (see Fig. 2) is provided with a collar 155 at its other end, which collar is fixed by a set-screw 156 upon the rod 157 extending upwardly from the top of the frame extension 85. Pivotally connected at 161 to the arm 152 is the link 162, which at its other end is pivotally connected at 163 to the arm 164 of the bell crank lever 165.

The bell crank lever 165 is pivotally mounted at 166 upon the extension 167 from the frame of the machine. The other arm 168 of the bell crank lever 166 carries the adjustable pin 169 the end 170 of which is adapted to contact the boss 71 on the sleeve 73 (see Fig. 3) and move the pawl rod 60 so that the tooth 61 thereof will ride upon the ratchet 42 instead of the ratchet 40 to reverse the jacquard chain 22—22.

The reversal will obviously only take place while the follower 151 is riding over the lobes 149 of the cam 148 and the lobes 149 will only elevate the roller 151 after a predetermined number of revolutions of the shafts 31 and 101 and reciprocations of the arm 24. It is obvious that the cam 148 may be widely varied in shape and the amplitude of the stroke of the arm 105 and the pawl 118 may be readily changed.

In the knitting operation it is desirable at predetermined intervals to prevent operation of the reversing mechanism and/or to delay operation of the reversing mechanism and this is conveniently accomplished by causing disengagement of the pawl 136 and the ratchet 137 during a predetermined or desired number of reciprocations of the arm 24.

To accomplish this reversal the pattern chain 128 (as best shown in Fig. 4) may be caused to carry a series of contact plates 181, 182, 182*a* of different or the same shapes and forms, and at different intervals, which plates are continuously advanced with the advancement of the chain 128 upon vertical reciprocation of the arm 105.

When these plates turn around the sprocket 125, they contact with the adjustable bar 183 adjustably connected at 183*a* to the L-shaped rod 184. The lower arm of the rod 184 is fixed by the set-screw 185 in the clevis 186 mounted upon the shaft 113 (see Figs. 4 and 5). The forward extension 187 of the arm normally contacts with the shaft 123 through the action of the spring 188 extending at 189 to the extension of the frame, see Fig. 2.

The upward extension 187 of the arm carries the pawl contact member 190, which (when the plates 181, 182, 182*a* contact with the adjustable arm 183) throws the pawl 136 to the left by con-

tact with the horizontal extension 191 upon said pawl (see also Fig. 1).

As long as the cam plates 181, 182, 182a retain said contact member 190 against the horizontal extension 191 on the pawl 136 the ratchet 137 will not be advanced by the pawl 136 upon reciprocation of the arm 105. During this period the reversing mechanism will not be operated.

In operation therefore, as the main shafts 101 and 31 are driven the arm 24 will be continuously reciprocated, causing advancement of the jacquard chain 22—22, and a reciprocatory movement of the thread guide 113 connected to the bar 16, resulting in the formation of a predetermined pattern for each position of the pins 21 of the jacquard chain 22—22.

With each of said reciprocations (due to the cooperation of the cam 103 and follower 104 upon reciprocation of the arm 105) the ratchets 119 and 137 will be advanced by the reciprocating pawls 116 and 136, causing an advance of the pattern chain 128, and the reversing cam 148.

The reversing cam 148 will, at predetermined intervals, elevate the follower roller 151 (as shown in Fig. 4) upon the lobes 149, which through the linkage 162 and bell crank lever 165 will cause a shifting of the pawl 60 from the forward ratchet 40 to the reverse ratchet 42 of Fig. 6.

The interval between said reversals will be controlled and varied by the contact plates 181, 182, 182a upon the pattern chain 128 (see Fig. 4) which will for predetermined intervals maintain the pawl 136 out of contact with the ratchet 137.

In this manner by relatively short jacquard chain 22—22 it is possible to obtain a very wide variety of designs, the variety of designs being capable of almost infinite variation by control of the reversal cams 148 and the positioning of the contact plates 181, 182, 182a on the reversal pattern chain 128.

Moreover, the arrangement shown permits a very ready control and adjustment of the jacquard chain, which may be accurately determined without undue difficulty to determine the pattern.

The jacquard chain 22—22, the pattern chain 128 and cam 148 may be almost readily coordinated to give a predetermined pattern.

As shown in Fig. 4 the contact plates 181 and 182 are of different shape and form, but if desired the plates may all be of the same type, character and shape. The plates 181 and 182a of Figs. 1 and 4 are adapted to keep the pawl 136 out of cooperation with the reversing ratchet 137 for a considerable period of time, while the plate 182 is adapted to merely keep the pawl 136 out of cooperation with the ratchet 137 for two relatively short successive periods.

The embodiment of Fig. 8 shows an alternative construction to Fig. 4 in which similarly functioning parts are indicated by the same numerals primed.

According to this embodiment the plates 181' are caused to contact directly with the pawl 136' instead of through an intermediate lever arrangement, as shown in Fig. 4 and intermittently to hold the pawl 136' out of engagement with the ratchet wheel 137'.

Fig. 9 shows still another modification similar to Fig. 4 in which similarly functioning parts are indicated by the same numerals provided with a superior 2.

In Fig. 9 the pattern reversing chain 128^2 carries a series of pins 181^2 which cooperate with the L-member 183^2 to actuate the arm 184^2 which is pivotally mounted at 113^2. The arm is provided with a forward extension 200, the forward end of which is provided with a pin 190^2 which is designed to move the pawl 136^2 out of engagement with the teeth 137^2 during predetermined intervals.

What is claimed is:

1. In a flat knitting machine for knitting curtains of the type having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact plates on the ends of said bars to be actuated, an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said plates and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, pawl means carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; the combination therewith of a reversing mechanism for said jacquard chain including two reversing ratchet devices, two reversing pawl means corresponding with said ratchet devices, a reciprocating carrier actuated during operation to reciprocate said pawls and thereby advance said reversing ratchet devices, a cam driven by one of said reversing ratchet devices, a lever follower actuated by said cam, said first mentioned ratchet means provided with double ratchet wheels arranged side by side, one being directly connected to said first mentioned sprocket means and the other being connected to said sprocket means by a reversing gearing train, said lever follower being connected to said first mentioned pawl means to shift it from one ratchet wheel to the other ratchet wheel, said second reversing ratchet device driving a second sprocket, a reverse pattern chain carried by said second sprocket, a plurality of contact elements carried by said reverse chain, said contact elements serving to move said first reversing pawl means out of engagement with said first cam-actuating reversing ratchet device, to render said reversing mechanism inoperative at spaced intervals.

2. In a flat bed knitting machine, movable yarn guides, pattern mechanism formed of a plurality of bar members, the length of said pattern mechanism representing substantially one-half of a symmetrical design in the finished fabric, a plurality of pins carried by each of said bar members to actuate said guides to control the throw of the yarn, means to actuate the pattern mechanism in one direction throughout its length to produce one-half of the design, means for reversing the movement of the pattern mechanism throughout its length to complete the design, including a reciprocating pawl driven by the machine, a ratchet driven by the pawl, a cam driven by the ratchet and a lever arrangement actuated by the cam, and means for periodically rendering said reversing mechanism inoperative, including a device for disengaging said pawl from said ratchet.

3. In a flat bed knitting machine, movable yarn guides, pattern mechanism formed of a plurality of bar members, the length of said pattern mechanism representing a portion less than the whole of a symmetrical design in the finished fabric, a plurality of pins carried by each of said bar mem-

bers to actuate said guides to control the throw of the yarn, means to actuate the pattern mechanism in one direction to produce said portion of the design, and means for reversing the movement of the pattern mechanism to complete the design, including a reciprocating pawl driven by the machine, a ratchet driven by the pawl, a cam driven by the ratchet and a lever arrangement actuated by the cam.

4. In a flat bed knitting machine, a thread-guiding element operable in conjunction with the needle bar of the machine to form a design on a fabric being knitted, a mechanism for operating said element in accordance with the design to be formed, means to repeatedly move said mechanism in one direction during the formation of a part of said design, means to reverse the direction of movement of said mechanism to thereby control the formation of another part of said design, including a reciprocating pawl driven by the machine, a ratchet driven by the pawl, a cam driven by the ratchet and a lever arrangement actuated by the cam, and control means for disengaging said pawl including a pattern chain.

5. In a flat bed knitting machine, a thread-guiding element operable in conjunction with the needle bar of the machine to form a design on a fabric being knitted, a jacquard mechanism including an endless element movable in opposite directions along its length to control the operation of said thread-guiding element, and means operable at predetermined intervals to reverse the direction of movement of said endless element to thereby control the formation of different parts of said design, said last mentioned means including a single pawl, a forward drive ratchet for said element, a reverse drive ratchet, and a pawl shifting mechanism to shift the pawl from one ratchet to the other.

6. In a flat bed knitting machine, thread-guiding elements operable in conjunction with the needle bar of the machine to form a design on a fabric being knitted, a jacquard chain movable in opposite directions and including a series of actuating members for said thread-guiding elements arranged on said chain in conformity with the design to be produced, means to reverse the movement of said chain including a reciprocating pawl, a ratchet driven by said pawl, a cam driven by said ratchet and a lever arrangement driven by said cam and a pattern device to periodically disengage said pawl.

7. In a flat knitting machine for knitting curtains having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact members on the ends of said bars to be actuated, an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said members and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, pawl means carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; said ratchet means being provided with two ratchet members one of which is adapted to drive the sprocket in one direction and the other of which is adapted to drive the sprocket in the opposite direction, one ratchet being directly connected to the sprocket and the other ratchet being connected to the sprocket by an intermediate reverse gearing connection and means to shift said pawl means from one sprocket to the other.

8. In a flat knitting machine for knitting curtains having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact members on the ends of said bars to be actuated, an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said members and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, pawl means carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; said ratchet means being connected to drive said sprocket means forwardly and reversely, means actuated by said machine to operate said pawl means to cause reversal of the ratchet means and additional means operated by the machine to render such last mentioned means inoperative at predetermined intervals, said additional means including a reciprocating pawl, a ratchet driven by said pawl and means periodically to disengage said pawl from said ratchet.

9. In a flat knitting machine for knitting curtains having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact members on the ends of said bars to be actuated, an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said members and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, pawl means carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; said ratchet means being connected to drive said sprocket means forwardly and reversely, means actuated by said machine to operate said pawl means to cause reversal of the ratchet means and additional means operated by the machine to render such last mentioned means inoperative at predetermined intervals, said last mentioned means including a pattern chain and said previously mentioned means including a cam, a ratchet actuating said cam, a pawl actuating said ratchet and a connection from the machine actuating said pawl substantially in synchronism with the movement of said reciprocating lever, said pattern chain serving to disengage said last mentioned pawl from said last mentioned ratchet at predetermined intervals.

10. In a flat knitting machine for knitting curtains having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact members on the ends of said bars to be actuated,

an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said members and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, a single pawl carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; said ratchet means including two ratchets positioned side by side, one connected to the sprocket means to drive the same directly and the other connected with the sprocket means to drive said sprocket reversely, and means to shift said pawl laterally from one ratchet to the other.

11. In a flat knitting machine for knitting curtains having a plurality of rows of thread guiding elements, transverse reciprocable bars carrying said elements, one for each row, contact members on the ends of said bars to be actuated, an endless jacquard chain, the links of which are provided with a series of spaced pins to contact with said members and cause actuation of said bars and elements, whereby a predetermined pattern is formed, sprocket means carrying said jacquard chain, ratchet means driving said sprocket means, pawl means carried by said machine engaging and advancing said ratchet means to drive said jacquard chain, a reciprocating lever carrying said sprocket means and crank means reciprocating said lever to cause said pins to contact with and actuate said bars at one end of the stroke and to cause said pawl means to advance said ratchet means at the other end of the stroke; said ratchet means including two ratchets, one connected to the sprocket means to drive the same directly and the other connected with the sprocket means to drive said sprocket reversely, and means to shift said pawl means from one sprocket to the other, said last mentioned means being actuated by a cam, a ratchet actuating said cam, a pawl actuating said ratchet and a connection from the machine operated in phase with said crank means to actuate said pawl.

12. The construction set forth in claim 11 in which the machine is provided with means to cause a disengagement of said last mentioned pawl from said last mentioned ratchet during predetermined periods of operation.

ABRAHAM HOLTZ.