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PATTERN MECHANISM FOR STRAIGHT KNITTING MACHINES

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2 Sheets-Sheet 1

Fig. 1.

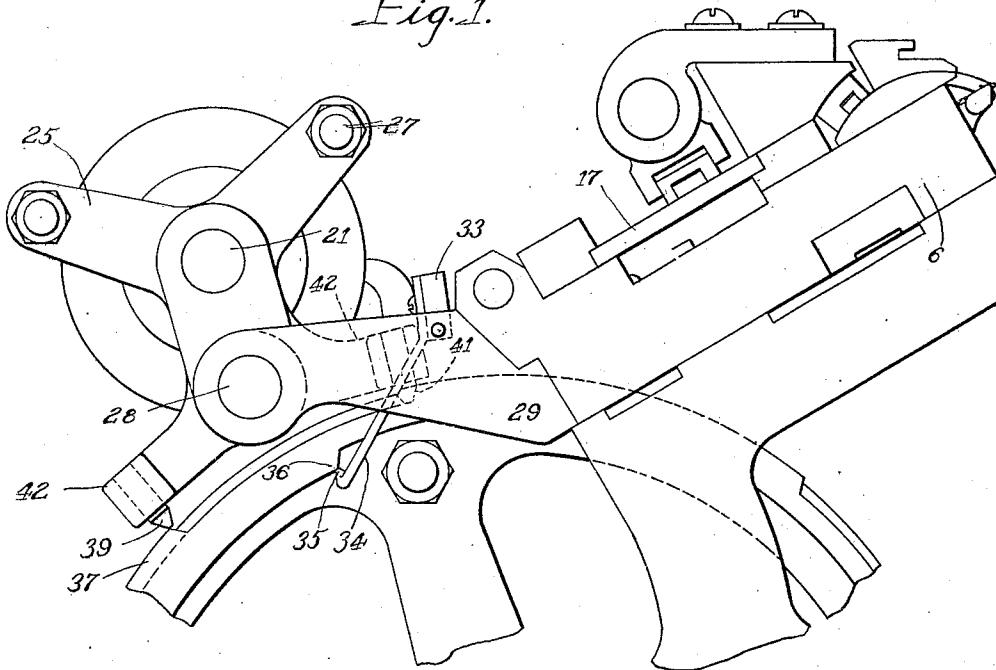
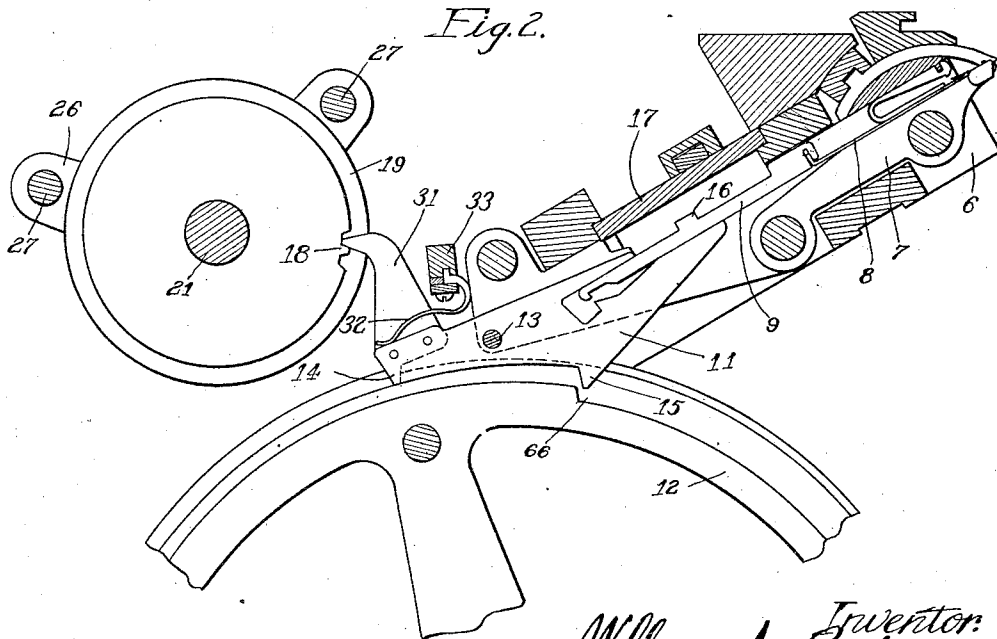


Fig. 2.



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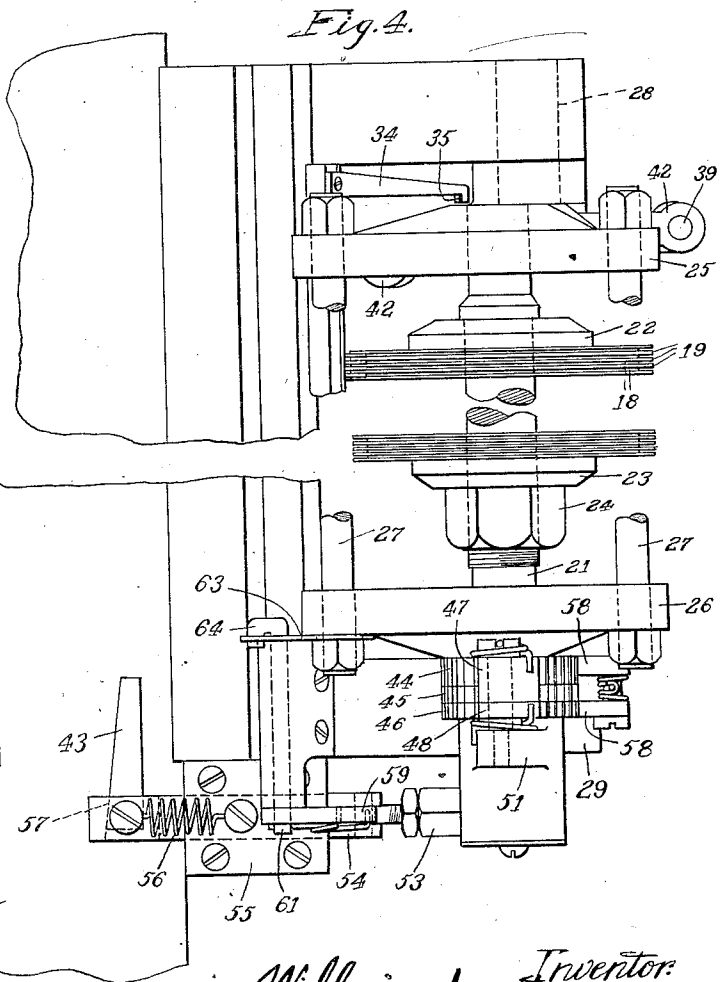
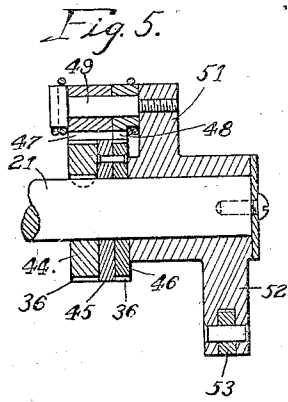
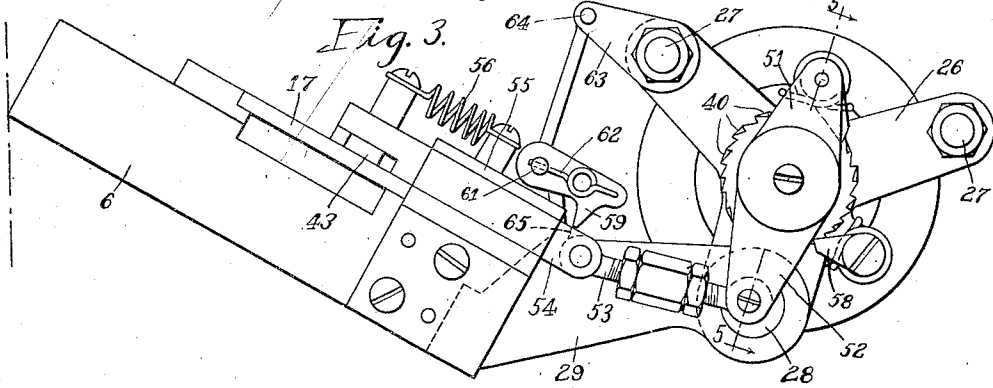
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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PATTERN MECHANISM FOR STRAIGHT KNITTING MACHINES

Application filed April 27, 1925. Serial No. 26,016.

In the art of straight parallel row knitting machines it is common to employ a pattern cylinder for controlling each row or bed of needles. In the knitting of an article such as a sock or stocking the pattern cylinders control the shape of the article by bringing more or less needles into action. This shaping of the toe, heel and leg portions is generally known in the trade as fashioning. If, in knitting an article of this kind, it is desired to produce in addition to the fashioning a design in the fabric either by stitches other than ordinary plain knitting or by employing different yarns and holding some of the needles out of action in predetermined order, it has been customary to construct the pattern cylinders to produce these effects. In other words, the pattern cylinders produce a fixed shape and design. And, while certain variations in design are possible with the same cylinders by reason of change in the control thereof or by change in the yarn control, nevertheless the number and character of such changes are limited by the inherent nature of the pattern and by the cylinder and yarn control mechanisms. Consequently, when certain new designs are desired it is necessary to provide new pattern cylinders for the purpose. This necessitates tearing down the machine and replacing the old pattern cylinders by the new. The primary purpose of the present invention is, therefore, to simplify the production of new designs in knitted fabrics so that changes may be made more quickly and at less cost than heretofore. These changes in design or pattern of the fabric are especially desirable in the manufacture of hosiery in order to meet the demands of the trade for multiplicity of designs.

Another purpose of my invention is to provide in furtherance of the foregoing, plural pattern mechanisms or devices for each bed of needles as distinguished from the prior art in which only a single pattern mechanism was employed for controlling the needles. These separate pattern control mechanisms may be of any suitable or preferred construction in keeping with the purpose of my invention. It is preferred, however, that each mechanism shall have an end-

less pattern control either of the cylinder or chain type. It is also preferred that one of said mechanisms shall serve primarily for controlling the shape of the fabric and another for controlling in whole or in part the design or pattern thereof. Thus, for example, in a straight knitting machine having opposed beds of needles a main pattern cylinder might be employed for each bed to control the shape of the fabric and an auxiliary or supplementary mechanism might be employed for controlling the needles to produce some particular design or pattern. It follows that the design or pattern of the fabric may be changed at will independently of and without disturbing the function of the main pattern cylinder the primary function of which is to control the shape of the fabric. My invention in its broader scope, however, contemplates the provision of plural pattern mechanisms for controlling the shape and design of the knitting, irrespective of whether these mechanisms are of the cylinder or endless chain type or otherwise and further irrespective of whether such mechanisms separately or jointly control the shape or design, or both.

Another purpose of my invention is to provide mechanism of this kind which may be applied as an attachment to straight knitting machines such for example as the Burson type, to operate in conjunction with the main pattern cylinder. In the preferred embodiment I have provided an auxiliary pattern mechanism characterized by a pattern cylinder operatively associated with the needle jack-levers and controlled or put into and out of operation by the main pattern cylinder, although the auxiliary pattern mechanism might be rendered operative and inoperative by other means.

It was necessary heretofore when changing a design or pattern or producing a new one, to remove the main pattern cylinder or cylinders, as the case might be, and substitute an entirely new pattern cylinder or new pattern plates therefor. According to the present invention the auxiliary pattern mechanism is supplemental to the main pattern control and may be applied to a machine of

this kind without disturbing the main pattern cylinder or cylinders. As a result of this organization I am able to produce a greater multiplicity of designs, both as to color and ornamental effects, quicker and at less cost than was heretofore possible.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which—

Figure 1 is a fragmentary end view of one bed of needles, a main pattern cylinder, and the addition thereto of an auxiliary pattern mechanism embodying my invention;

Fig. 2 is a vertical section through the needle bed and pattern mechanism shown in Fig. 1;

Fig. 3 is an end view of the needle bed and auxiliary pattern mechanism opposite from that shown in Fig. 1;

Fig. 4 is a fragmentary top view of the auxiliary pattern mechanism, and the cam bar for actuating it; and

Fig. 5 is a sectional view taken substantially on the line 5—5 of Fig. 3.

In the present application I have for purpose of illustration shown my invention applied to a straight knitting machine of the Burson type, in which each bed of needles is controlled by a separate pattern cylinder, thus necessitating a separate auxiliary pattern mechanism for each main pattern cylinder. It should be understood, however, that my invention in its broader aspect is not confined to this particular machine but is applicable to straight knitting machines in general and comprehends the use of plural pattern control mechanisms, one primarily intended for controlling the shape and another the design of the fabric, and further comprehends the independent use of plural pattern control mechanisms for each bed irrespective of the particular function of such mechanisms.

In the drawings I have shown only such parts of the machine as are necessary for an understanding of the present invention, the well known parts comprising a needle bed designated generally by 6, needle supports 7, needles 8, needle-operating jacks 9, jack-levers 11 and a main pattern cylinder 12. As is well known in this art there is a jack and jack-lever for each needle and each jack-lever is pivoted on a rod 13 and has depending lugs or feet 14 and 15 which ride on cam plates on the main pattern cylinder and are adapted to be actuated thereby for tilting the jack-lever to put its needle into or out of action. In the present type of machine such tilting movement of the jack-lever raises or lowers an upstanding lug 16 on the needle jack 9 into or out of the path of the needle advancing and retracting cams (not shown) on the cam

bar 17, so that the needle will be advanced and retracted in a knitting operation or will remain quiescent according to the position of the jack lever. The cams just referred to for advancing and retracting the needles in the reciprocation of the cam bar 17 are well known to this art; they appear in my Patent 1,520,479 issued December 23, 1924, as well as in various other patents. The means for reciprocating the cam bar 17 is also not shown but reference may be made to Rolston Patent 990,595 of April 25, 1911 for a showing thereof, as well as for a showing of means for intermittently turning the main pattern cylinder 12. It follows, therefore, that the main pattern cylinder controls the number of needles in action and consequently controls the shape and might also be employed to control to a limited extent the pattern or design of the fabric, it being understood that the pattern or design is further modified by reason of the number or color of yarns employed in the knitting, the yarn feed being controlled by separate mechanism not forming any part of the present invention. Reference may, however, be had to Burson Patent 616,601, issued December 27, 1898, for a showing of yarn transfer means.

In the knitting of various articles of merchandise such for example as socks and stockings the main pattern cylinder or cylinders, as the case may be, control the shape of the knitted article and may also be so constructed as to produce various designs or ornamental effects in the fabric. However, in view of the ever-changing demand for different designs the matter of changing the main patterns or substituting new patterns therefor involves not only a considerable expense but also requires a great amount of time and labor in making the new patterns and in substituting them in the machine. The present invention overcomes these difficulties by the provision of an auxiliary pattern mechanism of the endless pattern type adapted to be applied as an attachment operating in conjunction with each main pattern cylinder for controlling the needles in action and adapted to be thrown into and out of operation at will or by control of the main pattern cylinder. Thus while the main pattern cylinder controls the shape of the fabric and the design to any extent desired, the auxiliary pattern mechanism is intended to control the needles in conjunction with and supplemental to said control of the main pattern cylinder. And, inasmuch as the auxiliary pattern mechanism, in this instance of cylindrical form, is considerably smaller than the main pattern cylinder and constructed so that it may be produced at a comparatively low cost and changed quickly, a greater variety of different fabrics may be produced at a lower cost than was heretofore possible.

The auxiliary pattern cylinder comprises,

in this instance, a series of pattern plates 18 and spacing plates 19 arranged in alternation on an arbor or shaft 21 and clamped thereon between opposed heads 22 and 23. A nut 24 threaded on the arbor imparts the clamping pressure and upon removing the nut the head 23 and likewise the plates 18 and 19 may be removed endwise therefrom for replacement because of breakage or for other reasons. It is not intended to remove the plates for changing designs; on the contrary it is intended that each auxiliary cylinder shall be kept for the purpose of knitting the particular design that it produces, and that it shall be readily changeable from one machine to another or by substitution of one cylinder for another.

The cylinder arbor 21 is journaled at its ends in a suitable frame comprising, in this instance, spiders 25 and 26 connected by tie-rods 27 and pivotally mounted on stub-shafts 28 on bracket arms 29 secured to the main frame of the machine, at present to the bed frame 6. The auxiliary cylinder is therefore disposed in juxtaposition to the main pattern cylinder and the jack-levers.

Each jack-lever has integral therewith an upstanding foot 31 the end of which is disposed and guided in a groove formed between two adjoining plates 19 and adapted to be actuated by the pattern plate 18 in the bottom of said groove when the pattern cylinder is in the operative position. The auxiliary pattern cylinder is shown in said operative position in the drawings, in which it will be noted (Fig. 2) that the end of the foot 31 is disposed in one of the depressions in the pattern plate 18 so that when the cylinder is moved in a counter-clockwise direction the foot 31 will be raised, thereby tilting the jack-lever 11 and throwing its needle out of action. The means for imparting this rotative movement to the auxiliary pattern cylinder will be described later.

Suitable means may be employed to return the jack-lever to the position shown after it has been tilted by the auxiliary control as just described, this means in the present instance comprising a spring 32 for each jack-lever urging it down at its rear end. These springs are suitably attached to a bar or support 33 interposed between and pivotally mounted on the bracket arms 29 and adapted to be oscillated at predetermined times for relieving the spring pressure from the jack-levers when the latter are controlled by the main pattern cylinder. This means at present comprises a lever arm 34 (Fig. 1) attached to said bar 33 and controlled at its outer end 35 by a cam 36 on the main pattern cylinder. In the position of the parts shown the springs 32 are held down across the jack-levers by the high portion of the cam 36; and it will be manifest that when the end 35 of said lever enters a low portion

of said cam the said spring pressure on the jack-levers will be relieved.

The auxiliary pattern cylinder is adapted to be swung on its supporting stub-shafts 28 into and out of the operative position shown, this movement being just sufficient to withdraw the pattern plates 18 from the jack-lever feet 31 and still retain the ends of said feet in the grooves above-mentioned. Said movement of the auxiliary cylinder is controlled by the main pattern cylinder, at present by suitable cam plate 37 adapted to actuate followers 39 and 41 carried by extensions 42 of the spider 25. Thus by the provision of suitable control cams on the main pattern cylinder the auxiliary pattern cylinder will be brought into and out of operative position at predetermined times to control the needles. It will be understood, then, that the main pattern cylinder is intermittently advanced and in certain positions thereof, depending on the form of the cam 37, the auxiliary cylinder will be brought into operative position or moved out of operative position.

The mechanism above-mentioned for imparting rotative movement to the auxiliary pattern cylinder is operated in timed relation with the needle actuating cam bars so that the changes will be effected at the proper times with relation to the knitting action. While this cylinder motion might be imparted from various sources I prefer to obtain this motion directly from the needle cam bar, the mechanism for this purpose being shown in Figs. 3, 4 and 5. This mechanism comprises, briefly stated, a ratchet and pawl device acting on the arbor 21 and operated by a cam 43 on the cam bar 17. In view of the particular application of the auxiliary pattern mechanism its cylinder is actuated only upon each alternate stroke of the cam bar 17, this alternate action being produced by the pawl device per se as will be presently explained. Such alternate action is required because in round and round knitting by the needles on the opposite beds each bed of needles is quiescent while the other bed is in action, consequently during each alternate stroke of the cam bar motion is transmitted by its cam 43 to its auxiliary cylinder. Said ratchet device comprises a series of toothed wheels 44, 45 and 46, the first being keyed to the arbor 21 and the latter two being loose thereon and riveted or otherwise secured together as shown in Fig. 5. The wheels 44 and 46 have the same number of teeth and the intermediate wheel 45 has only one-half said number of teeth or in other words has a blank or solid tooth 40 for each alternate tooth depression on the adjoining wheels. See Fig. 3. A single pawl 47 engages the teeth on both the wheels 44 and 45 and a pawl 48 engages the teeth on the wheel 46. These pawls are pivotally mounted on a common bolt 49 secured to a ratchet

arm 51 mounted to oscillate on the adjacent end of the arbor 21 as shown in Fig. 5 and having a depending arm 52 connected by a lengthwise adjustable link 53 to a cam follower 54. Said cam follower 54, 5 guided in a suitable bearing 55 on the main frame, is constantly urged by a contractile spring 56 in a direction to swing the ratchet arm 51 in a counter-clockwise direction viewing Fig. 3 and holding the pawls in a retracted position, this movement placing the end 57 of the cam follower in the path of the cam 43. The cam 43 is so located on the cam bar that it will engage the follower end 57 and move the follower 54 to the left (Fig. 3) 10 at the end of the return stroke of said cam bar, thus advancing the pawls and imparting a control movement to the auxiliary pattern cylinder just prior to the knitting stroke. In view of the particular ratchet device described, the wheel 46 will be actuated at each stroke of the cam bar 43 and the wheel 44 will be actuated only at each alternate stroke of said cam bar, this being due to the fact 15 that the pawl 47 will be held up out of engagement with said wheel 44 by the alternate blank or high teeth on the wheel 45. Suitable holding pawls 58 prevent back motion of the ratchet wheels, the one having engagement with ratchet wheel 46 and the other 20 only with ratchet wheel 44.

The relationship between the operation of the main pattern cylinder and the auxiliary pattern cylinder should be clear from the foregoing description. The main pattern cylinder is intermittently advanced in a predetermined timed relation to the reciprocation of the cam bar 17, and the auxiliary pattern cylinder, it has just been shown, is arranged to be intermittently advanced through the medium of means operated in the reciprocation of the cam bar 17. Previously it was shown how the auxiliary pattern cylinder is arranged to be brought into and out of operative position by the main pattern cylinder 25 through the medium of the cam 37 provided on the main pattern cylinder and engaging followers provided on the carriage of the auxiliary pattern cylinder. In the following description, it will appear how the auxiliary pattern cylinder is arranged to be locked against further intermittent advancement by the cam bar when said cylinder has been shifted to inoperative position. 30

Suitable means is provided for locking the ratchet device against movement and consequently the auxiliary pattern cylinder against rotative displacement when said cylinder has been moved bodily to the inoperative position. This means comprises, in the present case, a pawl 59 pivoted on a rock shaft 61 and fastened thereto by a spring 62 so that while the pawl will be raised and lowered by rocking said shaft it will also be capable of an independent movement thereon to be present-

ly noted. The rock shaft will be actuated by movement of the auxiliary pattern cylinder into and out of its operative position, in this instance by a link 63 loose on one of the rods 27 and pivotally connected at its outer end to the upturned end 64 of said rock shaft. 70 With the present arrangement of parts the auxiliary pattern cylinder will be moved to the inoperative position when the cam follower 54 is in its retracted position, that is, held to its outermost position by the spring 56, so that the rock shaft 61 will be turned in a clockwise direction to urge the pawl 59 against said follower 54. Upon the next succeeding movement of the follower 54 by the action of the cam 43 a notch 65 in said follower will be brought into registration with the end of the pawl 59 which being urged downwardly by the spring 62 will enter said notch and thereby lock the ratchet device 75 against further movement. 80 85

From the foregoing it will be manifest that the auxiliary pattern cylinder will be brought into and out of operation at predetermined times under control of suitable cams on the main pattern cylinder and that when in the operative position it will be automatically operated by the cam bar to impart a needle control movement to put needles into or out of action prior to each knitting stroke. And, inasmuch as the auxiliary pattern cylinder will be operative on all needles held in action by the main pattern cylinder it will control the design or pattern of the fabric as distinguished from the shape thereof which is determined by said main cylinder. It will be noted that a suitable depression or notch 66 (Fig. 2) is formed in the pattern plate on the main cylinder for the jack-lever lug 15 to afford clearance for the latter when the jack-lever is tilted by the auxiliary cylinder. 90 95 100 105

An auxiliary control mechanism of this kind may be employed in connection with any straight knitting machine having one or more pattern cylinders. In practice one auxiliary pattern control mechanism or cylinder and appurtenant mechanism might be provided for each main cylinder as in the example illustrated herein. However, my invention should not be confined to primary and auxiliary pattern control mechanisms, since as stated above it comprehends plural pattern control mechanisms for a bed of needles for the purpose of facilitating and securing in a more practical manner a greater multiplicity of designs. It should be understood, therefore, that in putting my invention into practice many changes might be made in the construction and in the particular devices employed for the purposes described, without departing from the spirit and scope of the invention as expressed in the appended claims, in which— 110 115 120 125

I claim:

1. In a straight knitting machine, in com- 130

6 combination, a bed of needles, jack-levers there-
 7 for, a main pattern cylinder for controlling
 8 the jack-levers and an auxiliary pattern
 9 mechanism comprising an auxiliary pattern
 10 cylinder, a frame on which said cylinder is
 11 mounted to revolve about its longitudinal
 12 axis, means pivotally supporting said frame
 13 so that the auxiliary pattern cylinder may
 14 swing into and out of an operative position,
 15 cam followers on said frame adapted to ride
 16 on cam plates on the main pattern cylinder
 17 for controlling the position of the auxiliary
 18 pattern cylinder, and cam followers on the
 19 jack-levers adapted to be operated by pat-
 20 tern plates on the auxiliary pattern cylinder
 21 when the latter is in the operative position.

22 2. The combination set forth in claim 1, in-
 23 cluding a cam bar for advancing and retract-
 24 ing the needles, and means actuated by said
 25 cam bar for imparting rotative movement to
 26 the auxiliary pattern cylinder.

27 3. The combination set forth in claim 1, in-
 28 cluding the needle advancing and retracting
 29 cam bar, and a ratchet device actuated by
 30 said cam bar for imparting rotative move-
 31 ment to the auxiliary pattern cylinder.

32 4. In a straight parallel row knitting ma-
 33 chine, the combination with the main pat-
 34 tern cylinders and the jack-levers, of an
 35 auxiliary pattern cylinder for each bed of
 36 needles arranged adjacent the main cylinder
 37 and with the operated ends of the jack levers
 38 extending therebetween for interchangeable
 39 operation by one or the other, whereby the
 40 auxiliary cylinder is adapted to control the
 41 jack-levers therefor in addition to the control
 42 of said jack-levers by the main pattern
 43 cylinder.

44 5. In a straight parallel row knitting ma-
 45 chine, the combination with the main pattern
 46 cylinder and the jack levers, of an auxiliary
 47 pattern cylinder for each bed of needles
 48 adapted to control the jack levers therefor in
 49 addition to the control thereof by the main
 50 pattern cylinder, each auxiliary pattern
 51 cylinder being moved into and out of opera-
 52 tive relation to the jack levers by its main
 53 pattern cylinder.

54 6. A straight parallel row knitting ma-
 55 chine as set forth in claim 4, in which each
 56 auxiliary pattern cylinder is moved into and
 57 out of operative relation to its jack-levers by
 58 its main pattern cylinder and in which each
 59 auxiliary pattern cylinder is moved rotatably
 60 in jack-operating movement by operation of
 61 reciprocating cam bars.

62 7. In a straight knitting machine, the com-
 63 bination with the main pattern cylinder and
 64 the jack-levers for a bed of needles, of an
 65 auxiliary pattern cylinder arranged over the
 66 main cylinder with the operated ends of the
 67 jack levers extending therebetween, and
 68 means to move the auxiliary pattern cylinder
 69 into and out of operative relation to the jack-
 70 levers, in the operative position of which to

control said needles supplemental to the con-
 71 trol thereof by the main pattern cylinder.

72 8. The combination set forth in claim 7,
 73 including a needle actuating cam bar, and
 74 means operated by said cam bar to impart
 75 rotative control motion to the auxiliary pat-
 76 tern cylinder.

77 9. In a straight knitting machine, in com-
 78 bination, a bed of needles, jack-levers there-
 79 for, a main pattern cylinder arranged on one
 80 side of the operated ends of said levers for
 81 operating the same, an auxiliary pattern
 82 cylinder arranged on the other side thereof
 83 for operating the jack-levers in one direc-
 84 tion to move their needles out of action, and
 85 springs for moving the jack-levers in the
 86 opposite direction.

87 10. In a straight knitting machine in com-
 88 bination a bed of needles, jack levers there-
 89 for, a main pattern cylinder for operating the
 90 same, an auxiliary pattern cylinder for oper-
 91 ating the jack levers in one direction to move
 92 their needles out of action, spring means for
 93 moving the jack levers in the opposite direc-
 94 tion, and means controlled by the main pat-
 95 tern cylinder for relieving the spring pres-
 96 sure from the jack levers when they are
 97 operated by the main pattern cylinder.

98 11. In a straight knitting machine, in com-
 99 bination, a bed of needles, jack-levers there-
 100 for, a main pattern cylinder for operating the
 101 jack-levers, a reciprocating cam bar, an
 102 auxiliary pattern cylinder for operating said
 103 jack-levers, means operated by the main pat-
 104 tern cylinder for moving the auxiliary pat-
 105 tern cylinder into and out of operative re-
 106 lation to said jack-levers, and means operated
 107 in timed relation to said cam bar for im-
 108 parting rotative movements to the auxiliary
 109 pattern cylinder for operating the jack-
 110 levers.

111 12. A straight knitting machine as set
 112 forth in claim 11, in which said last men-
 113 tioned means includes a ratchet device which
 114 imparts a rotative movement to the auxiliary
 115 pattern cylinder only upon each alternate
 116 stroke of said cam bar.

117 13. In a straight knitting machine, in com-
 118 bination, a bed of needles, jack-levers there-
 119 for, a main pattern cylinder for operating
 120 the jack-levers, an auxiliary pattern cylin-
 121 der for operating the jack-levers, a needle-
 122 actuating cam bar, and means operated by
 123 the latter for imparting a rotative movement
 124 to the auxiliary pattern cylinder only upon
 125 each alternate stroke of said cam bar.

126 14. A straight knitting machine as set
 127 forth in claim 13, including means for hold-
 128 ing the auxiliary pattern cylinder out of op-
 129 eration at predetermined times.

130 15. Pattern mechanism for a straight knit-
 131 ting machine comprising, in combination
 132 with a needle bed and jack-levers adapted
 133 to be actuated for putting the needles into
 134 and out of action, a plurality of endless

traveling pattern control mechanisms, each adapted to actuate the jack-levers independently of the other, one of said mechanisms being primarily adapted for controlling the shape of the fabric and the other primarily for controlling the design thereof.

16. In a straight knitting machine, the combination with a bed of needles, of a main pattern cylinder, jack-levers normally operated by the main pattern cylinder to throw a different number of needles into action in different stages in the knitting of an article, and an auxiliary pattern cylinder arranged to be shifted into and out of operative position with relation to the jack-levers, said auxiliary pattern cylinder when in operative position serving to control the jack-levers for only the active needles.

17. In a straight knitting machine, such as a Burson machine, the combination with a bed of needles, of a main pattern mechanism for determining the number of needles thrown into action in different stages in the knitting of an article, and controlling such needles whereby mainly to control the shaping or fashioning of the fabric and partly the design, an auxiliary pattern mechanism for controlling the needles selected for operation by the main mechanism when they are not being controlled by the main pattern mechanism whereby mainly to control the design of the fabric for the article, and means for rendering the auxiliary pattern mechanism operative and inoperative at predetermined points in the knitting of the article.

18. In a straight knitting machine, such as a Burson machine, the combination with a bed of needles, of a main pattern mechanism for determining the number of needles thrown into action in different stages in the knitting of an article, and controlling such needles whereby mainly to control the shaping or fashioning of the fabric and partly the design, an auxiliary pattern mechanism for controlling the active needles when they are not being controlled by the main pattern mechanism whereby mainly to control the design of the fabric for the article, and means operated by the main pattern mechanism for throwing the auxiliary pattern mechanism into and out of operative position at predetermined points in the knitting of the article.

19. In a straight knitting machine, the combination with a bed of needles, of main pattern mechanism arranged in the operation thereof to determine the number of needles thrown into action in different stages in the knitting of an article, and auxiliary pattern mechanism arranged in the operation thereof to control only the number of needles selected for action by the main pattern mechanism.

20. A machine as set forth in claim 19 including means for shifting the auxiliary pattern mechanism into and out of operative

position, the means for advancing the auxiliary pattern mechanism being rendered inoperative when said mechanism is shifted to inoperative position whereby to cause the auxiliary pattern mechanism to stay at rest until the same is shifted back to operative position.

21. A machine as set forth in claim 19 including jack-levers for throwing the needles into and out of action, each of said jack-levers being arranged to be operated positively in both directions by the main pattern mechanism, each of said levers being arranged to be operated positively in one direction by the auxiliary pattern mechanism, and spring means for operating said levers in the other direction.

22. A machine as set forth in claim 19 including jack-levers for throwing the needles into and out of action, each of said jack-levers being arranged to be operated positively in both directions by the main pattern mechanism, each of said levers being arranged to be operated positively in one direction by the auxiliary pattern mechanism, spring means for operating said levers in the other direction, and means for relieving the spring pressure on said levers when the auxiliary pattern mechanism is shifted to inoperative position.

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