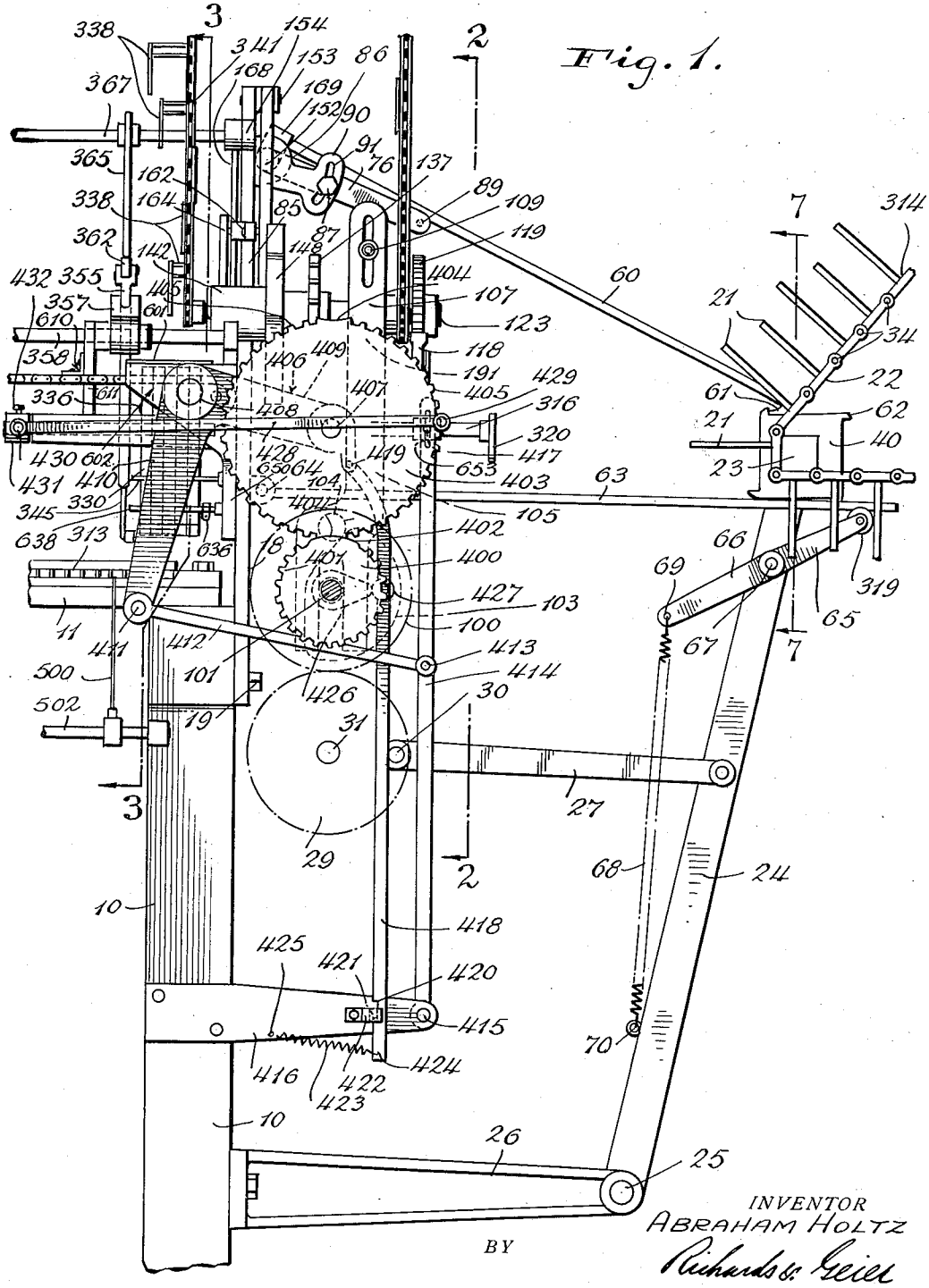
Sept. 13, 1938. A. HOLTZ 2,130,236

KNITTING MACHINE

Filed June 28, 1935 9 Sheets-Sheet 1

Fig. 1.



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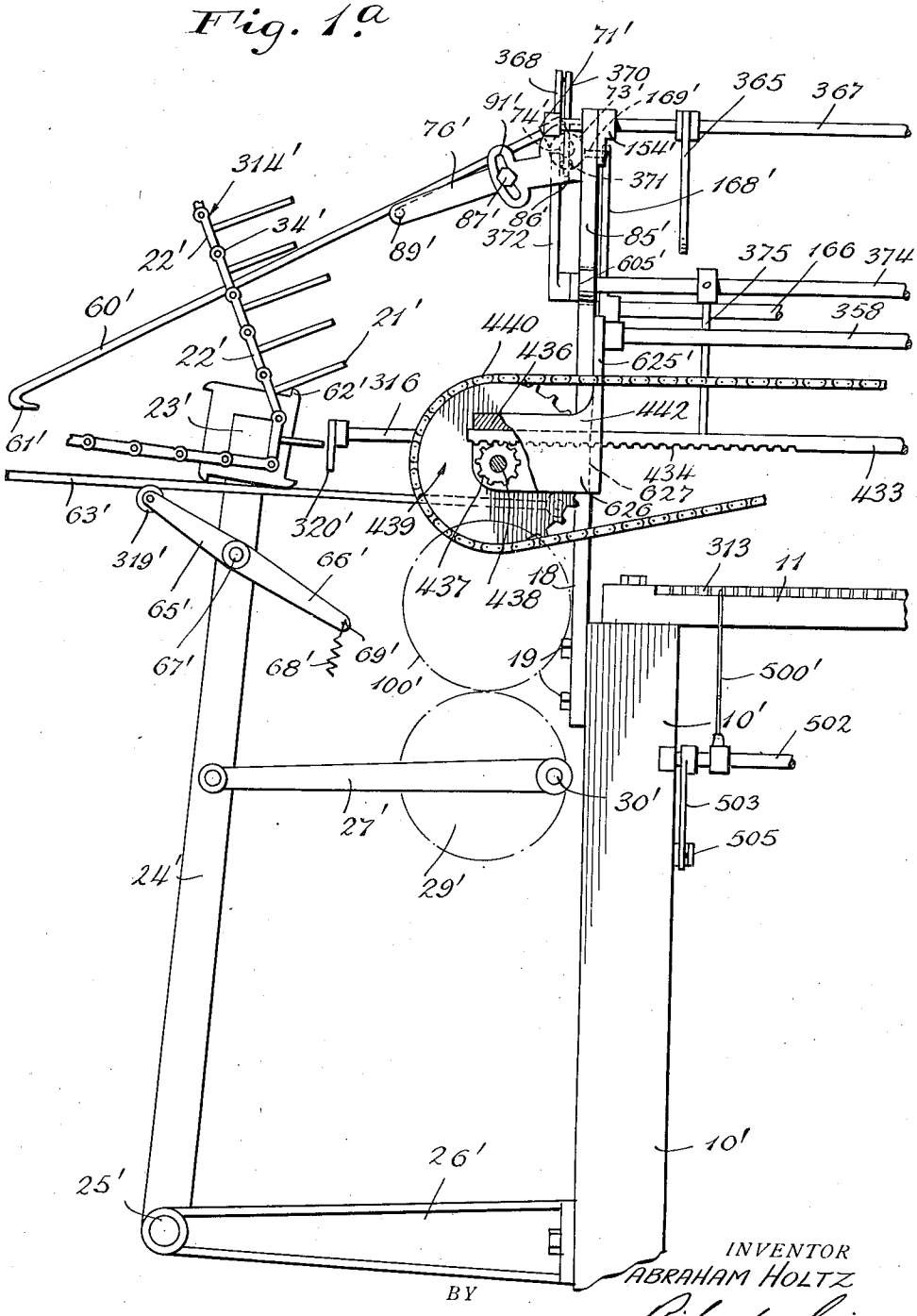
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KNITTING MACHINE

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Fig. 1a



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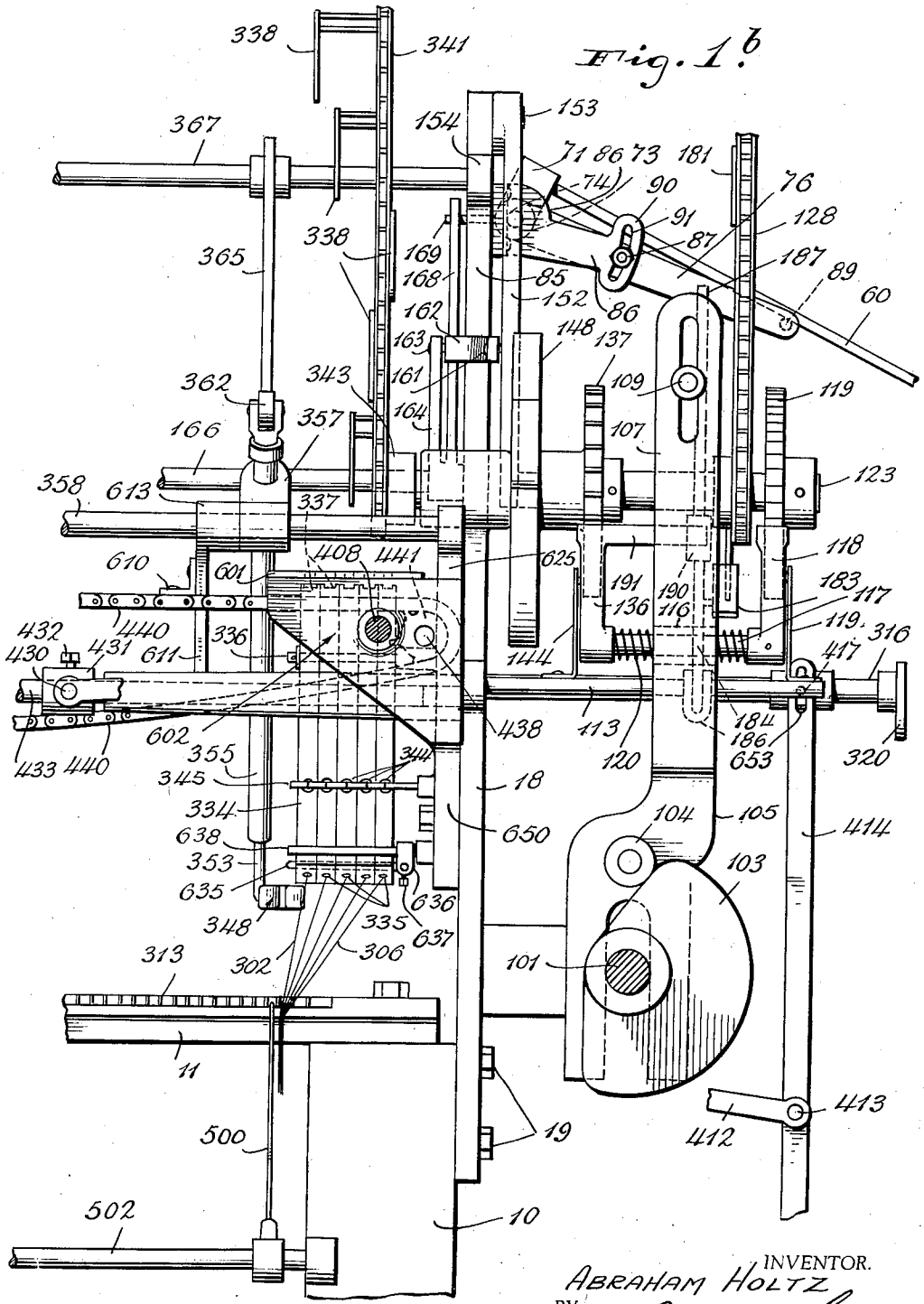
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KNITTING MACHINE

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Fig. 1b



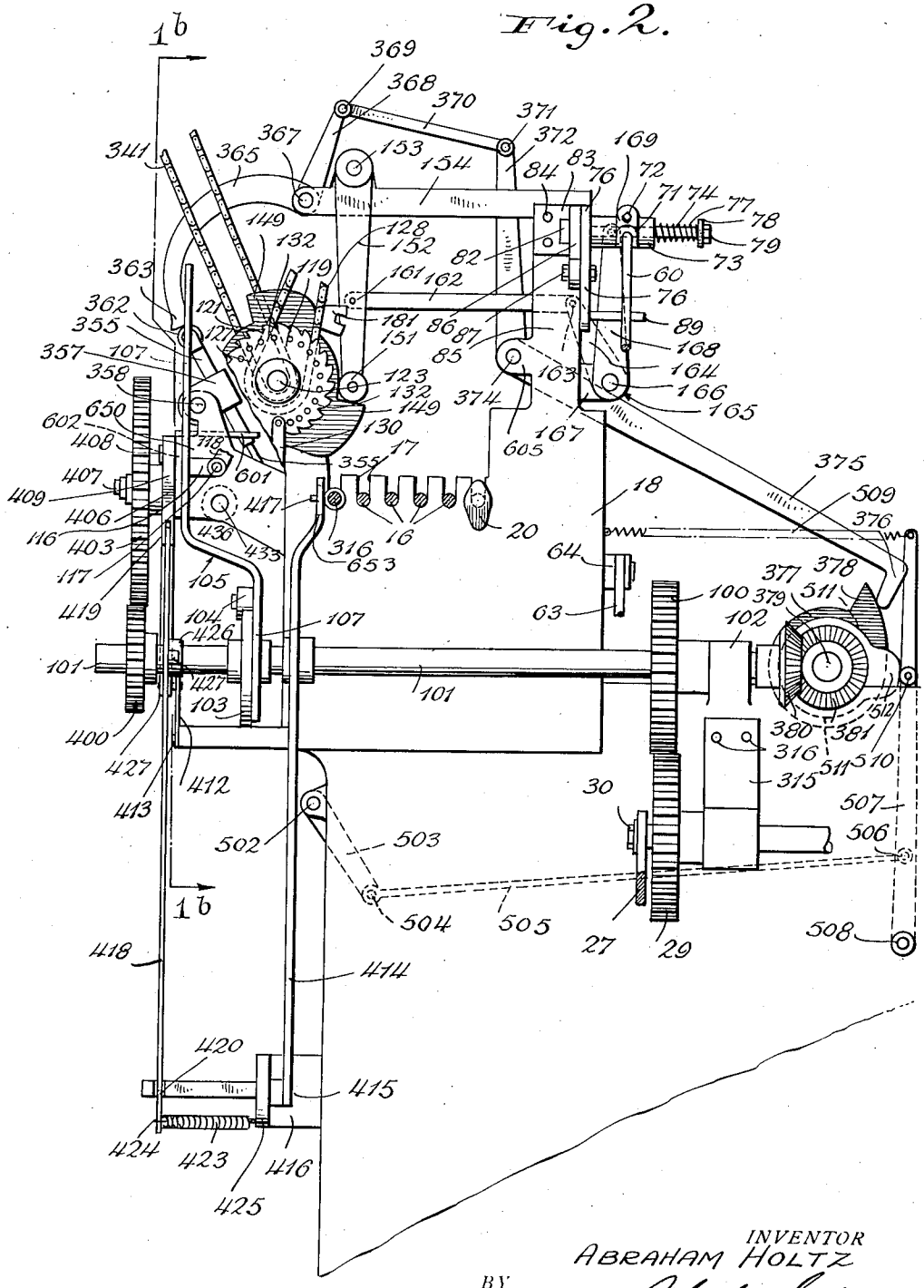
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KNITTING MACHINE

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Fig. 2.



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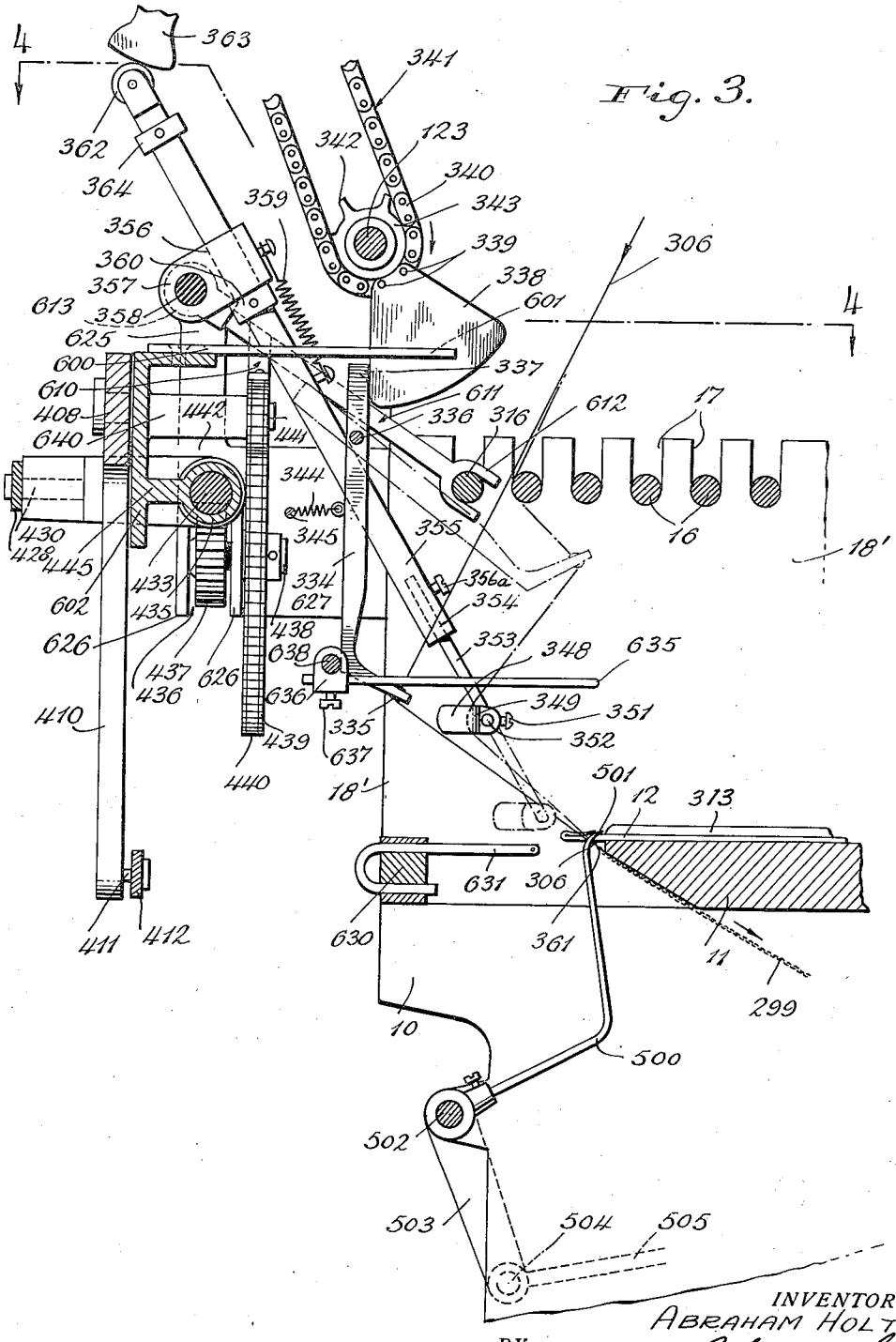
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KNITTING MACHINE

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Fig. 3.



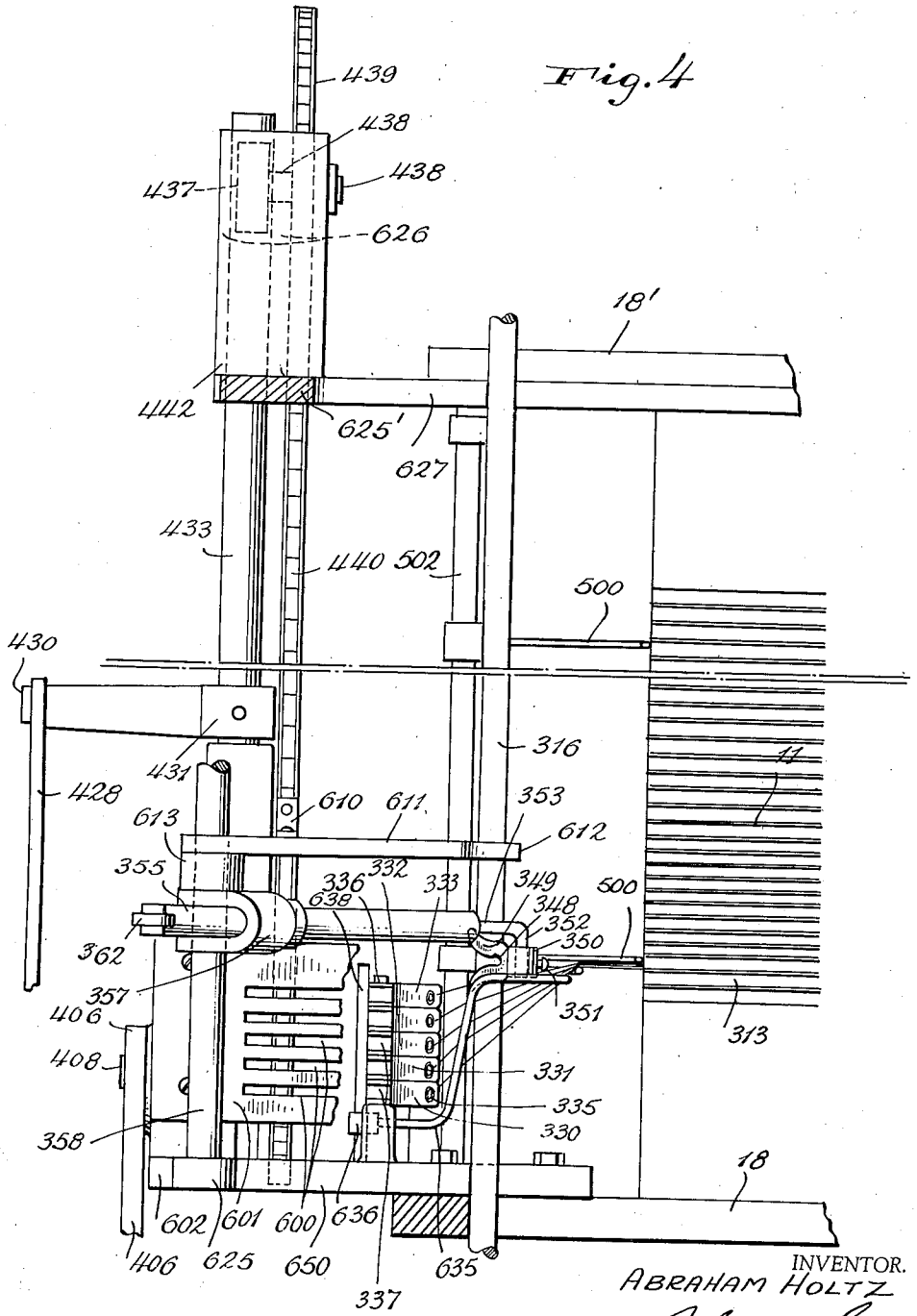
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KNITTING MACHINE

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Fig. 4



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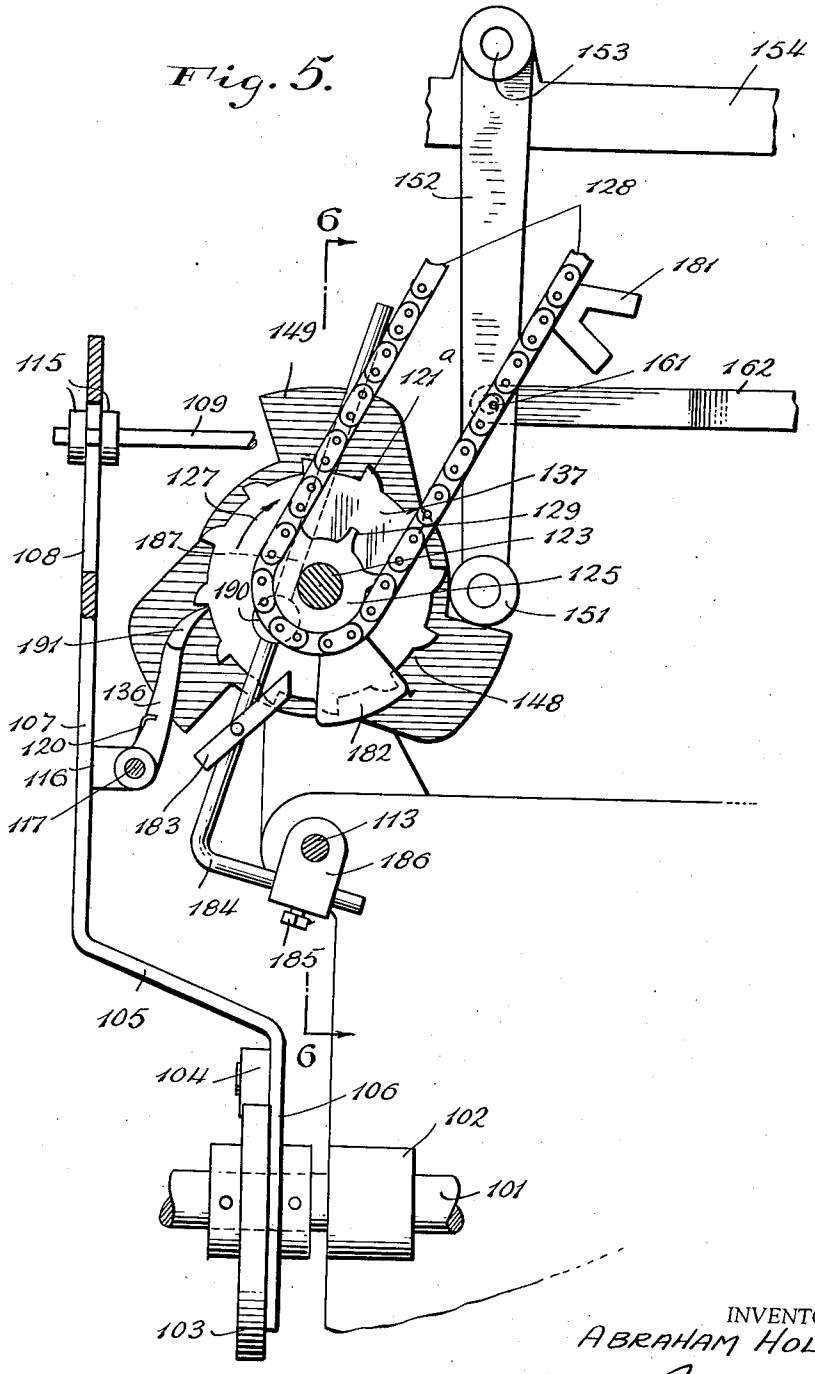
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KNITTING MACHINE

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Fig. 5.



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Fig. 6.

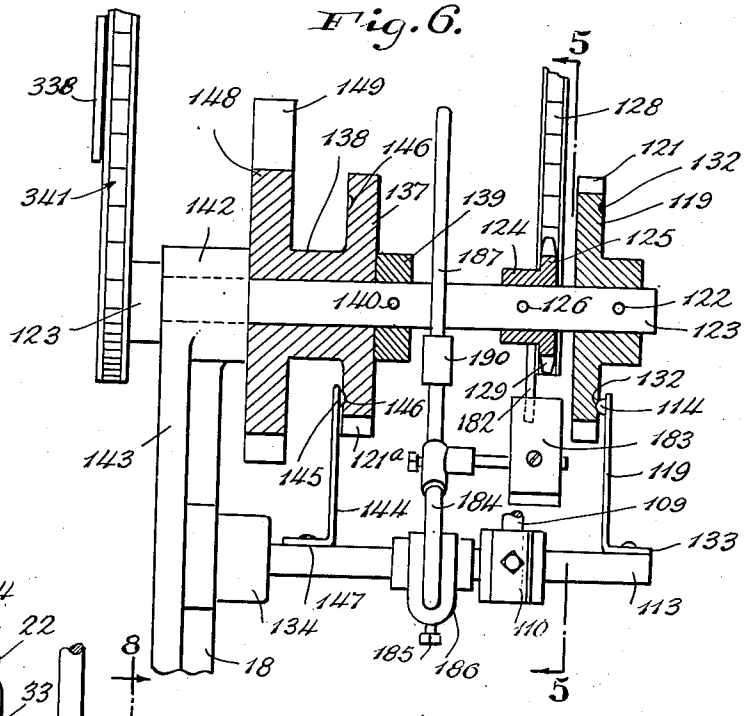


Fig. 7.

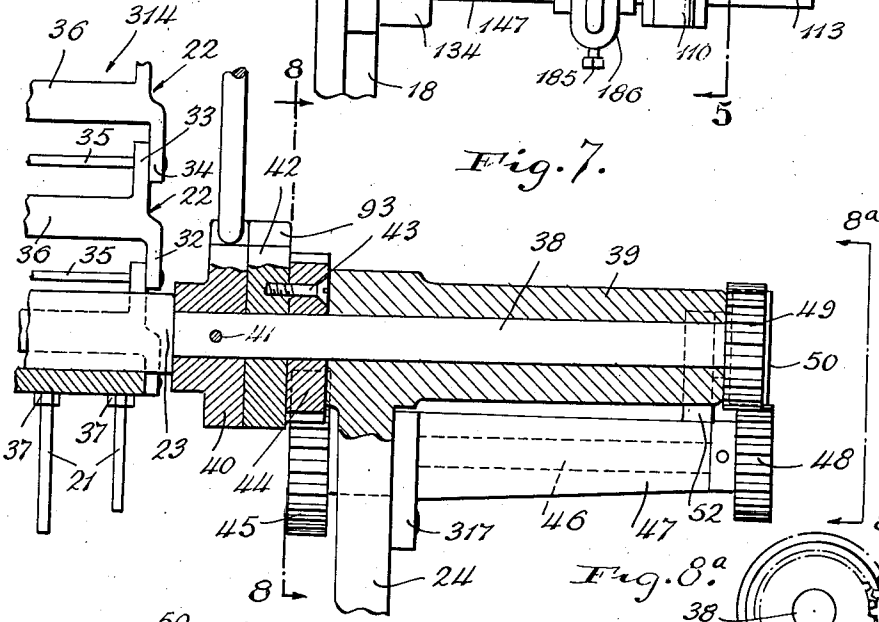


Fig. 8.

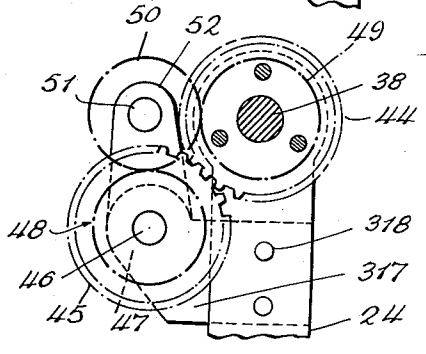
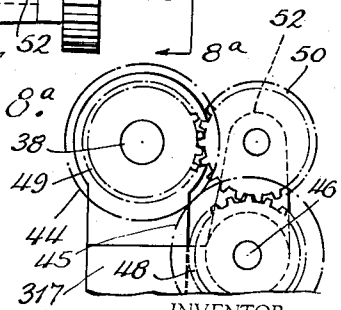


Fig. 8a.



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Fig. 9.

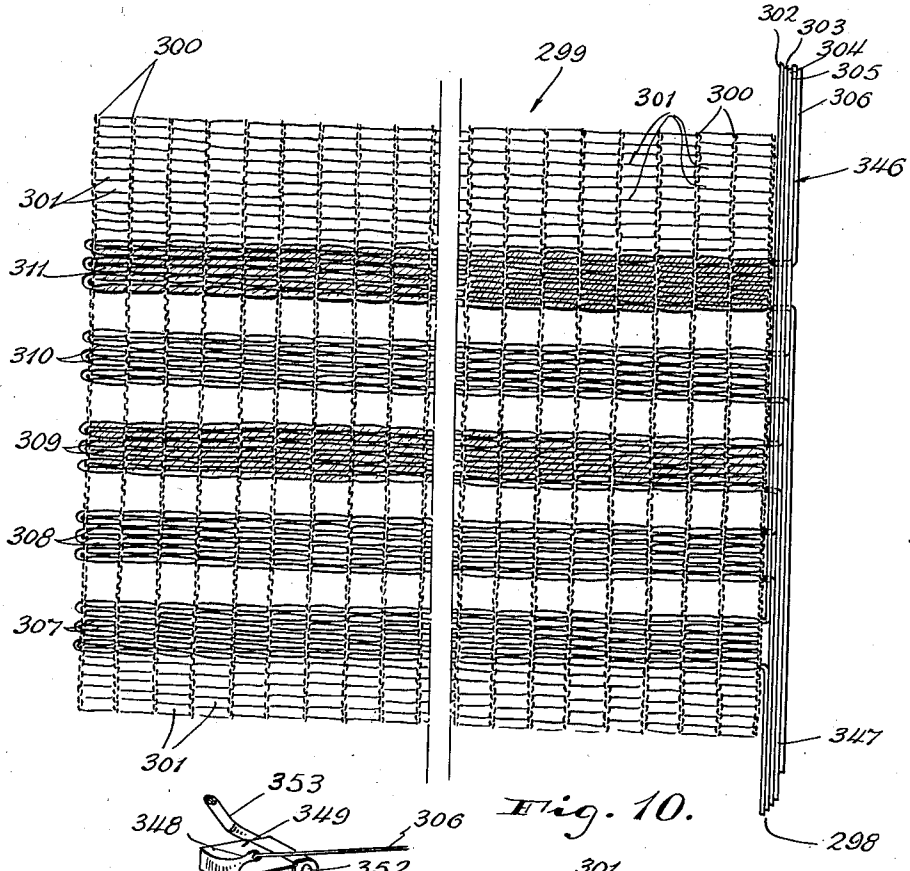
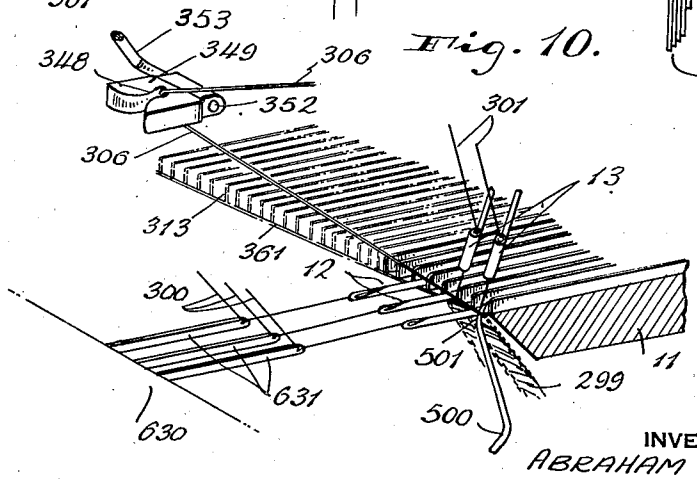


Fig. 10.



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Patented Sept. 13, 1938 2,130,236

UNITED STATES PATENT OFFICE

2,130,236

KNITTING MACHINE

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

Application June 28, 1935, Serial No. 28,797

28 Claims. (Cl. 66—85)

The present invention relates to improvements in knitting machines and it particularly relates to mechanisms associated with knitting machines for producing ornamental and artistic patterns and inlays in the knitted fabrics.

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 knitting of curtains.

In machines of this character it is customary to knit a plurality of spaced rows of longitudinal warp ribs, which form the basic structure of the curtain and serve to locate and hold the weft or filler threads in position.

As a general rule in most curtain constructions of this character the transverse, filler or weft threads are run back and forth in ladder-like fashion between one or more of the longitudinal or warp rows, and locked thereby in position during manufacture of the curtain construction.

However, it is often desirable to utilize for ornamental and contrasting purposes other filler or inlay threads. These inlay or additional threads or yarns may be of larger diameter than the short weft threads above mentioned and may also be of contrasting colors.

It is among the objects of the present invention to provide a device for placing said ornamental and/or contrasting color filler materials in position in the structure of the knitted fabric, which may be readily applied to flat knitting machines of standard construction without material or substantial modification therein and which may be readily operated in connection therewith without need for any extra or skilled labor over and above which is now required.

Another object is to provide a method for knitting fabrics, particularly of the type of curtains in which the inlays are locked into the fabric incidental to the knitting operation to give an enhanced decorative appearance.

Another object is to provide an improved knitted fabric in which the ornamental and fillers of contrasting colors will be laid in or combined with the knitted textile structure in such a way as to present a most decorative or ornamental appearance without any increased cost in the fabric.

In accomplishing the above objects it has been found most desirable in connection with knitting machines of the character described to lay filler or inlay threads in substantially continuous rows across the entire width of the fabric being produced.

It is not possible to use the usual filler mechanism to accomplish this purpose, since the bars carrying the filler guides are actuated by push members on the jacquard chain, and it is not satisfactory to move these thread guides across more than one or relatively a few of the spaces between the longitudinal knitting warp strands. These thread guides carried on the transverse bars therefore could not be satisfactorily utilized to lay a continuous thread or strand of filler across the entire width of the knitted fabric.

It is therefore a further object of the present invention to provide an attachment of such a character that the ornamental or filling materials may be laid into the fabric and substantially across the entire width thereof without increasing the cost of the machine or the difficulty of operation thereof.

Other objects will be subsequently pointed out during the following specification.

In accomplishing the above objects it has been found most satisfactory to combine with a knitting machine of the flat type, which will be subsequently more fully described, an inlay mechanism which may be operated to select any number of a series of filler strands or threads of different colors, textures and/or structures and lay such strands across the knitted fabric where such strand or inlay will be located and locked in position by the next knitting operation forming the knitted longitudinal warp strands.

Preferably this mechanism for forming an inlay extending across the entire width of the fabric may be operated or controlled by a jacquard mechanism associated with the knitting machine and in one preferred form of the invention, with the usual jacquard mechanism of knitting machine there is combined a special jacquard mechanism consisting of endless chain, the various links of which are provided with a plurality of cam or plate actuating members for controlling the selection of the extra inlay or filler yarns.

The actuating members are preferably arranged on this chain in conformity with the particular design of filler or inlay to be made, and as the chain is intermittently advanced in the direction of its length the actuating members are sucessively brought into position to cause the inlay device of the present invention to select the proper inlay or strand of predetermined color, texture and/or structure, and then carry such strand across the width of the fabric so that upon the next knitting operation the strand will be locked into knitting position at what might be termed the fell of the knitted fabric.

In one preferred form of the present invention the inlay device is caused to traverse the fabric by a rack construction which is driven by an intermittent gear arrangement, the intermittent gear serving to reciprocate the inlay device with the fabric.

After the inlay has ben made, another arrangement is preferably actuated to press and hold the inlay yarn in position at the fell where it will be knitted into the fabric, while the transversely moving inlay device is lifted out of the way of the knitting needles.

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

In the drawings:

Figures 1 and 1*a* are fragmentary front elevations of the right and left ends respectively of a knitting machine of the flat type, particularly designed for knitting curtains, illustrating the jacquard mechanism applied thereto and also the inlay device of the present invention.

Figure 2 is an elevation taken at right angles to Fig. 1 from the line **2—2** thereof, showing a part of the mechanism utilized to actuate the inlay device and the jacquard arrangement of the knitting machine.

Fig. 1*b* is an enlarged view similar to Fig. 1 with the mutilated gears removed upon the line 1*b*—1*b* of Fig. 2.

Figure 3 is a transverse sectional view upon the line **3—3** of Fig. 1 upon an enlarged scale illustrating the jacquard mechanism for actuating and controlling the selection of the inlay device of the present application.

Figure 4 is a top view upon the line **4—4** of Fig. 3 illustrating the aforesaid inlay device and the control mechanism therefor.

Figure 5 is a side sectional view upon the line **5—5** of Fig. 6 upon an enlarged scale illustrating a detail of the jacquard mechanism.

Figure 6 is a side sectional view upon the line **6—6** of Figure 5 upon a similarly enlarged scale.

Figure 7 is a side sectional view upon the line **7—7** of Fig. 1 upon an enlarged scale illustrating the detailed construction of the reversing mechanism of the jacquard.

Figures 8 and 8*a* are side sectional views upon the line **8—8** and **8***a*—**8***a* of Fig. 7.

Figure 9 diagrammatically illustrates one type of fabric which may be made according to the machine of the present application, and

Figure 10 is a schematic view illustrating how the device of the present application operates to construct the fabric.

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

To enable a clear understanding, however, of the present invention the jacquard mechanism of the knitting machine and its cooperation with the other elements of the knitting machine to form the knitted structure will be described at some length to lay a basis for the application thereto and operation thereon of the inlay device to which the present application is most particularly directed.

First briefly to describe the fabric construction which may be most readily constructed upon the machine to which the inlay device of the present invention is applicable, in Fig. 9 this fabric construction is formed by a plurality of longitudinal knitted warp strands **300** which are spaced as indicated to form the skeleton work of this fabric shown. The spacing may be widely varied to give the desired effect.

Extending backwardly and forwardly between one or more of the knitted strands **300** and locked therein are the ladderlike filler threads **301**.

Along one edge **298** of the fabric while it is being knitted are a plurality of inlay or filler strands of contrasting textures, colors and/or constructions **302**, **303**, **304**, **305** and **306**, which may be respectively inlaid into the fabric to give the desired texture and artistic design of transverse stripes, as indicated respectively at **307**, **308**, **309**, **310** and **311**, the strands **302** to **306** respectively being laid transversely backwardly and forwardly across the entire width of the fabric indicated by the numeral **312**.

These inlay or filler yarns **302** to **306** as indicated in positions **307** to **311** are located and locked in position by the knitted loops forming longitudinal strands **300** as indicated.

During the knitting operation, the inlay or filler strands **302** to **306** are carried along the side of the fabric until they are used or inlaid therein, as indicated at **307** to **311** respectively, and when the fabric construction has been completed the ends of the filler strands are cut off to give a finished construction.

Referring to Figs. 1, 1*a* and 3 the knitting machine is provided with the frame **10** which carries a needle bar **11** which extends entirely across the machine. The needles **12** of the machine are carried between the guides **313**.

Operating in conjunction with the needles **12** of the machine and adapted to reciprocate transversely across the needle bed **11** are thread or yarn guides **13**, (see Fig. 10) which are carried by the reciprocatory bars **16**, (see Figs. 2 and 3).

These reciprocatory bars, as best shown in Figs. 2 and 3, are supported in slots or recesses **17** in the side plate **18**, which is bolted at **19** to the side frame **10** of the machine (see Figs. 1 and 1*a*).

As these bars are intermittently shifted back and forth by the jacquard mechanism, they will cause the thread guides **13** to guide different threads to form the pattern of Fig. 9.

The foremost bar **316** does not function in connection with the jacquard mechanism but functions to control the inlay of the present application and its operation will be more fully described subsequently.

Each of the bars **16** (see Figs. 1 to 3) are provided with the end contact plates **20** at both the right side of the machine and the left side of the machine, similarly functioning parts shown on the left side of the machine in Fig. 1*a* being designated with the same numerals, as on the right side of Fig. 1 with the numerals, however, primed.

These contact end plates **20** are respectively adapted alternately to be actuated by the pin **21** on the right side of the machine and **21'** on the left side of the machine. The pins **21** and **21'** are carried by the links **22** and **22'** respectively of the jacquard chains **314** and **314'** respectively, and they are arranged so as to cause varied reciprocating movements of the bars **16**, thus controlling the placement of the ladder-like or weft strands **301** of the fabric **299** of Fig. 9.

The jacquard chains **314** and **314'** (see Figs. 1 and 1*a*) ride upon and are advanced by the square polygonal sprocket elements **23** and **23'**, which sprocket elements are rotatably mounted

on the upper ends of the reciprocatory arms or carriers 24 and 24'.

The reciprocatory arms or levers 24 and 24' are pivotally mounted at 25 and 25' upon the fixed arms 26 and 26' which extend out from the frame of the machine 10. The arms 24 and 24' are reciprocated by the links 27 and 27' which are pivotally connected at 30 and 30' to the gear wheels 29 and 29', the combinations 29—30 serving as a crank to reciprocate the arms 24 and 24'.

The gear wheels 29 and 29' are driven by similar power shafts 31 of the machine, which shafts are provided with a bearing such as 315, supported on the frame of the machine, as indicated at 316 (see Fig. 2).

As shown in Figs. 1 and 7, each of the links 22 of the chain 314 are provided with the outset forward arms 32 and the rearwardly extending inset arm 33, 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 elements 36 of each link 22 are preferably of such length as to carry a corresponding number of pins to cooperate with the contact elements 20 on the needle bars 16 and the corresponding element 320 on the bar 316.

The sprocket wheel or carrier 23, as shown in Fig. 7, 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 317 by which it is bolted to the arm 24 at 318.

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 jacquard chain 314.

As appears from Figs. 1 and 7 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 plate 18 and is pressed upwardly by the roller 319 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 tooth 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 314 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 63 acts to hold the ratchet 40 in each position (as shown in Fig. 1) after it has been advanced one-quarter turn by the pawl 60.

The upper end of the pawl 60 for the jacquard chain ratchet 40, as shown in Fig. 2 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 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 of the rod 74. The arm 76 is pivotally mounted on the rod 74.

The end of the rod 74 (see Fig. 2) is fixed 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 also 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 (see Fig. 1) 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 314 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. 7). 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 60 from the ratchet 40 to the ratchet 42 is accomplished through the mechanism best shown in Figs. 1, 2, 5 and 6.

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 bearing 102 and extending across the plate 18 of the machine frame.

To the shaft 101 (see Figs. 1, 2 and 5) is connected the cam 103 which cooperates with the follower roller 104 on the pawl actuator member or bar 105.

The upper outset portion 107 of the bar 105 is provided with the slot 108, into which projects the guide rod 109. 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 and is carried by the element 110 on the bar 113 (see Fig. 6).

To the upper outset portion 107 of the bar 105 is connected the bearing mount 116 on which the pawl rod 117 (see Fig. 5) is pivotally mounted. The rod 117 (see Figs. 1 and 6) carries the pawls 118 and 136, which are pressed into contact with the ratchet wheels 119 and 137 (see Fig. 6) 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 121a as may be desired (see Figs. 2, 5 and 6).

The pawl 118 may desirably be set to advance the wheel 119 one or two teeth 121 for each re-

ciprocation, while the pawl advances the ratchet 137 one tooth 121*a*.

Referring to Figs. 5 and 6, 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 113 in the direction 127, upon actuation by the pawl 118 shown in Fig. 1, and the shaft 123, will rotate the sprocket wheel 125. The reversing jacquard 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 resilient detent 130 (see Figs. 2 and 6), the end of which is provided with an embossment 114 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 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 Figs. 5 and 6, 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 located on the inside of the plate 18.

The ratchet 137 as 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 arm 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.

The ratchet 137 (see Fig. 6) 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 (see Figs. 5 and 6) having the lobes 149, which are symmetrically positioned around the periphery thereof and move in the direction indicated by the arrow 127 to cooperate with the roller 151 on the follower arm 152. The follower arm 152 is pivotally mounted at 153 on the bar 154 (see also Fig. 2).

Pivotally connected at 161 to the arm 152 is the link 162 (see Figs. 2 and 5) 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 of which is connected to the sleeve 73. The arm 168 therefore may 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 314.

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 vertical bar 105 and the pawl 118 may be readily changed to achieve controlled operation of the reversing mechanism.

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 jacquard chain 128 (as best shown in Fig. 5) may be caused to carry a series of contact plates 181 and 182 of different or the same shapes and forms, and at different intervals, which plates are continuously advanced with the advancement of the reverse jacquard chain 128 upon vertical reciprocation of the bar 105.

When these plates turn around the sprocket 125, they contact with the adjustable bar 183 adjustably connected to the L-shaped rod 184. The lower arm of the rod 184 is fixed by the setscrew 185 in the clevis 186 mounted upon the shaft 113 (see Figs. 5 and 6). The forward extension 187 of the arm normally is caused to contact with the shaft 123 by a spring (not shown).

The upward extension 187 of the arm carries the pawl contact member 190 (see Figs. 5 and 6) which (when the plates 181, or 182, contact with the adjustable contact 183) throws the pawl 136 to the left by contact with the horizontal extension 191 from said pawl (see also Fig. 1b).

As long as the cam plates 181 or 182 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 vertical bar 105. During this period the reversing mechanism will not be operated.

In operation therefore, as the main shafts 101 and 131 are driven the arms 24 and 24' will be continuously and alternately reciprocated, causing advancement of the jacquard chains 314 and 314' and a reciprocatory movement of the thread guides 13 connected to the bars 16, resulting in the formation of a predetermined pattern of the short fillers 301 (see Fig. 9) for each position of the pins 21 and 21' of the jacquard chains 314 and 314'.

With each of said reciprocations (due to the cooperation of the cam 103 and follower 104 with resultant 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 reverse jacquard chain 128, and the reversing cam 148.

The reversing cam 148 will, at predetermined intervals, elevate the follower roller 151 (as shown in Fig. 5) 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 and 182, upon the reversal jacquard chain 128 (see Fig. 4) which will for predetermined intervals maintain the pawl 136 out of contact with the ratchet 137.

The knitting and jacquard mechanism so far described is particularly pointed out and claimed in a copending application of Abraham Holtz filed February 13, 1935, entitled Knitting machine, bearing Serial No. 6,275.

The knitting and jacquard mechanism have been fully described, however, so that their cooperation and combination with the inlay mechanism to which the present invention is particularly directed will be fully understood.

As shown best in Fig. 4, and also in Figs. 1 and 3, the various inlay filler yarns or threads 302 to 306 are respectively carried by the guides 330, 331, 332, 333 and 334, each of which are provided with the eyes 335 through which the yarn 302—306 respectively passes.

Each of these guides 330 to 334 (the guide 334 being alone shown in Fig. 3 for the sake of simplification) are pivotally mounted on the rod 336 and they are provided at their upper ends with the grooves 337 which are adapted to cooperate with the plates 338, detachably bolted at 339 to the links 340 of the inlet jacquard chain 341.

The plates 338 when they come down into contact with the upper ends of the arms 330 to 334 are guided by the slots 600 in the plate 601, which plate is supported on the bracket 602 (see Figs. 1, 2 and 4) attached to plate 650 (see Fig. 2).

The inlet jacquard chain 341 (see Figs. 1, 3 and 6) meshes with the sprocket teeth 342 of a sprocket wheel 343 which is fixed upon and turns with the shaft 123.

As has been previously described and as shown in Fig. 6, the shaft 123 is driven by or together with the reverse jacquard chain 128 through the pawl 118 and ratchet wheel 119, which in turn are driven by the reciprocating vertical bar 105 and the cam 103.

Normally the guide arms 330 to 334 are in retracted position, as indicated in solid lines on Fig. 3 due to the action of the coil springs 344, which are attached to the fixed pin 345. When the arms 330 to 334 are in that position, the filler threads are permitted to run loosely along the side of the fabric as indicated at the positions 346 and 347 in Fig. 9.

When, however, the filler is to be laid into the fabric as indicated at 307 to 311 in Fig. 9, the contact plate 338 on the inlay jacquard chain 341 will move the inlay yarn guide forward, as indicated at the dotted line position for the arm 334 in Fig. 3 with the result that the corresponding inlay yarn 306 will be drawn into the recess 348 in the U-member 349 (see Figs. 3 and 4).

The filler yarn guide 635 (see Fig. 3) will guide the yarn 306 during the operation into the recess 348. The guide 635 is carried by the yoke 636 and fixed thereto by the setscrew 637. The yoke 636 is carried on the rod 638 which also acts to stop the levers 330 to 334 under action of spring 344.

The U-member 349 is adjustably carried by the inturned end 352 of the rod 353.

The rod 353 fits into the bore 350, which is provided with the set-screw 351. The rod 353 is adjustably fixed in the recess 354 in the bar 355 by the set-screw 356a. The bar 355 is adapted to slide through the bearing 356 in the clevis member 357, which clevis member is pivotally mounted upon the shaft 358.

The bar 355 is normally drawn upwardly by the coil spring 359, until the fixed collar 360 contacts with the lower face of the clevis 357 (see Fig. 3).

When the bar 355 is to be depressed so as to carry the U-member 349 with the inserted filler 306 to adjacent the fell position 361 (see Fig. 3), so that the filler may be inlaid and locked in position by the next knitting operation, the contact roller 362 at the upper end of the bar will be depressed by the lower end 363 of the arm 365 (see also Fig. 2). This will cause the bar 355 to slide downwardly through the bearing 356 in the clevis 357. The fixed collar 364 will limit the downward movement of the bar 355.

The semi-circular arm 365 carrying the contact element 363 is mounted as indicated on the shaft 367 mounted at its ends upon the arms 154 and 154' (see Figs. 1a and 2). The shaft 367 carries the arm 368. The arm 368 is pivotally connected at 369 to one end of the link 370. The link 370 is pivotally connected at its other end at 371 to the arm 372 mounted at its lower end on the rod 374.

The rod 374 is mounted in the ear 605 projecting forwardly from the upward extension 85 of the frame element 18. The arm 375 mounted on the rod 374 extends downwardly to and is provided with the contact element 376 which rides on the cam 377 having the lobs 378. The cam 377 is driven on the shaft 379 through the meshing bevel gears 380 and 381, the bevel gear 381 turning with the shaft 101.

A similar set of bevel gears (not shown) are positioned at the other side of the machine (Fig. 1a) and drive the gear wheel 100' which in turn drives the gear 29'.

It is thus apparent that the cam 377 with proper timing and in coordination with the rest of the mechanism as controlled by the shaft 101 will, upon movement of the guide bar 334, from full line position in Fig. 3, actuate the slider bar 355 through the levers 375 and 372, the link 370 and the levers 360 and 365 to depress the U-shaped guide 349 to select the desired filler 306 and carry it down to adjacent the fell position, as indicated at 361 in Figs. 3 and 9.

When the guide member 349 has selected the proper filler yarn the guide member 349 with this filler yarn 306 will be permitted to spring under action of spring 359 back out of the way of the needles 12 and longitudinal or warp yarn carriers 631 (see Figs. 3 and 10) and caused to traverse the machine by the mechanism now to be described.

As indicated in Figs. 1 and 2, to the end of the shaft 101 is connected the mutilated gear 400 having the gear teeth 401 and the uncut portion 402.

Ccoperating with the mutilated gear 400 is another somewhat larger gear 403 having diametrically opposite concavities, as indicated at 404, which cooperate with the uncut portion 402 of the gear 400.

The teeth 405 extending along the side of the gear wheel 403 between said mutilated portion 404 to mesh with the teeth 401 of the drive element.

The gears 400 and 403 are not in mesh when the inlay is not being made, the gear wheel 403 being above and spaced from the gear wheel 400 by the arm 409 of the lever 406 upon which it is pivotally mounted at 407 (see Figs. 1 and 2).

The lever 406 is pivotally mounted at 408 upon a plate 602 on the extension 650 from the frame plate 18. The lever 406 is provided with a downwardly extending arm 410 (see Fig. 1) which is pivotally connected at 411 to the link 412. The link 412 is pivotally connected in turn at 413 to the vertical bar 414.

The lower end of the bar 414 is pivotally mounted at 415 upon the arm 416 from the frame 10 and at its upper end it is slotted at 653 to receive the pin 417, which is carried by the transverse bar 316 and actuated by the pins 21 of the jacquard chain 22, either to swing the bar 414 as shown in Fig. 1 to the left, and bring the mutilated gears 400 and 403 into cooperating relationship and thereafter by the pins 21' of the other chain 22' to swing the bar 414 to the right,

in which case the gears 400 and 403 are separated.

When the mutilated gears 400 and 403 are moved in cooperating relationship they are locked in this position by the downwardly depending latch member 418 (see Figs. 1 and 2) which is pivotally connected at 419 to the outer end of the arm 409 of the lever 406.

The lower end of the latch rod 418 is provided with a recess 420 (see Fig. 1) which is adapted to be engaged by the tooth 421 on the catch member 422. This interlocking action is assured by the coil spring 423 which extends between the end 424 of the latch rod 418 and the holder 425 on the arm 416.

After the traversing movement of the yarn or thread carrier element 349, which will be now described, the cam member 426 will knock out the roller 427 on the latch lever 418 and at the same time cause disengagement of the latch 420—421. This will permit the gear 403 to be lifted out of engagement with the gear 400 by elevation of the arm 409. The arm 409 is elevated by rightward movement of the pivot 413 with movement of the bar 316.

To traverse the carrier 349 with the selected filler yarn (say 306) therein, when the gears 400 and 403 are in engagement, the link 428 is provided (see Fig. 1). The link 428 is pivotally connected to the gear 403 at 429 and at its other end is pivotally connected at 430 to the collar 431.

The collar 431 is fixed by a set-screw 432 upon the rack bar 433 (see also Fig. 1*a*), the left end of which is provided with the teeth 434. The rack bar 433 at its right end is received in a guide recess or sleeve 435 (see Figure 3) and at its left end it is received in the recess 436, and meshes with the pinion 437 also received therein (see Figure 1*a*).

The pinion 437 drives the sprocket wheel 439 which meshes with the chain 440, the right side of the chain passing over the sprocket 441 (see Figs. 1*a*, 3 and 4).

The shaft 438 of the pinion 437 is mounted in the side members 626 of the frame member 442 which is provided with the flange connection 627 to the frame member 18 (see Fig. 1*a*).

As is indicated in Fig. 3, the sleeve 435 which carries the right end of the bar 433 is carried on the arm 445 extending from the table or frame 602 at the right of the machine.

The chain 440 carries the angle mount 610 which is connected to the stabilizing arm 611 and is rigid and carries the slider arm 355 carrying the thread guide 349.

The arm 611 (see Fig. 3) is provided with a yoke 612 fitting on the bar 316 and at its upper end is held in the eye 613 which slides with the element 357 on the shaft 358.

It is thus apparent that the crank 428 upon cooperation between the mutilated gears 400 and 403 will first move the arms 355 and 611 to the left, after the carrier 349 has been depressed by the lever 365 to select the proper filler thread and then by the next throw of the crank 428, the arms 355 and 611 will be returned, each traversing movement of the arms being followed by a knitting operation by which the filler 306 is locked into position at the fell 361.

To hold the yarn at fell position and assure that it will be knitted in by the next operation of the needles 12, the holder members 500 are provided at each side of the machine (see Figs. 2 and 3). The upper ends of these members 500 are curved as indicated at 501, to catch the filler yarn 306. The lower ends of the members 500 are pivotally mounted on the rod 502 and actuated by the lever 503.

The lever 503 is pivoted at 504 to a link 505 (see Figs. 2 and 3) which is connected at its rear end 506 to an arm 507 fixedly pivoted at 508 on the machine frame.

The upper end of the arm 507 (see Fig. 2) is connected to the spring 509 so its follower roller 510 will be pressed against the cam 511 having the lobe 512.

It is apparent from Fig. 2 that when the cam 511 reaches the position indicated, the elements 500 will be actuated to push the filler yarn up to the fell position 361.

What is claimed is:

1. In a knitting machine, a short filler inlay mechanism, means for operating said short filler inlay mechanism, and a long filler inlay mechanism comprising a holder for a plurality of long filler yarns, a selector for the long filler inlay yarn, means to hold said selector away from said long inlay filler yarns when not in use, means to move said selector toward said long filler yarns, means to cause said selector to select one of said long filler yarns, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to hold the long inlay in position during the subsequent knitting operation.

2. In a knitting machine, a short filler inlay mechanism, means for operating said short filler inlay mechanism, and a long filler inlay mechanism comprising a holder for a plurality of long filler yarns, a selector for the long filler inlay yarn, means to reciprocate said selector vertically to cause it to select one of said long filler yarns and to cause it to traverse the knitting needle bank, and means to hold the long inlay in position during the subsequent knitting operation.

3. In a knitting machine, a short filler inlay mechanism, means for operating said short filler inlay mechanism, and a long filler inlay mechanism comprising a holder for a plurality of long filler yarns, a selector for the long filler inlay yarn, means to depress said selector, means to cause it to select a desired long filler yarn and a rack and pinion arrangement to cause said selector to traverse the knitting needle bank, and means to hold the long inlay in position during the subsequent knitting operation.

4. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a support for said selector, a slide for said support and a chain and sprocket arrangement to cause said selector to traverse the knitting needle bank.

5. In a knitting machine a short filler inlay mechanism, means for operating said short filler inlay mechanism, and, a long filler inlay mechanism comprising a holder for a plurality of long filler yarns, a selector for the long filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to control the selector including a cam chain, means driven by the machine to advance the chain, means to move said selector toward said long filler yarn when said traversing mechanism is to be actuated, means to cause said selector to select one of said long filler yarns and means to depress the selector toward the selvedge after each traverse.

6. In a knitting machine, a filler inlay mecha-

nism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to drive said traversing mechanism including a pair of mutilated gears, a rack and pinion combination driven from the driven element of said mutilated gears, and a sprocket and chain combination driven by said rack and pinion combination, said chain being connected to said selector to cause traversing movement thereof.

7. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to drive said traversing mechanism including a rack and pinion combination, and a sprocket and chain combination driven by said rack and pinion combination, said chain being connected to said selector to cause traversing movement thereof.

8. In a knitting machine, a filler inlay mechanism comprising a plurality of guides for different types of filler inlay yarns, a selector to select one of the filler inlay yarns, means to move one of said guides and said selector together when an inlay is to be made, whereby said selector will take up an inlay filler yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank and means to depress said selector toward fell position at the ends of traversing movements.

9. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to initiate operation of said traversing mechanism from the jacquard mechanism of the machine.

10. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to drive said traversing mechanism including a pair of mutilated gears, a rack and pinion combination driven from the driven element of said mutilated gears, and a sprocket and chain combination driven by said rack and pinion combination, said chain being connected to said selector to cause traversing movement thereof, said gears being provided with lever means to move them in and out of cooperating relationship, said lever means being actuated by the jacquard mechanism of the machine.

11. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, and means to operate said selector and traversing mechanism actuated in turn from the jacquard mechanism of the machine.

12. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bed and a plurality of jacquard chains one chain to control the short weft pattern, and said traversing mechanism, a second chain to reverse movement of said short weft pattern controller and a third chain to control the operation of said selector.

13. In a knitting machine, a filler inlay mechanism comprising a plurality of filler insert devices one to lay short fillers and one to lay long fillers, a jacquard chain to actuate the former and a chain and sprocket drive to actuate the latter, said last mentioned device comprising an elongated selector, a plurality of guide members each carrying a long filler, means to move said guide member and said selector together when a long filler is to be laid and means to depress said selector at each selvedge after each traverse.

14. In a knitting machine, a filler inlay mechanism comprising a plurality of filler insert devices one to lay short fillers and one to lay long fillers, the former being carried by a plurality of bars having a limited reciprocating movement and the latter being carried by a reciprocating element capable of traversing the entire bed of the machine, said last mentioned device comprising an elongated selector, a plurality of guide members each carrying a long filler, means to move said guide member and said selector together when a long filler is to be laid and means to depress said selector at each selvedge after each traverse.

15. In a knitting machine, a filler inlay mechanism comprising a selector for the filler inlay yarn, a traversing mechanism to cause said selector to traverse the width of the knitting needle bank, a gear drive to actuate said traversing mechanism and jacquard means to control said gear drive, said last mentioned device comprising an elongated selector, a plurality of guide members each carrying a long filler, means to move said guide member and said selector together when a long filler is to be laid and means to depress said selector at each selvedge after each traverse.

16. In a flat bed knitting machine of the type suitable for knitting curtains, including a horizontal bed, a plurality of spaced knitting needles in said bed to knit a plurality of spaced longitudinal warp strands, a plurality of warp yarn guides feeding said needles, a plurality of cross bars carrying short weft or filler yarn guides with contact members on the ends thereof, said guides feeding the yarn to said needles, jacquard mechanisms on each side of said machine for reciprocating said bars according to a predetermined design for the short fillers in the fabric, said jacquard mechanisms each including a linked chain, a sprocket for said chain to drive the same, a plurality of pins carried by each of said links according to a predetermined desired movement of said short filler yarn guides, an arm to reciprocate said sprocket and cause said pins to alternately move said cross bars on opposite sides of said machine, and a pawl mechanism to rotate said sprocket upon said reciprocation by said arm; the combination therewith of an inlay filler mechanism comprising a plurality of guides for said inlay filler, a carrier for said inlay filler, selector means to cause said carrier to catch the desired filler and driver means to cause said carrier to traverse the bed.

17. The combination of claim 16 in which said selector means includes a jacquard chain.

18. The combination of claim 16 in which said driver means includes a pair of mutilated gears.

19. The combination of claim 16 in which said driver means includes a rack-pinion-sprocket-chain combination.

20. The combination of claim 16 in which said driver means is initiated in operation by said jacquard chain.

21. In a knitting machine, a jacquard mech-

anism including a plurality of cross bars, yarn guides on all but one of said cross bars, selective means to reciprocate all of said bars backwardly and forwardly to produce a pattern, means to insert an inlay in said fabric, means to drive said insert means and a connection between said last mentioned means and said one bar, whereby said insert means will be controlled by said selective means.

22. In a knitting machine, a jacquard mechanism including a plurality of cross bars, yarn guides on all but one of said cross bars, selective means to reciprocate all of said bars backwardly and forwardly to produce a pattern, means to insert an inlay in said fabric, means to drive said insert means and a connection between said last mentioned means and said one bar, whereby said insert means will be controlled by said selective means, said bars having end contact plates and said selective means including a jacquard chain with outstanding pins and means to reciprocate said pins to press on said plates and move said bars.

23. A filler inlay mechanism for knitting machines comprising a reciprocating thread guide, driving means therefor, means to hold said driving means in inactive position and jacquard means to actuate said last mentioned means to move said driving means to active position, a plurality of filler inlay holders, and means to move one of said filler inlay holders toward said guide when said driving means is moved to active position.

24. A filler inlay mechanism for knitting machines comprising a reciprocating thread guide, driving means therefor, means to hold said driving means in inactive position and jacquard means to actuate said last mentioned means to move said driving means to active position, said driving means including two gears normally held out of mesh by said holding means, a plurality of filler inlay holders, and means to move one of said filler inlay holders toward said guide when said driving means is moved to active position.

25. A filler inlay mechanism for knitting machines comprising a reciprocating thread guide, driving means therefor, means to hold said driving means in inactive position and jacquard means to actuate said last mentioned means to move said driving means to active position, said driving means including a rack, a crank to drive said rack, a sprocket wheel driven by said rack and a chain driven by said sprocket carrying said thread guide.

26. In a knitting machine of the type suitable for knitting curtains, including a plurality of spaced knitting needles to knit a plurality of spaced longitudinal warp strands, a plurality of warp yarn guides feeding said needles, a plurality of cross bars carrying short weft or filler yarn guides with contact members on the ends thereof, said guides feeding the yarn to said needles, jacquard mechanisms on each side of said machine for reciprocating said bars according to a predetermined design for the short fillers in the fabric; the combination therewith of an inlay filler mechanism comprising a plurality of guides for said inlay filler, a carrier for said inlay filler, selector means to cause said carrier to catch the desired filler and driver means to cause said carrier to traverse the bed.

27. A filler inlay mechanism for a fabric forming knitting machine of the flat bed type comprising a reciprocating thread carrier, a plurality of thread holders and means to move said carrier and one of said holders relatively to each other to cause said carrier to engage the thread passing through said one holder.

28. A filler inlay mechanism for a fabric forming knitting machine of the flat bed type comprising a reciprocating thread carrier, a plurality of thread holders and means to move said carrier and one of said holders relatively to each other to cause said carrier to engage the thread passing through said one holder, said last mentioned means including a jacquard chain.

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