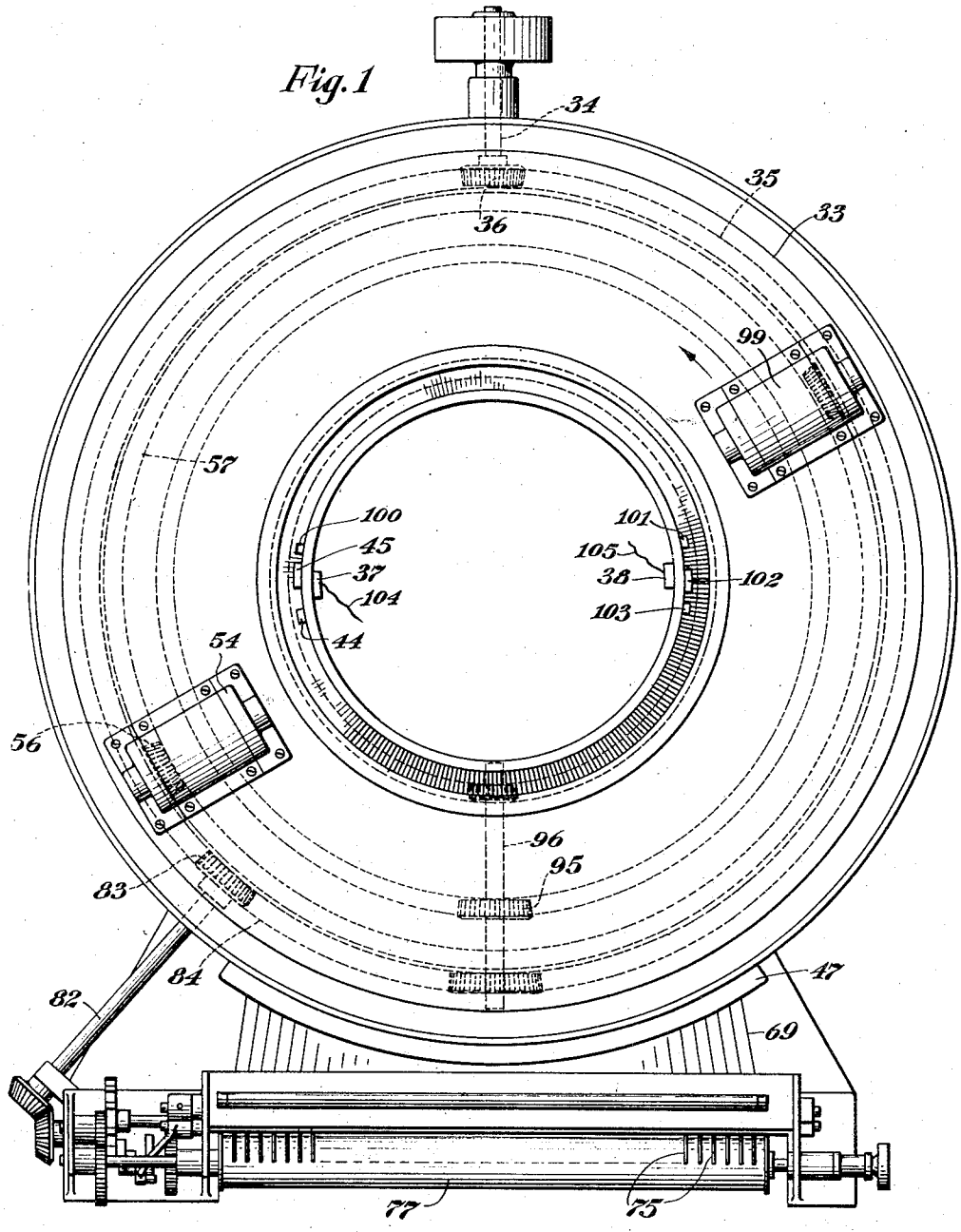
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KNITTING MACHINE

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Fig. 1



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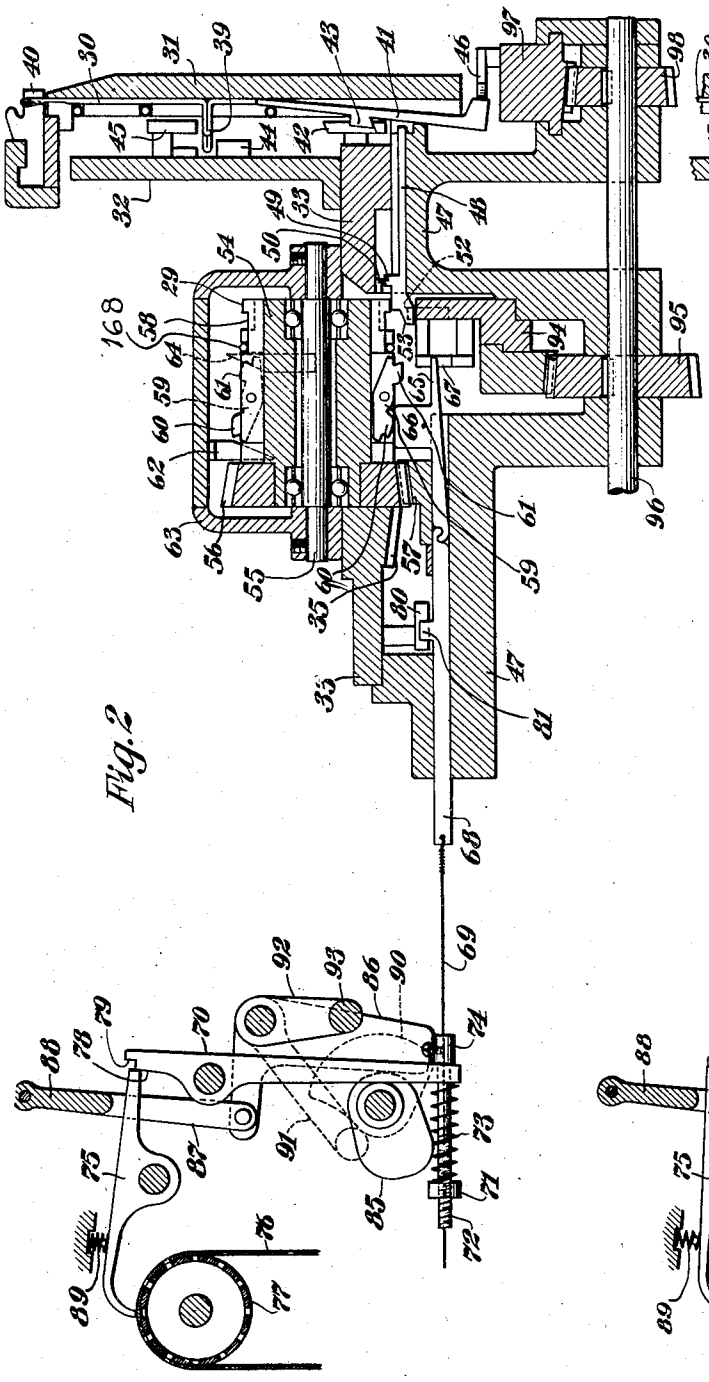


Fig. 2

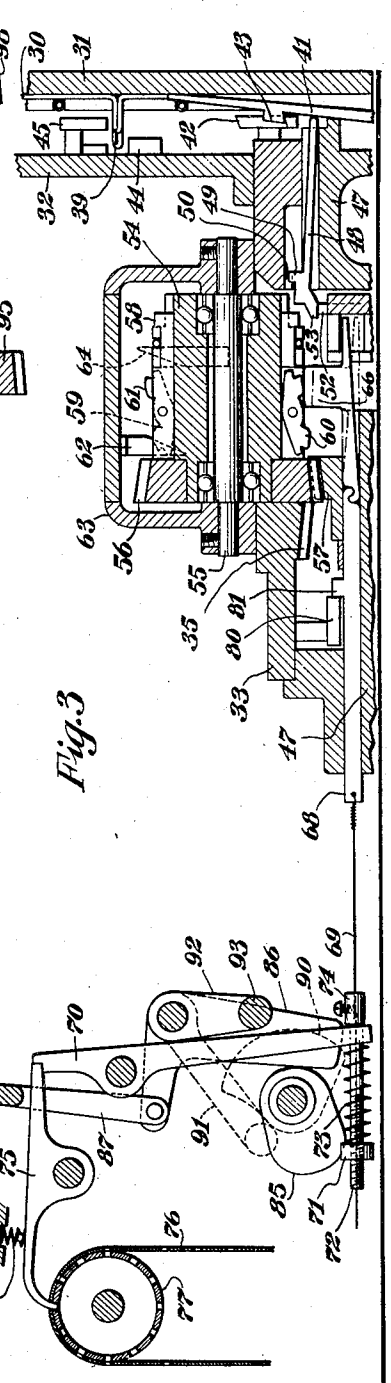


Fig. 3

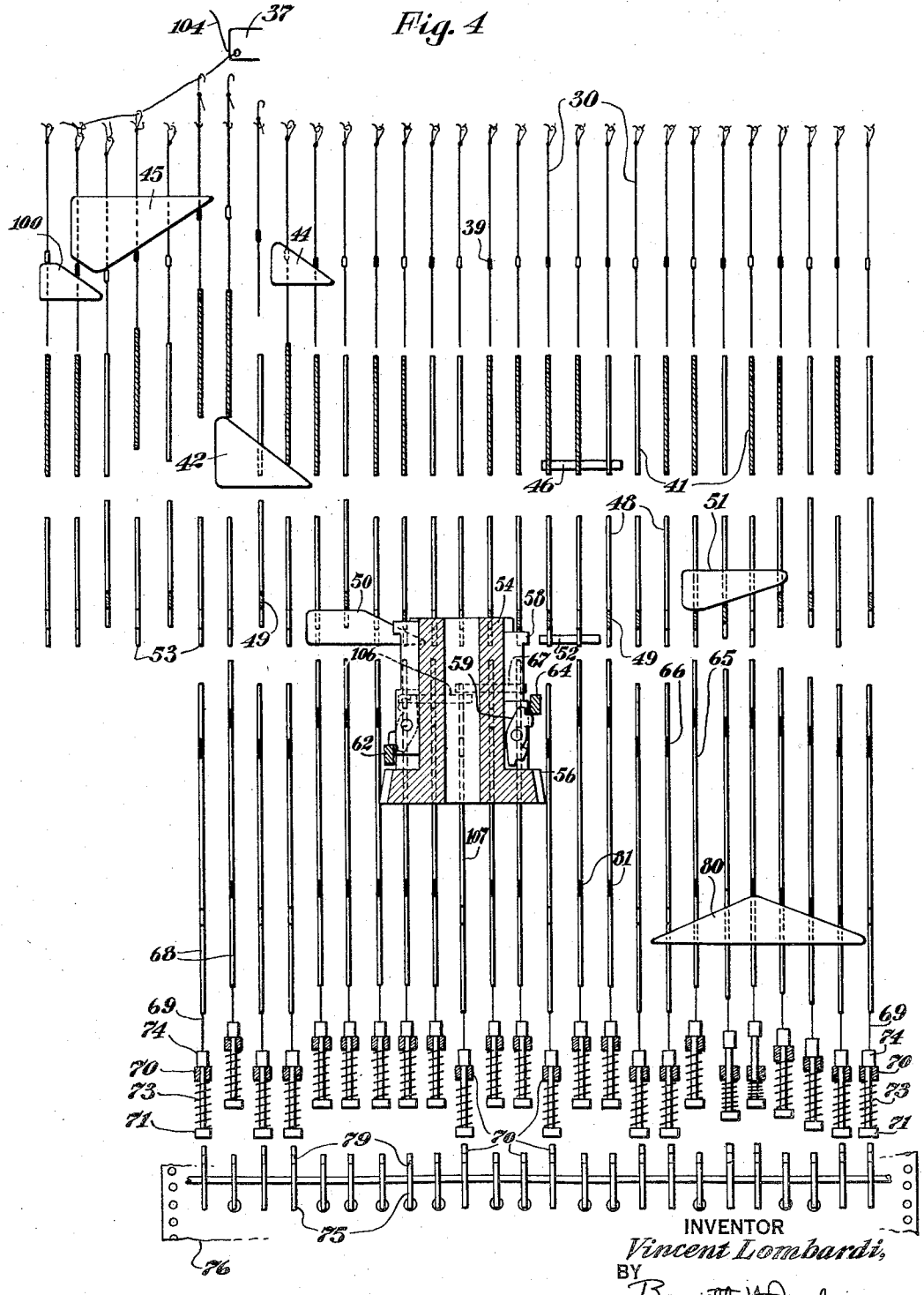
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Fig. 4



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Fig. 5

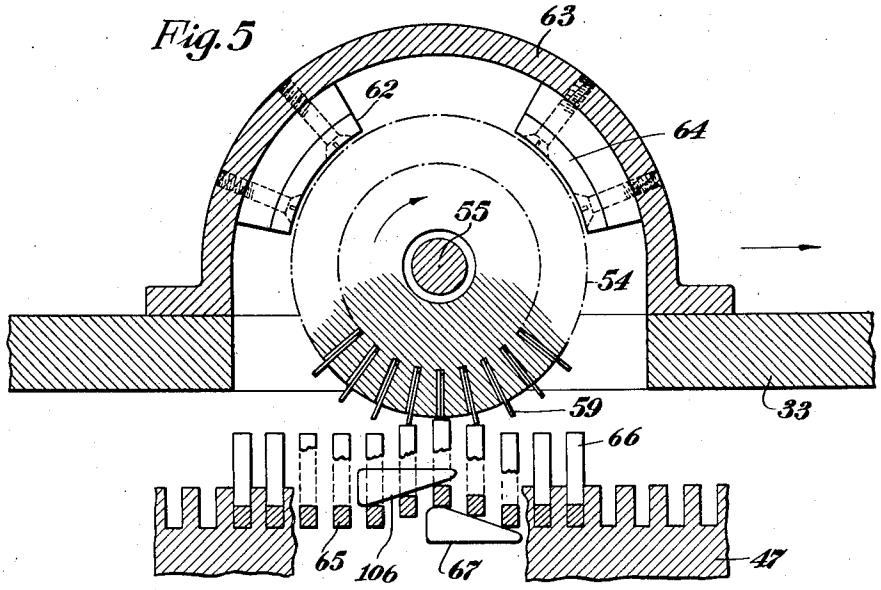


Fig. 6

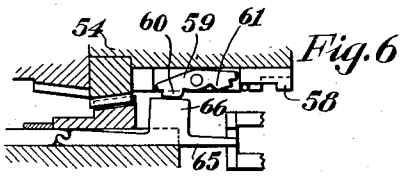


Fig. 7

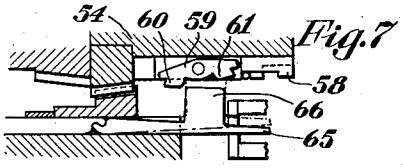


Fig. 8

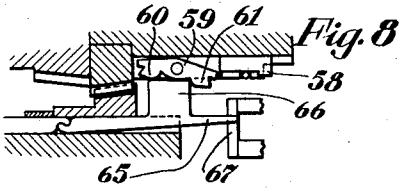


Fig. 9

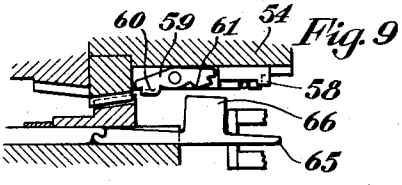


Fig. 10

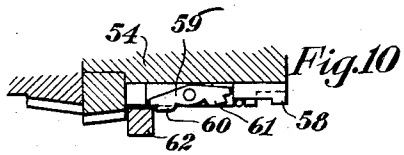


Fig. 11

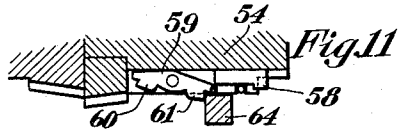


Fig. 12

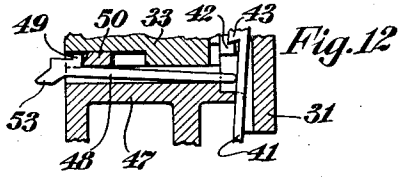
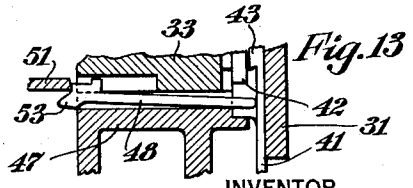


Fig. 13



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Fig.14

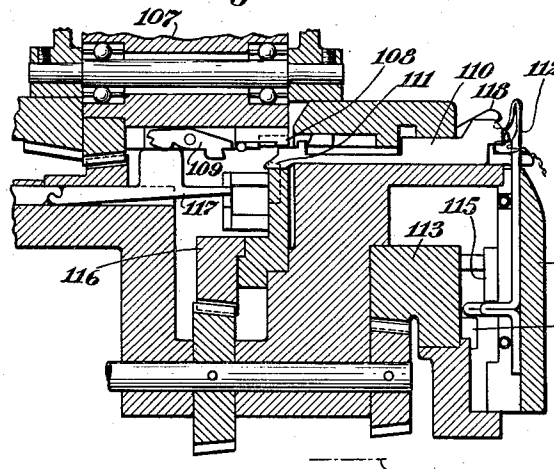
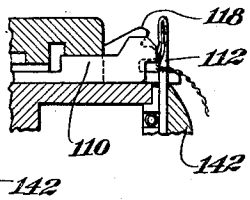


Fig.15



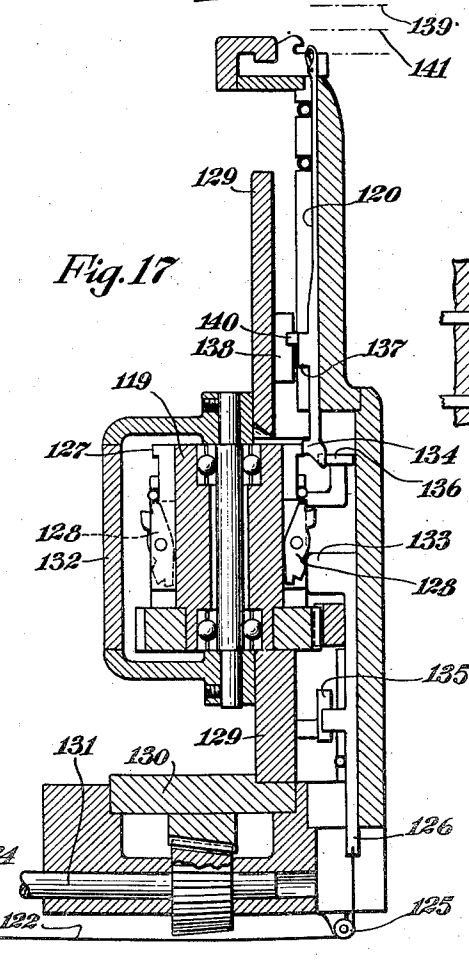


Fig.16

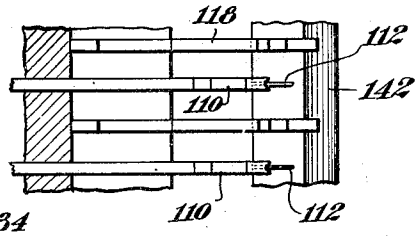


Fig.17

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Fig. 18

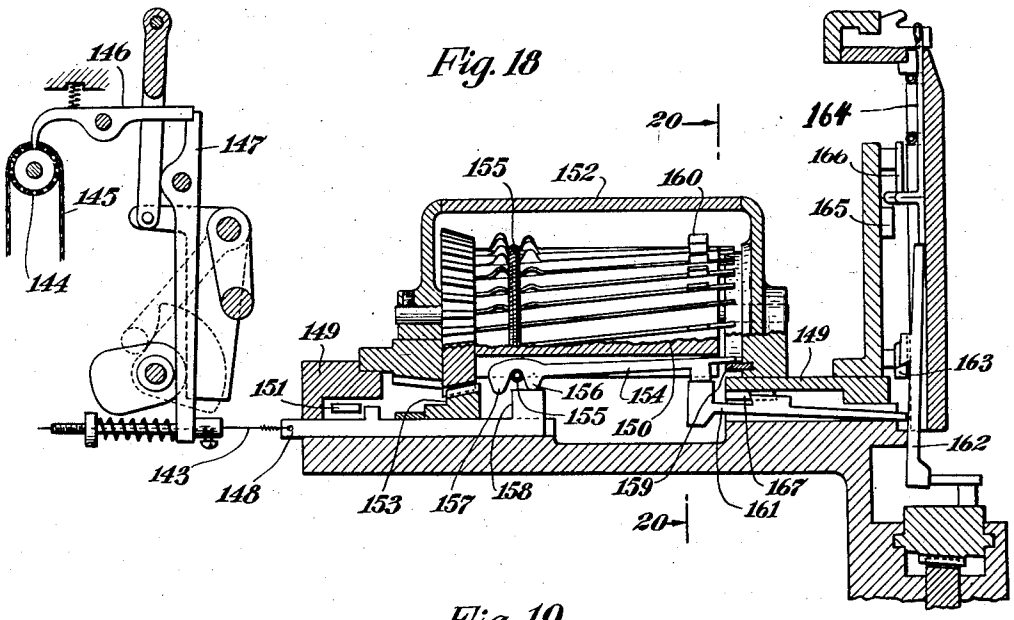


Fig. 19

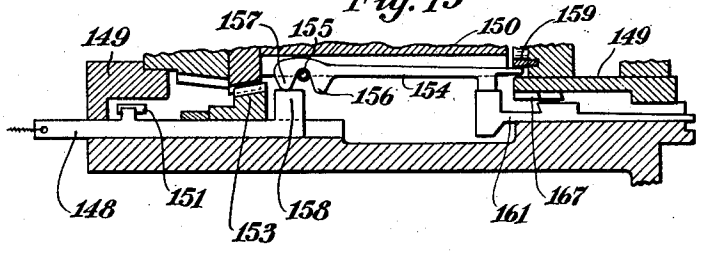
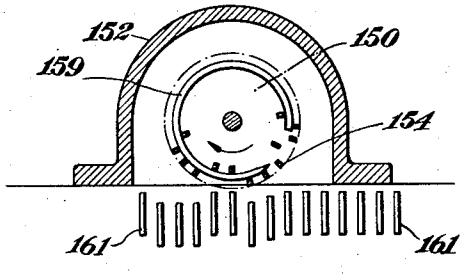


Fig. 20



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Fig. 21

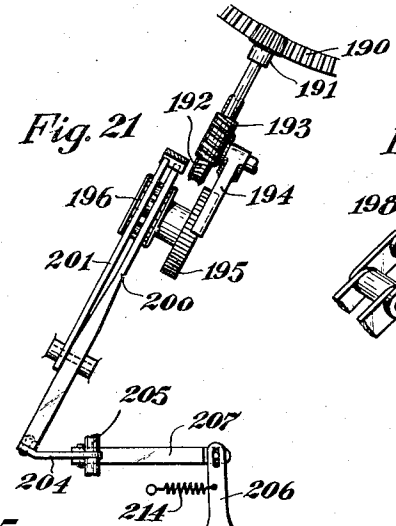


Fig. 23

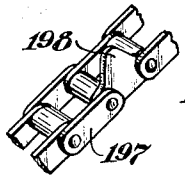


Fig. 24

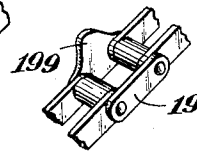


Fig. 22

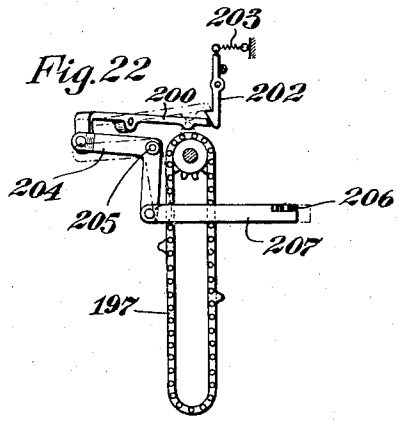


Fig. 25

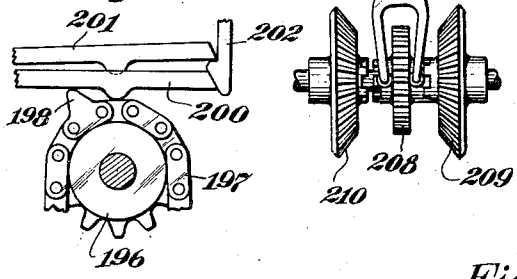


Fig. 26

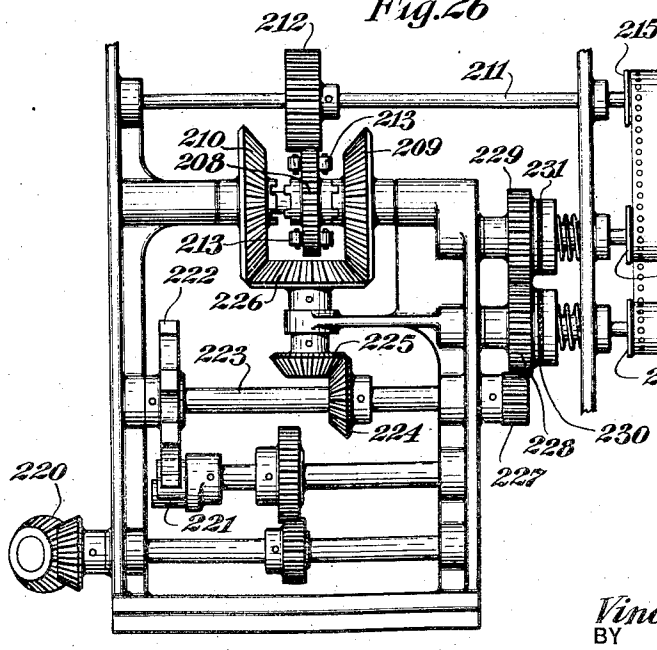
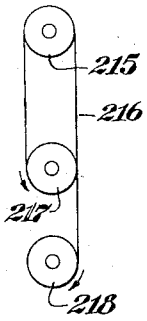


Fig. 27



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Patented Feb. 17, 1931

1,792,647

UNITED STATES PATENT OFFICE

VINCENT LOMBARDI, OF BROOKLYN, NEW YORK

KNITTING MACHINE

Application filed November 17, 1928. Serial No. 320,111.

This invention relates to knitting machines and includes certain correlated inventions and discoveries appertaining thereto.

An object of the invention is to provide a knitting machine whereby a large number of varied pattern effects may be readily and economically incorporated into a knitted fabric.

In its more specific aspects, the invention has for an object the provision in a knitting machine of improved pattern control mechanisms arranged to be set periodically in accordance with the configurations presented thereto by a pattern-determining medium, and in response to said setting to impart pattern-controlling actuations to a series of needles.

An additional object is to provide a knitting machine which is simple in construction, economical of manufacture and assembly, readily adjustable, capable of a wide variety of uses and adapted for ready and efficient operation.

Another object is to provide an improved type of pattern wheel for a knitting machine by means of which the knitting operations of the needles may be more readily controlled.

Another object is to provide a more rugged pattern mechanism for a knitting machine.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the constructions hereinafter set forth and scope of the application of which will be indicated by the appended claims.

For a fuller understanding of the nature and objects of the invention, reference is made to the following detailed description taken in connection with the accompanying drawings, in which

Fig. 1 is a plan view of a circular knitting machine embodying this invention;

Fig. 2 is a sectional view of a portion of the same,

Fig. 3 is also a sectional view of the machine of Fig. 1 in which certain parts have assumed different positions from those illustrated in Fig. 2;

Fig. 4 is a schematic lay-out of the pattern control arrangements of this invention;

Fig. 5 is an end view partly in section of the pattern drum of Fig. 1;

Figs. 6 to 13, inclusive illustrate the cam control of the pattern control elements of the pattern drum in various stages;

Figs. 14 to 16 inclusive illustrate a modification of the invention applied to a spring needle machine;

Fig. 17 is another modification of the invention in which the pattern drum directly actuates the needles of the machine;

Figs. 18 to 20 inclusive illustrate still another modification of the invention in which the control elements of the pattern drum are unitary elements as contrasted with the double elements of Fig. 2;

Fig. 21 represents a top view and Fig. 22 an end view of a mechanism for controlling the rotation of a driving member in opposite directions;

Figs. 23 to 25 inclusive show details of the chain and related parts employed in Figs. 21 and 22;

Fig. 26 illustrates how the apparatus of Figs. 21 and 22 may be applied to the control of a paper pattern sheet for a knitting machine; and

Fig. 27 shows the relation of the three drums over which the pattern sheet of Fig. 26 passes.

The invention may be exemplified in connection with a circular knitting machine employing cylinder needles as in Fig. 1 and the succeeding figures where the invention is employed to control needles of that type. The cylinder needles 30 are mounted in grooves in a stationary cylinder 31, as is customary. Associated with the needle cylinder 31 is a rotatable cam cylinder 32 mounted on a rotatable plate 33 operatively connected to a driving shaft 34 through the medium of a tooth rack 35 and a crown 36 on the shaft 34. As illustrated the cylinder 31 supports a row of vertical latched needles 30 adapted to be advanced or retracted to receive yarn from a pair of yarn feeds 37 and 38, carried by the rotatable member 33 and to incorporate the same into a fabric either by knitting continu-

ous rows of loops thereof to form jersey cloth or by interlocking, tucking or otherwise varying the knitting. The needles shown are formed intermediate the ends thereof with outwardly extending butts 39, certain of the needles having short butts and others having long butts. The needles are mounted for vertical movement in the usual manner in grooves in the cylinder 31. Certain cams to be described later control the needle movements. The usual sinkers such as those shown at 40 are provided between the needles.

The needle control means are for convenience shown as arranged to cause a needle movement of the general type described in my Patent No. 1,541,230, whereby there may be provided a multi-color fabric, such as exemplified in my said patent as well as in my Patent Nos. 1,426,576 and 1,541,230 and in my application Serial No. 196,894 filed June 6, 1927, Patent No. 1,737,598, wherein one yarn is formed into a series of interknitted loops in one section of the fabric and a second yarn is formed into a series of interknitted loops in another section of the fabric, the yarn not entering into the fabric in any section being interlocked with the interknitted loops by being caught between the loops in certain, preferable alternate, wales, and being extended behind the interknitted loops in intermediate wales.

The functioning of the various cams of the machine, now to be described will be best understood by referring both to Figs. 2 and 4, it being understood that as each yarn carrier is passing a given needle, the needle may be fully raised to form a loop, or may be partially raised to catch the yarn without looping, or it may be retained in a retracted position. Mounted in the groove below each needle is a needle jack 41 capable at times of advancing its associated needle. When the lower end of a jack 41 projects away from the needle cylinder 31 a rotatable cam 42 mounted on plate 33 contacts with a butt 43 on the jack and raises the jack and associated needle until the needle is in a knitting position. Cam 44 mounted on cam cylinder 32, is designed to contact with the butts of the long butt needles and cause such needles to be raised to the so-called interlocking position where the new yarn is caught without forming a new loop and without discarding the old loop. Cam 45 serves at an appropriate time to lower all partially advanced and fully advanced needles.

As previously stated, a new loop will be knitted only when the lower end of a jack 41 is in such a position as to be controlled by cam 42. An additional rotatable cam 46 contacting with the lower end of each needle jack insures that all needle jacks around the entire machine will periodically be thrown over into the path of the raising cam 42. The present invention however provides a simple and effective mechanism for selecting certain of the needle jacks after the passage of cam 46 to cause the selected jacks to be returned into their grooves out of the path of the cam 42 while permitting the remaining jacks to be raised by cam 42. Of course, the needles associated with the said selected jacks will not form loops of the yarn that is passing at that particular moment.

Mounted in radial grooves in a horizontal plane on the upper surface of the stationary base plate 47 are a plurality of slidable elements 48, each of which when actuated serves to force its associated needle jack out of the path of the knitting cam 42. Each of these slidable elements 48 has several cam surfaces near its end opposite the needle cylinder. The cam surface 49 is adapted to contact at times with a rotatable cam 50 mounted on the under side of rotatable plate 33, whereby the element 48 is moved towards the needle cylinder. At other times a cam 51 similarly mounted contacts with cam surface 49 and moves the elements 48 away from the needle cylinder. A third rotatable cam 52 mounted below the slidable elements contacts at times with the portion 53 of each element to periodically raise the outer ends of the elements for a purpose to be described later.

Each slidable element may or may not be controlled by cam 50 depending upon the setting of a pattern drum 54 mounted for movement around the needle cylinder and rotating in response to this movement. The shaft 55 of the pattern drum is suitably mounted for rotation on the plate 33. A crown 56 at one end of the drum and a stationary tooth rack 57 cause the rotation of the drum as the drum is moved bodily around the needle cylinder. This drum 54 is somewhat similar to the drum shown in my above mentioned patent application Serial No. 196,894, Patent No. 1,737,598. The drum contains a plurality of parallel grooves in its outer surface, each groove containing a slidable element 58 and each element 58 having a pivoted member 59 mounted thereon for rocking movement, as in my prior application. When the end 60 of the pivoted member 59 has been rocked so as to project beyond the surface of the drum, a cam 62, mounted on the housing 63 for the drum, is adapted to contact with the portion 60 and cause a movement of the associated element 58 towards the needle cylinder. When a member 59 has been rocked so as to project portion 61 beyond the surface of the drum, a similar cam 64 is adapted to move the associated element 58 away from the needle cylinder. As shown in Figs. 2 and 3, a slidable element 58 in its inner position will in the rotation of the drum contact with the outer end of an element 48 and push the element 48 down out of the path of the advancing cam 50. However when the element 58 is in its

outer position (see Fig. 3) it has no control over the slidable elements 48.

The various elements 58 may be held in place in the drum slots by a coiled spring 168 surrounding the drum. It will also be noted that the drum is of smaller diameter at the end adjacent the needle cylinder to permit the proper functioning of the elements 58. Each pair of elements 58 and 59 is also preferably sprung or bent so as to fit fairly tightly in its slot and prevent undesired movements.

From the above description it will appear that when a pivoted member 59 has its portion 60 projecting outwardly the chain of operations is such that certain slidable elements 48 around the machine will not be actuated by cam 50, so that needles corresponding to the said certain elements will be raised to full knitting position. Similarly a pivoted member 59 having its portion 61 projecting outwardly will mean that certain corresponding needles around the machine will not be raised to full knitting position.

It is to be understood that the slots containing elements 68, 65, and the slots for jacks 48 are radially disposed with the center of the needle cylinder 31, that is the slots for elements 68, 65, converge towards each other from their outer ends to the ends adjacent the needle cylinder and the same holds true for the slots for jacks 48. This makes it preferable that the contact points of the pattern drum elements should generate a conical surface in order to reduce friction at the contact points and to prevent slipping. The slots in the drum 54 are parallel to each other and the distance from the axle to the bottom of each slot is the same at each end of the drum but the conical surface is obtained in the following manner of construction. If each rocker arm 59 is moved so that a plane touching the bottom contact surface of portions 60 and 61 also touches the bottom contact surface of projection 29 on the corresponding element 58 and also passes through the gear 56, such a plane in the rotation of the drum should generate a conical surface having its smaller diameter adjacent the needle cylinder, the pitch of the cone being such as to insure the proper contacting of portions 60 and 61 with jack 65 and portion 29 with jacks 48.

The manner in which pivoted members 59 may be controlled by a pattern sheet to vary the knitting will now be explained. Mounted underneath the path of the pattern drum and located in grooves in the stationary plate 47 are a plurality of slidable jacks 65 having upwardly extending portions 66, and there is one of these jacks 65 for each slidable element on drum 54. The free ends of these jacks 65 project beyond the base plate 47 into the path of a rotating cam 67 which at the proper time raises each of the jacks 65 in turn to have the portion 66 contact and rock its corresponding pivoted member 59 either in one direction or the other depending upon the position of each jack 65. Each jack 65 is pivotally connected to another member 68 in an extension of each slot. Each member 68 is connected to one end of a wire 69, the other end of which passes through an aperture in the lower end of a pivoted lever 70. A thumb screw 71 threaded on a small tube 72 surrounding the wire serves by a coiled spring 73 to force lever 70 against a lug 74 clamped on the wire at a predetermined point. The tube 72 also passes freely through the hole in lever 70 and clamp or lug 74 is actually an extension of tube 72. The upper end of each lever 70 is adapted to contact with one end of a second lever 75. The levers 75 have fingers adapted to contact with the paper pattern 76 or perforations therein, the pattern being mounted on a rotatable drum 77 as in my aforesaid patent application. When a finger is resting on the paper pattern the relation of levers 70 and 75 is such that lever 75 contacts with shoulder 78 of lever 70 (Fig. 2), but if the finger enters a perforation the lever 75 contacts with the shoulder 79, (Fig. 3). It will be apparent that spring 73 will keep clamp 74 and lever 70 in close contact with each other so that the position of clamp 74 will be determined by whether shoulder 78 or 79 contacts with the end of lever 75.

In order that the position of the slidable elements 65 may be accurately determined by the presence or absence of a perforation under the lever 75 corresponding to each element 65, an additional cam 80 is mounted on the under side of rotatable plate 33 which, after all the levers 75 and 70 have been set in accordance with one pattern setting, will carry all of the slidable elements 65 towards the needle cylinder by contacting with projection 81 until the portion 66 on each element 65 is immediately below the path of the ends 61 of the pivoted levers carried by the pattern drum. After the passage of cam 80, the springs 73, corresponding to those levers 75 which have not encountered a perforation in the pattern 76, will pull back the corresponding slidable elements 65 until the portion 66 of each such element is immediately below the path of the ends 60 of the pivoted members on the pattern drum. After the elements 65 have been selectively moved in the above fashion cam 67 as above described will raise the elements 65 in succession and selectively set the pivoted members 59 either with end 60 up or end 61 up. Those members 59 with their ends 60 knocked up will, due to cam 62, cause the pattern drum elements 58 to be moved forwardly and cause predetermined elements 48 to be removed from the path of cam 50, so that the needles corresponding to said predetermined elements will be fully raised due to passage of

cam 42. In other words, each finger 75 which rests on the pattern 76 will so set its corresponding element on the pattern drum 54 that predetermined needles spaced around the machine will knit loops of the next yarn that passes, while each finger 75 which passes through a perforation in the pattern sheet 76 will so set its corresponding element on drum 54 that predetermined needles spaced around the machine will not knit loops of that yarn. Obviously if there are no perforations under any of the fingers 75 then every needle in the machine will knit a loop of the next passing yarn, while if every finger 75 finds a hole, then said next passing yarn will not be looped by any needle.

As previously stated there is a lever 75 corresponding to each slidable element 59 of the pattern drum and preferably the number of elements 59 should equal the number of needles in the machine divided by a whole number. Thus if there are 300 needles in the machine there may be 30 slidable elements on the pattern drum, so that through the drum 54 each finger 75 controls 10 needles spaced around the machine.

It has now been described how the paper pattern 76 determines what needles are fully raised to a knitting position. It remains to be described what happens to the remaining needles. Of the remaining needles those with long butts will be partially raised to the interlocking position while those with short butts will be in a retracted position. If every other needle in the needle row is a long butt needle and the remainder are short butt needles, an interlocked fabric will be produced by the machine, the yarn being knitted into loops by needles corresponding to no holes in the pattern sheet and interlocked in alternate wales of the remainder of the fabric due to cam 44, which operation is described in detail in my above mentioned patents.

The pattern sheet 76 may be moved a step at a time from one row of configurations to another in the usual manner due to power communicated by a shaft 82 having a cog wheel 83 engaging a toothed rack 84 mounted on the rotatable base. The levers 75 are disengaged from the paper pattern at the time of movement in the following manner. Cam 85 mounted on a rotating shaft periodically contacts with the lower end of a pivoted lever 86 causing it to be moved in a counter clockwise direction. Arm 87 fastened to an angular extension of lever 86 is therefore moved downwardly thereby lowering a member 88 which extends above all the fingers 75 and contacting therewith raises the fingers 75 away from the pattern sheet. After cam 85 has passed, a suitable spring 89 for each lever presses each finger against the new setting of the pattern which has taken place while the fingers were raised.

The action of separating the ends of levers 70 and 75 in order to allow for the resetting of fingers 75 is accomplished as follows: A rotatable cam 90 mounted on the same shaft as cam 85 periodically rotates arm 91 in a clockwise direction for a short distance and since arms 91 and 92 are connected to each other, this causes a rod 93 which extends along the front of all the levers 70 to contact therewith and force the upper ends of levers 70 away from the levers 75. After the levers 75 have been reset in accordance with the new pattern configurations and cam 90 having passed, the passage of cam 80 will cause levers 70 to contact with levers 75 either by portion 78 or portion 79.

Cam 52 is mounted on a rotatable ring 94 which has a toothed rack meshing with a cog wheel 95 mounted on the rotatable shaft 96. Cam 46 is mounted on a rotatable ring 97 having a toothed rack meshing with a cog wheel 98 also mounted on shaft 96.

As shown in Fig. 1 the machine may be provided with a pattern drum for each yarn carrier and in the particular machine disclosed there are two pattern drums 54 and 99. The rotatable cams and the pattern drums are assumed to be rotating around the needle cylinder in a counter-clockwise direction. Pattern drum 54 sets the needles for the passage of yarn carrier 37 while drum 99 sets the needles for the passage of yarn carrier 38. Both the pattern drums 54 and 99 are set in twin by the paper pattern sheet 76 whereby alternate rows of configurations on the pattern sheet control the knitting of the yarn from yarn carrier 37 while the remaining rows control the knitting of the yarn from yarn carrier 38. That is each of the drums 54 and 99 is set in twin by the same pattern sheet once for each revolution of the pattern drums around the needle cylinder. As shown in Fig. 4 cam 45 retracts all needles slightly below their normal retracted position in order to insure tight interlocking (as is explained in my prior application Serial No. 196,894), after which a cam 100 restores the needles to their normal position. Yarn carrier 38 is associated with an advancing cam 101 similar to cam 44, a retracting cam 102 similar to cam 45,—and a restoring cam 103 similar to cam 100.

If desired the yarns 104 and 105 may be of different colors so as to secure pleasing pattern effects. It of course is true that the invention is not limited to a two yarn feed but may be applied to a machine having one or more yarn feeds.

Fig. 4 being a schematic layout illustrates the sequential operation of the various cams acting in conjunction with the pattern sheet and one of the pattern drums 54. After a new setting of the fingers 75, cam 80 passes to advance all of the slidable elements 65 after which they assume an advanced or retracted position depending on the presence

or absence of a hole in the pattern opposite the corresponding finger 75. At the same time cam 51 is retracting all the slidable elements 48 to make ready for the passage of the pattern wheel. Cam 46 then moves all elements 41 into the path of cam 42, while cam 52 raises all the elements 48 into the path of cam 50. At the moment a pivoted lever 59 is above its corresponding element 65, cam 67 raises the particular element 65 to cause its projection 66 to move the pivoted lever 59 one way or the other dependent on whether the element 65 is advanced or retracted. A cam 106 then causes the lowering of each element 65, after each element 65 has passed on to a pivoted lever 59 a particular pattern setting. Cams 62 and 64 subsequently advance or retract the elements 58 on the pattern drum and thereafter each element 58, so set, lowers or allows to remain elevated its corresponding jacks 48 around the needle cylinder. It will be particularly noted that each of the pivoted levers 59 receive their new pattern actuations from elements 65 at a time when its corresponding element 58 is imparting a pattern actuation to jack 48 in accordance with the pattern setting made on the previous passage of the pattern drum over the elements 65. Thus in Fig. 4 the particular element 65 designated 107 is imparting a new pattern determining movement to its corresponding pivoted lever 59 at the same time its associated element 58 is passing on its old pattern setting to the jack 48 immediately under that element 58 at that instant. This feature of setting a certain member in each slot on the pattern drum independently of another member in the same slot at that particular instant is quite important and makes for greater flexibility and efficiency. After the passage of the pattern drum 54, cam 50 advances those jacks 48 which the pattern drum has allowed to remain in an elevated position. Jacks 41 corresponding to the retracted jacks 48 are then elevated by cam 42 to raise certain needles to full knitting position. At about the same time, cam 44 raises all long butt needles not actuated by cam 42, to the interlocking position. This is followed by cams 45 and 100 as previously described.

Several of the novel features of the machine of Fig. 2 will now be emphasized. One is the accessibility of the tensioning springs 73. These springs have been positioned where they are readily accessible during the operation of the machine to enable adjustments to be made by means of the adjustable nut 71 which controls the tension of each spring so as to determine the proper relation of the levers 70 and elements 68 in their pattern control movements. Attention is also called to the fact that the elements 68 are not simultaneously advanced but are advanced one at a time by a cam 80 after which they stay advanced or are retracted according to the pattern. This insures a positive separation of the elements 68 that should be advanced and those that should remain retracted and is a substantial improvement over prior means for accomplishing the same result. Another special feature is the positive setting of the pivoted members 59 by the elements 65 without any substantial angular or sliding contact of the two due to the continuous rotation of the pattern drum 54. As previously described the element 65 is not in contact with its corresponding pivoted member 59 until its member 59 has reached substantially the lowermost portion of its path, at which time cam 67 raises element 65 to actuate positively its pivoted member 59.

It is of course to be understood that if desired only a portion instead of all the needles around the machine may be controlled by the pattern drum and sheet, in which case the remaining needles may enter into the knitting independently of the pattern drum.

Fig. 5 is an end view of one of the pattern drums showing the relation of cams 62 and 64 to the drum, along with the actuation of the pivoted levers 59 by the slidable elements 65 located in slots in the stationary plate 47, the actuation being accomplished by the raising of elements 65 by cam 67 and their subsequent lowering by cam 106. It will be noted that cam 67 is in such a position as to cause the projections 66 to contact with the pivoted members 59 only when they are substantially at the bottom of their path.

Fig. 6 illustrates the relative positions of lever 59 and its slidable element 65 prior to the passage of cam 67, with projection 66 in such a position as to move lever 59 clockwise. In Fig. 7, the position of projection 66 is such that the passage of cam 67 will move lever 59 counter clockwise. Fig. 8 is similar to Fig. 6 except cam 67 has actuated element 65 to cause the movement of lever 59. Fig. 9 illustrates the positions of these various parts after element 65 has been lowered by cam 106.

Fig. 10 shows how after a lever 59 has been set by its slidable element 65 to cause portion 60 to project beyond the surface of the drum, the said lever encounters cam 62 which acts to move lever 59 and its elongated element 58 towards the needle cylinder. Element 58 is shown flush with the end of drum 54 due to cam 62. Fig. 11 however shows the position element 58 takes due to cam 64 striking portion 61, whereby element 58 is removed so as not to depress its corresponding jacks 48.

Fig. 12 illustrates in greater detail how the jacks 48 are retracted away from the needle cylinder by cam 50 in order to make all jacks 48 receptive to new pattern actuations by drum 54. After the drum 54 has passed, Fig. 13 shows how cam 51 then passes to move forward those jacks 48 which were not depressed by the elements 58 of the pattern

drum. Fig. 13 also shows that such movement by cam 51 causes the needle jack to be moved so that it will not be actuated by the lifting cam 42.

It will be apparent from Fig. 4 that the knitting machine will preferably have one pattern drum for each yarn to be knitted. Each yarn carrier will be provided with cams corresponding to cams 44, 42, 45, 100, 46, 51, 52, 50, 67, 106 and 80, properly spaced with respect to their yarn carrier and pattern drum as in Fig. 4.

Figs. 2 and 3 particularly have illustrated the invention in connection with the usual latch type needles. The invention however is not so limited and Figs. 14, 15 and 16 illustrate the invention adapted to selectively actuate spring type or bearded needles. It will be seen that Fig. 14 corresponds in most details with Fig. 2 with the exception of such changes as are necessary because of the change in type of needles. Pattern drum 107 is constructed similarly to drum 54 and the slidable elements 108 each having a pivoted lever 109 are controlled by the paper pattern in exactly the same manner as the slidable elements of drum 54 of Fig. 2. That is, element 117 by cam actuation throws each pivoted lever 109 clockwise or counter-clockwise after which cams move certain of the elements 108 away from the needle cylinder 142 and others towards the needle cylinder. Needle jack 110 at its end near the pattern drum is similar to jack 48 of Fig. 2. A cam 111 raises all of the jacks 110 prior to passage of the pattern drum. Then as the pattern drum comes along certain of the jacks 110 will be depressed while others will remain elevated. Those that remain elevated will thereafter be actuated by a cam similar to cam 51 of Fig. 13 and will be moved towards the needles and the end of each such jack 110 will contact with a needle 112 and press the spring against the shank of the needles thereby closing the needle hook. The general manner in which knitting is accomplished by spring cylinder needles is well known in the art and a detailed description thereof is not believed necessary for the understanding of this invention since it has already been disclosed how the pattern drum 107 selectively actuates the spring needles to cause them to close and knit loops of the hooked yarn. Alternate spring needles have long butts and the remainder short butts so that an interlocked fabric can be produced. Rotatable ring 113 carries a cam 114 for raising the long butt needles to the interlock position and a cam 115 for lowering all needles. Rotatable ring 116 carries cams for raising and lowering the slidable elements 117 after they have received pattern determining actuations by the paper pattern sheet. The needle jacks 110 alternate with appropriate sinkers 118 in the usual manner as shown in Figs. 15 and 16, the usual sinker cam also being provided. Fig. 15 shows how the spring needle is closed by the actuation of needle jack 110. As is better illustrated in Fig. 16 the end of jack 110 which strikes the spring of the needle is grooved in a vertical plane so as to insure positive action without danger of slipping.

Fig. 17 is another modification of the invention in which a simplification of the apparatus is secured by mounting the axle of the pattern drum 119 in a vertical plane parallel to the cylinder needles 120. The end of a lever 121, corresponding to lever 70 of Fig. 2, is apertured to allow a wire 122 to pass therethrough. By means of a screw (not shown) and spring 123, the lever 121 is pressed against a clamp 124 fastened to the wire. The relation of lever 121 to wire 122 is identical with the relation of lever 70 to wire 69 of Fig. 2. Wire 122 passes over a pulley 125 and is fastened to the end of a jack 126, which is similar in function to element 68 of Fig. 2, for controlling the setting of pattern drum 119. This drum 119 is similar in construction to drum 54 and contains slidable elements 127 mounted in grooves on the outside of the drum. Each element 127 has a pivoted lever 128 mounted near one end to correspond to levers 59 of Fig. 2.

The housing 132 of drum 119 is mounted on a rotatable vertical ring 129 the base 130 of which carries a toothed rack to rotate the ring 129 by power from shaft 131.

The upper end of jack 126 has a projection 133 similar to projection 66 of Fig. 2. The paper pattern (not shown) which controls the position of lever 121 determines whether each jack projection 133 is opposite the upper or lower end of the pivoted levers 128 through the cooperation of a cam 135 operating on each jack 126 in succession as in Fig. 2. The jacks 126 are set, of course, prior to the passage of the pattern drum. Each pivoted lever as it reaches the part of its course adjacent the needle cylinder will be thrown clockwise or counterclockwise depending upon the position of its corresponding jack 126 at the time of contact. Those levers 128 that are moved so that their lower ends project beyond the surface of the drum are later driven upwardly along with each associated slidable element 127 by a cam, not shown, but similar to cam 62 of Fig. 2. If their upper ends project instead, a cam similar to cam 64 of Fig. 2 insures that the corresponding slidable elements 127 are in their lowermost position. It therefore results that certain of the portions 134 of each needle will be pressed inwardly by the passage of its corresponding element 127 while others will remain in a position away from the needle cylinder. Prior to the passage of the pattern drum, a cam 136 suitably supported from ring 129 has insured that prior pattern settings of the needle portions 134 have been

erased by moving all of the needle ends 134 away from the needle cylinder. In Fig. 17 the portion 134 is shown against the needle cylinder due to action of element 127 in returning it to that position. Those needles that are not thrust back by elements 127 have their lower cam surface 137 contact with rotatable cam 138 which raises such needles to the full knitting position 139. It will be assumed that alternate needles have a butt extension 140 while the remaining needles have not. Those needles having extensions 140 and which were not in a position to be raised by cam 138 contacting with cam surface 137 will be raised to the interlock position 141, when their extensions 140 contact with cam 138. That is when cam 138 contacts with cam surface 137 a loop will be formed, but when cam 138 contacts only with extension 140, the needle is only partially advanced. It follows that those needles without a butt extension 140 and which were pressed towards the needle cylinder by the pattern drum elements 127 will remain retracted for that particular pattern setting. Fig. 17 therefore discloses how cylinder needles may be actuated directly by the pattern drum elements to obtain any desired variation in the pattern such as is produced by interlocking.

It is of course to be understood that there is a slidable element 126 for each element 127 on the pattern drum, so that each pattern drum element 127 controls the knitting of a plurality of needles spaced around the needle cylinder and that all of the cylinder needles are controlled by the pattern drum elements collectively. Thus each drum element 127 may control one-thirtieth of the needles, assuming there are thirty elements 127 on the drum. There of course may be more than one pattern drum 119 each of which will be set in succession by the elements 126 controlled in twin by the paper pattern. The cylindrical machine of Fig. 17 may also have any desired number of yarn carriers, one for each pattern drum.

Figs. 18, 19 and 20 illustrate still another modification of this invention. In Fig. 18 the parts of the apparatus to the left of wire 143 are identical with the corresponding parts of Fig. 2. The pattern sheet 145 is mounted on a rotatable drum 144 and the pattern configurations on sheet 145 are conveyed by levers 146 and 147 and wire 143 to a plurality of jacks 148. It will be apparent that when a lever 146 has entered a perforation in the paper pattern its corresponding jack 148 will be in the position shown in Fig. 18 while the absence of a perforation under a lever 146 will cause the corresponding jack 148 to assume the position shown in Fig. 19. As in Fig. 2 a cam 151 contacts with the jacks 148 to move them forwards periodically.

Mounted on the rotatable plate 149 is a pattern drum 150 in a housing 152. A toothed rack 153 on plate 149 insures the rotation of the drum 150 as it travels around the needle cylinder. The slots in the drum 150 are angularly spaced with reference to the axle of the drum. Each slot contains a unitary slidable member 154, suitably pivoted near the end away from the needle cylinder. Thus a coiled spring 155 passing between the two projections 156 and 157 of each element may serve as pivoting means. The elements 154 may be held in the slots by friction, being bent for example so as to contact with both sides of a slot so that each element will hold a definite position until positively actuated. The two projections 156 and 157 are adapted to be actuated by projection 158 on the corresponding jack 148 depending on whether projection 158 is under element 156 or element 157. At the same time element 158 is contacting with element 156 the other end of that particular jack 154 has not yet reached the lowermost point of its path and hence is free to be thrown inwardly from the surface of the pattern drum due to actuation by jack 148. Similarly a jack 148 will be thrown outwardly by contact of projections 157 and 158, as is shown in Fig. 19.

Mounted on the side of the housing 152 and hence not rotating with the drum is an annular ring shaped member 159 which however has its two ends separated a short distance at a position corresponding to the point where each jack 154 will be thrown inwardly or outwardly by jack 148. The effect of this incomplete ring 159 is that certain of the jacks 154 will have their ends bearing against the outside of ring 159 and other jacks 154 will have their ends bearing against the inside of ring 159 during the rotation of the drum around the needle cylinder and will continue in such relative positions until the drum again passes over the jacks 148 for a new pattern setting. This is clearly illustrated in Fig. 20. After a jack 154 has been moved outwardly by jack 148 and the jack 154 is outside of ring 159, the further rotation of the drum will cause projection 160 on that particular jack to contact with an arm of jack 161 and force the said jack 161 downwardly as well as other jacks 161 spaced around the machine and corresponding to the particular drum element in question. A jack 154 which has its end inside ring 159 will not depress its corresponding jacks 161. Those jacks 161 not so depressed will be actuated by a cam 167, for moving such jacks 161 to contact with their corresponding vertical needle jacks 162 to cause said jacks 162 to be moved inwardly so that they will not be raised by cam 163. The jacks 162 corresponding to depressed jacks 161 will be actuated by cam 163 which will cause their corresponding needles to be fully raised to form loops of the passing yarn.

The operations from jacks 161 to the needles 164 are identical with the corresponding parts of Fig. 2 and need not be explained in detail. Alternate needles 164 have long butts and the others short butts so that interlocked fabric may be produced. Cam 165 serves to partially raise the long butt needles while cam 166 retracts all needles. Cam means is also shown for periodically forcing the lower end of each needle jack 162 away from the needle cylinder to receive the desired pattern setting. Cam means, not shown, may also be arranged as in Fig. 2 to periodically lift the outer ends of jacks 161 to receive the desired pattern setting from the pattern drum.

From the above description it will be apparent that the drum 150 is designed to receive pattern determinations from a pattern sheet, such as in Fig. 2, and to so control the needles around the needle cylinder as to produce the desired fabric. It will also be apparent that for every jack 154 on the pattern drum there is one slidable jack 148 leading to the lever controlled by one row of configurations on the pattern sheet. It is also to be understood that there may be a slidable element 161 for every needle around the cylinder.

The type of pattern drum illustrated in Figs. 18 to 20 is characterized by having only one unitary element in each slot, whence the pattern drums of the previous figures have two elements in each slot.

In connection with the use of machines such as are described above, it may be frequently desirable to employ pattern effects which do not repeat themselves for a substantial distance and hence require several yards of paper pattern for one complete knitting of the pattern. One way such a long paper pattern may be handled effectively is disclosed in Figs. 21 to 27 by means of which the paper is rolled on one drum and then unrolled onto another.

Figs. 21 and 22 illustrate one way for periodically changing the direction of rotation of a drum carrying a paper pattern. The toothed rack 190 may be one of those disclosed in Fig. 1 or 2. A conical gear 191 meshes therewith and drives a shaft having a worm wheel 192 and 193. A pawl 194 on an eccentric steps around a ratchet wheel 195 which is connected to a chain wheel 196. Around wheel 196 is a pattern chain 197 which at proper intervals has either a projection like 198 or like 199. When the chain causes a projection 198 to come over the wheel the projection raises the lever 200 until it is caught by the hook on the pivoted lever 202 which is biased by a spring 203 to hold said lever caught after projection 198 has passed. At the same time the forcing back of lever 202 by the raising of lever 200 has allowed an idle lever 201 to drop down assuming it previously had rested on the hook of lever 202. Similarly the appearance of a projection 199 would raise idle lever 201 and allow lever 200 to drop.

As shown in both Figs. 21 and 22, lever 200 is connected to an angle lever 204 pivoted at the point 205. Lever 204 is coupled to a pivoted double fork shaped lever 206 by an extension 207. The raising or dropping of the end of lever 200 will cause the movement of the various parts by an amount shown in dotted lines in Fig. 22. Fork 206 is arranged to determine whether a gear 208 is coupled with a crown gear 209 or a crown gear 210 which are rotating in opposite directions. The control of gear 208 by fork 206 may be secured in any desired manner as by having the ends of the fork terminate in rollers 213 which bear against the sides of gear wheel 208. If fork 206 causes the sleeve carrying gear 208 to mesh with the shaft of gear 209, then the shaft 211 carrying gear 212 will be rotated in one direction. Movement of the fork 206 in the opposite direction will mean that shaft 211 will rotate in the opposite direction. Fork 206 is suitably biased to one position by a spring 214.

Shaft 211 drives a drum 215 around which the pattern sheet 216 passes while being unwound from drum 217 and wound on drum 218 or vice versa. Pins or drum 215 passing through perforations in the pattern sheet insure the positive movement of the pattern sheet in the direction of rotation of shaft 211 at any particular movement.

Power for driving the gears 209 and 210, as well as the other parts of the apparatus, is secured from the main source of power for the knitting machine by gears 220 which are coupled to a so-called Geneva movement comprising the parts 221 and 222 to secure the step by step movement of the pattern sheet as the knitting progresses. The resulting step by step rotation of shaft 223 is communicated to gears 209 and 210 by gears 224, 225 and 226. A gear 227 on a shaft 223 also drives gears 228 and 229 in opposite directions. Gear 228 by a friction clutch 230 tends to rotate drum 218 in a clockwise direction while gear 229 by friction clutch 231 tends to rotate drum 217 in a counter-clockwise direction. Drums 217 and 218 are not positively driven by the disclosed mechanism but instead there is a mere tendency to rotate one drum in one direction and the other drum in the opposite direction due to the friction clutches. During the use of the paper pattern one of the drums 217, 218 will actually be rotated in a direction opposite to the direction in which it tends to rotate because of the friction clutch. It follows that drum 215 at certain times may work with drum 217 and cause the pattern sheet to be wound on drum 217 and unwound from drum 218. At other times drum 215 may work with drum 218 and cause the pattern sheet

to be wound on drum 218 and unwound from drum 217. This means that the projections 198 and 199 on the chain 197 may be so spaced that the pattern sheet will first be wound on drum 217 and then wound on drum 218, alternating thus as long as knitting is desired. It is of course to be understood that the pattern sheet 216 may be the pattern sheet used to control the knitting of any of the machines previously described herein and drum 215 may be the drum containing perforations corresponding to the perforations in the pattern sheet in order to have levers such as levers 75 of Fig. 2 cooperating therewith to secure the desired pattern control.

It is furthermore to be understood that this invention may present various embodiments differing widely from the apparatus herein described as representative, without departing in any wise from the spirit of this invention as defined in the appended claims.

The invention claimed is:

1. A circular knitting machine comprising a slotted cylinder, needles in said slots, a pattern drum mounted for movement around said cylinder and rotating in response to said movement, movable elements on said drum, a pattern sheet, means for selectively actuating said elements in accordance with the pattern on said sheet, a slidable jack associated with each of a plurality of said needles and adapted to control the knitting operations, and means including said jacks for controlling certain of said needles in accordance with the actuations of said elements.

2. A circular knitting machine comprising a cylinder, needles mounted on said cylinder, a pattern drum mounted for movement around said cylinder and rotating in response to said movement, slidable elements mounted on said drum, a movable sheet containing pattern determining configurations thereon, means for periodically setting each of said elements in accordance with the configurations on the portion of said sheet, slidable jacks spaced around said cylinder on a stationary portion of the machine and controlled by said elements during the rotation of said drum, and means including said jacks for actuating said needles in accordance with the pattern settings of said elements.

3. A circular knitting machine comprising vertically disposed slotted cylinder, needles mounted in said slots, a pattern drum mounted for movement around said cylinder and rotating in response to said movement, slidable elements mounted on said drum, a pattern mechanism embodying pattern effects to be knitted by said needles, means for actuating said elements in accordance with said mechanism, a stationary member around said machine and below said drum, radially disposed slots in said member spaced to correspond to the slots in said cylinder, a horizontally disposed slidable jack in each of a plurality of said slots, said jacks being selectively actuated by the passage of said drum, and means for controlling said needles in accordance with the actuation of said jacks.

A knitting machine comprising a row of vertically disposed needles, a slotted pattern drum mounted for movement past said row and rotating in response to said movement, slidable elements mounted in the slots of said drum, means for impressing pattern determining actuations on said elements, a plurality of jacks mounted on a stationary portion of the machine and arranged to control said needles, and means including said drum for causing a lateral movement of certain of said jacks to secure the selective operation of said needles.

5. A knitting machine comprising a row of cylinder needles, a grooved pattern drum mounted for movement around said needles and rotating in response to said movement, slidable elements mounted in said grooves, means for impressing pattern determining actuations on said elements, a plurality of jacks mounted on a stationary portion of said machine between said drum and said needles, means for raising the ends of a plurality of said jacks into the path of said elements prior to the passage of said drum whereby certain of said jacks will be knocked down by said elements and others will remain elevated, and means for actuating the jacks that remain elevated for regulating the knitting operations of certain of said needles.

6. A circular type knitting machine comprising a row of cylinder needles, cam means for raising said needles to a full knitting position, a pattern drum mounted for movement around said row and rotating in response to said movement, slidable elements mounted on said drum, a pattern sheet for controlling the settings of said elements, a radially disposed jack extending from beneath the path of said drum in the direction of each of a plurality of said needles and mounted on a stationary portion of said machine and means for causing a lateral movement of said jacks controlled by said drum to remove certain of said needles from the control of said cam means.

7. A circular type knitting machine comprising a row of cylinder needles, cam means for raising said needles to a full knitting position, a pattern drum mounted for movement around said row and rotating in response to said movement, slidable elements on said drum, a pattern sheet for imparting pattern settings to said elements, a row of horizontally disposed jacks one for each of said needles, means for periodically lifting all of said jacks into the path of said elements to cause certain of said jacks to be lowered by said elements and others to remain lifted depending upon the positions of

the respective elements, means for causing those jacks that remain lifted to be moved inwardly towards said needles, and means controlled by the inward movement of said jacks for preventing the actuation of certain needles by said cam means.

8. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, slidable elements mounted on said drum, a pattern sheet having pattern configurations thereon, a plurality of jacks mounted in a stationary part of said machine and corresponding in number to the number of slidable elements on said drum, said jacks projecting below the path of said drum, pivoted fingers cooperating with said sheet to receive pattern determinations therefrom, means including a cam for successively producing a lateral movement of said jacks to cause the pattern setting of each finger to be impressed on one of said elements, and means controlled by said drum for regulating the knitting by certain of said needles.

9. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, a plurality of slidable elements mounted in grooves in said drum, a stationary slotted member, jacks in said slots, means for actuating said jacks in accordance with a predetermined pattern, cam means for lifting said jacks into the path of said elements to cause said jacks to actuate a plurality of said elements, and means controlled by said elements to vary the knitting produced by said needles.

10. A circular type knitting machine comprising a row of needles, a pattern drum mounted for movement around said machine and rotating in response to said movement, pivoted elements mounted on said drum, a slotted stationary member, a jack in each of a plurality of said slots spaced so that the passage of said drum over said slots will place certain of said elements in a condition to be actuated by said jacks, means for imparting pattern determinations to said jacks, means for subsequently raising all of said jacks into the path of said drum to cause the selective actuation of said elements by said jacks whereby contact is made between each jack and its corresponding element substantially only when each element has reached the lowermost part of its circular path, and means controlled by said elements for regulating the knitting by said needles.

11. A knitting machine comprising a pattern drum having diagonally disposed grooves along its outer surface mounted for movement relative to other parts of said machine and rotating in response to said movement, a single unitary element in each of a plurality of said grooves, jacks located in slots in a stationary portion of the machine for contacting with said elements to impart pattern settings to said elements, and other jacks located in slots in a stationary portion of the machine and contacting with the other portions of said unitary elements for regulating the knitting operations of said machine.

12. A pattern drum for a needle machine comprising a plurality of spaced slidable elements mounted in grooves on the outer surface of said machine, the bottom of each groove throughout its entire length being substantially the same distance from the axis of the drum, said grooves running substantially parallel with the axis of said drum, a plurality of spaced cam surfaces on each of said elements lying in a common plane which generates a conical surface in the rotation of the drum and means cooperating with said cam surfaces for determining the knitting operations of the machine.

13. A circular type needle machine comprising a needle cylinder, with a row of needles mounted thereon, a stationary plate mounted around said cylinder, slidable jacks mounted in radial grooves in said plate, each of said jacks controlling one of said needles, a plurality of slidable elements mounted in grooves near the outer edge of said plate, said elements being substantially fewer in number than said jacks, a pattern drum mounted for movement around said cylinder and rotating in response to said movement, movable members on said drum controlled by said elements and controlling said jacks, and pattern determining means for controlling said elements.

14. A knitting machine comprising a row of needles, jacks for controlling the knitting by said needles, pattern determining mechanism for said machine, pivoted levers controlled by said mechanism, a flexible wire coupling between each of said levers and one of said jacks, a projection on said wire adjacent its pivoted lever, and spring biasing means tending to maintain said projection in contact with said lever.

15. A knitting machine comprising a row of needles, jacks for controlling the knitting by said needles, pattern determining mechanism for said machine, pivoted levers controlled by said mechanism, flexible wire couplings between said jacks and said levers, one end of each wire being fastened to one of said jacks and the other end of each wire terminating in a sleeve passing through an aperture in said lever, spring biasing means on said sleeve on the side of said lever remote from the associated jack, and means for limiting the movement of said wire in response to actuation by said spring.

16. A knitting machine comprising a needle cylinder, grooves in said cylinder, needles mounted in said grooves, needle jacks mounted in said grooves below said needles, rotating cam means for periodically mov-

ing said jacks outwardly away from said needle cylinder, and means comprising a pattern drum mounted for movement around said cylinder and rotating at a substantially constant speed in response to said movement for periodically moving certain of said jacks inwardly.

17. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, slidable elements mounted on said drum, a pattern sheet having pattern configurations thereon, a plurality of jacks mounted in a stationary part of said machine for actuating said slidable elements in a manner depending upon the position of said jacks, a cam mounted on a rotating part of said machine for successively producing a lateral movement of all of said jacks, means controlled by said pattern sheet for subsequently selectively moving certain of said jacks, and means controlled by said drum for regulating the knitting by certain of said needles.

18. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, slidable elements mounted on said drum, a pattern sheet having pattern configurations thereon, a plurality of jacks mounted in a stationary part of said machine for actuating said slidable element in a manner depending upon the position of said jacks, cam means for periodically producing a lateral movement of all of said jacks in one direction, spring means controlled by said pattern sheet for subsequently moving certain of said jacks in the opposite direction, and means controlled by said drum for regulating the knitting by certain of said needles.

19. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, slidable elements mounted on said drum, a pattern sheet having pattern configurations thereon, a plurality of jacks mounted in a stationary portion of said machine and corresponding in number to the number of rows of pattern configurations on said sheet, said jacks projecting underneath said drum for causing certain actuations of said elements, cam means operating in advance of the movement of said drum over said jacks for producing a lateral movement of said jacks, means controlled by said pattern sheet for producing an opposite movement of certain of said cams, and means controlled by said drum for regulating the knitting by certain of said needles.

20. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, a plurality of slidable elements mounted on said drum, a stationary member containing movable jacks, means for actuating said jacks in accordance with a predetermined pattern, cam means for successively moving all of said jacks into the path of said elements to cause said jacks to actuate a plurality of said elements, and means controlled by said elements to vary the knitting produced by said needles.

21. A knitting machine comprising a row of needles, a slotted pattern drum mounted for movement relative to said needles and rotating in response to said movement, a plurality of slidable elements mounted in said slots, a slotted stationary member containing movable jacks, means for producing a lateral movement of said jacks in accordance with a predetermined pattern, cam means mounted below said pattern drum and moving around said needles at the same speed as said drum for successively raising each of said jacks into the path of said elements, and means controlled by said elements to vary the knitting produced by said needles.

22. A knitting machine for producing a knitted fabric comprising a plurality of movable elements for controlling the knitting, a movable pattern, pivoted levers contacting at times with said pattern, a second set of pivoted levers controlled by said first levers, a flexible wire coupling between each of said second levers and one of said elements, and means independent of said second levers for periodically raising said first levers away from said pattern.

23. A knitting machine comprising a row of slidable elements for controlling the operation of said machine, pattern determining mechanism for said machine, pivoted levers controlled by said mechanism, a wire coupling between each of said levers and one of said elements, and spring means on the side of each lever opposite its said element for tending to pull one of said elements toward its associated lever.

24. A needle machine comprising a row of needles, a pattern drum mounted for movement relative to said needles and rotating in response to said movement, a plurality of adjustable elements mounted on said drum, a plurality of movable jacks, means for actuating said jacks in accordance with a predetermined pattern, rotating cam means for projecting all of said jacks into the path of said elements to cause said jacks to actuate a plurality of said elements, and means controlled by said elements to vary the character of the fabric produced by said machine.

25. A circular type knitting machine comprising a pattern drum, adjustable elements mounted on said drum, a stationary member, jacks mounted on said member such that the passage of said drum past said member will place certain of said elements in a condition to be actuated by said jacks, means for imparting pattern determinations to said jacks and independent means for subsequent-

ly moving said jacks towards said drum to cause each jack to contact with one of said elements substantially only when said element has reached the point nearest the point occupied by said jacks prior to actuation by said independent means.

26. A needle machine comprising a row of needles, a pattern drum mounted for movement relative to said row and rotating in response to said movement, means on said pattern drum for controlling the operations of said machine, a plurality of jacks mounted on a stationary part of said machine for controlling said pattern drum, pattern mechanism, cam means mounted in advance of said drum for periodically imparting a uniform movement to all of said jacks and means controlled by said mechanism for restoring certain of said jacks.

27. A knitting machine comprising a row of needles, a pattern drum mounted for movement relative to said row and rotating in response to said movement, means on said pattern drum for controlling the knitting operations of said machine, a plurality of jacks mounted on a stationary part of said machine for controlling said pattern drum, pattern mechanism, cam means mounted in advance of said drum for periodically moving all of said jacks to a position adjacent the path of said drum, and spring means controlled by said mechanism for moving certain of said jacks to a different position.

28. A knitting machine comprising a circular row of needles, a pattern drum mounted for movement around said row and rotating in response to said movement, adjustable elements on said drum for controlling the knitting operations of said machine, jacks mounted on a stationary part of said machine adapted in one position to actuate said elements in one manner and adapted in a second position to actuate said elements in a different manner, pattern mechanism, rotating cam means mounted in advance of said drum for periodically causing all of said jacks to assume said second position, and means controlled by said mechanism for restoring certain of said jacks to said first position.

In witness whereof, I hereunto subscribe my name this 12th day of November, A. D. 1928.

VINCENT LOMBARDI.