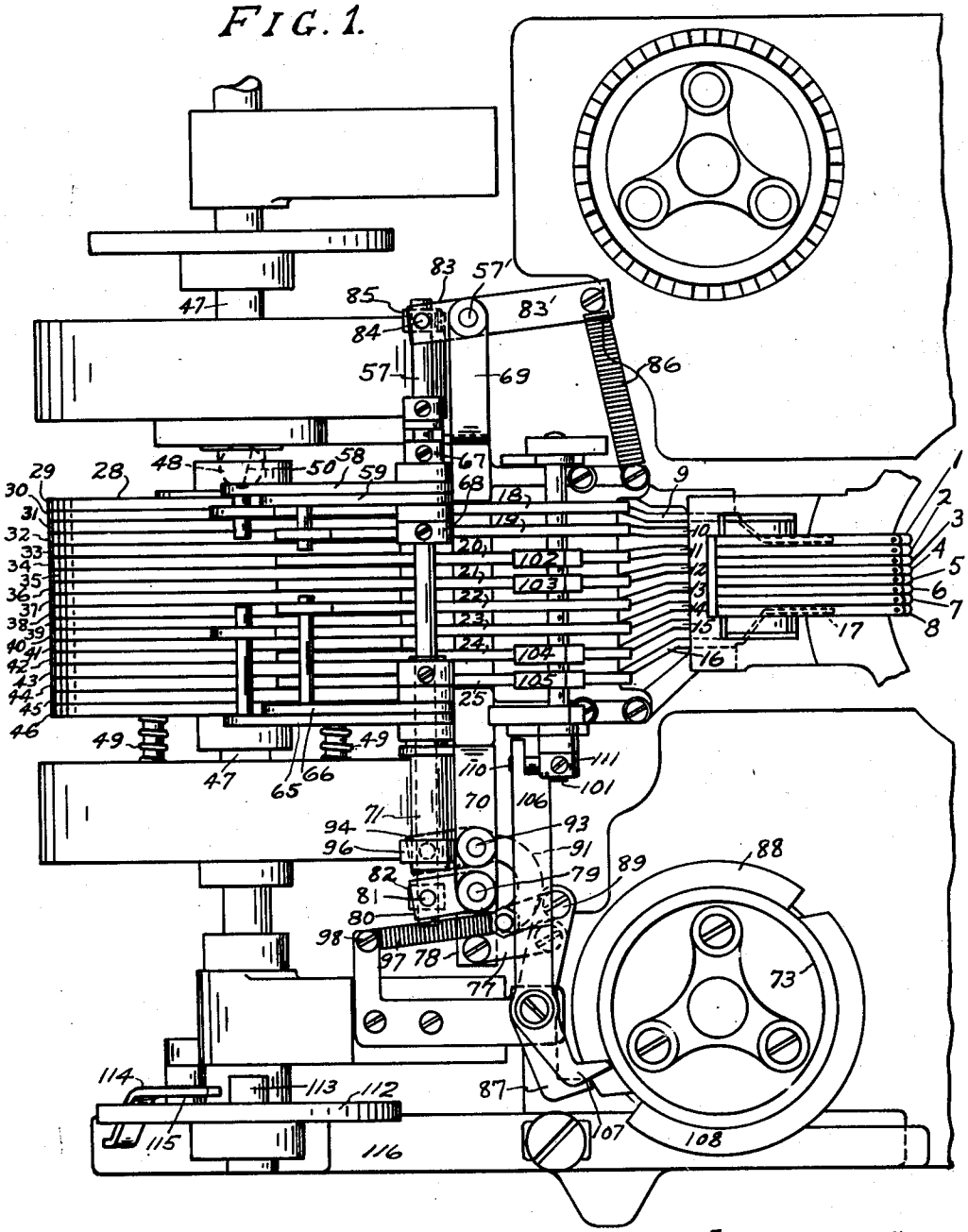
Jan. 20, 1953 I. H. C. GREEN ET AL 2,625,808

YARN LEVER CONTROLLING MECHANISM

Filed June 19, 1951 5 Sheets-Sheet 1

FIG. 1.



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YARN LEVER CONTROLLING MECHANISM

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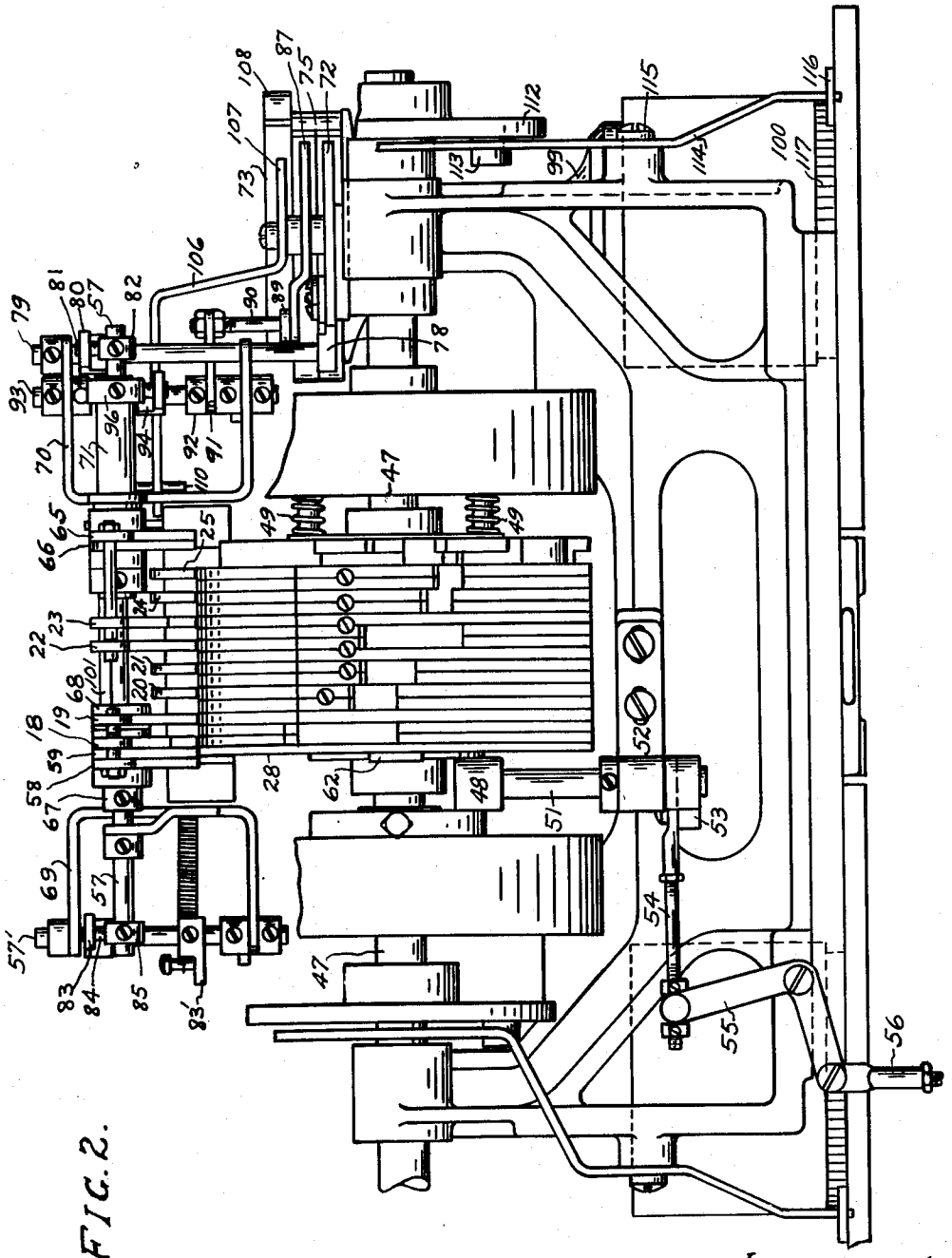


FIG. 2.

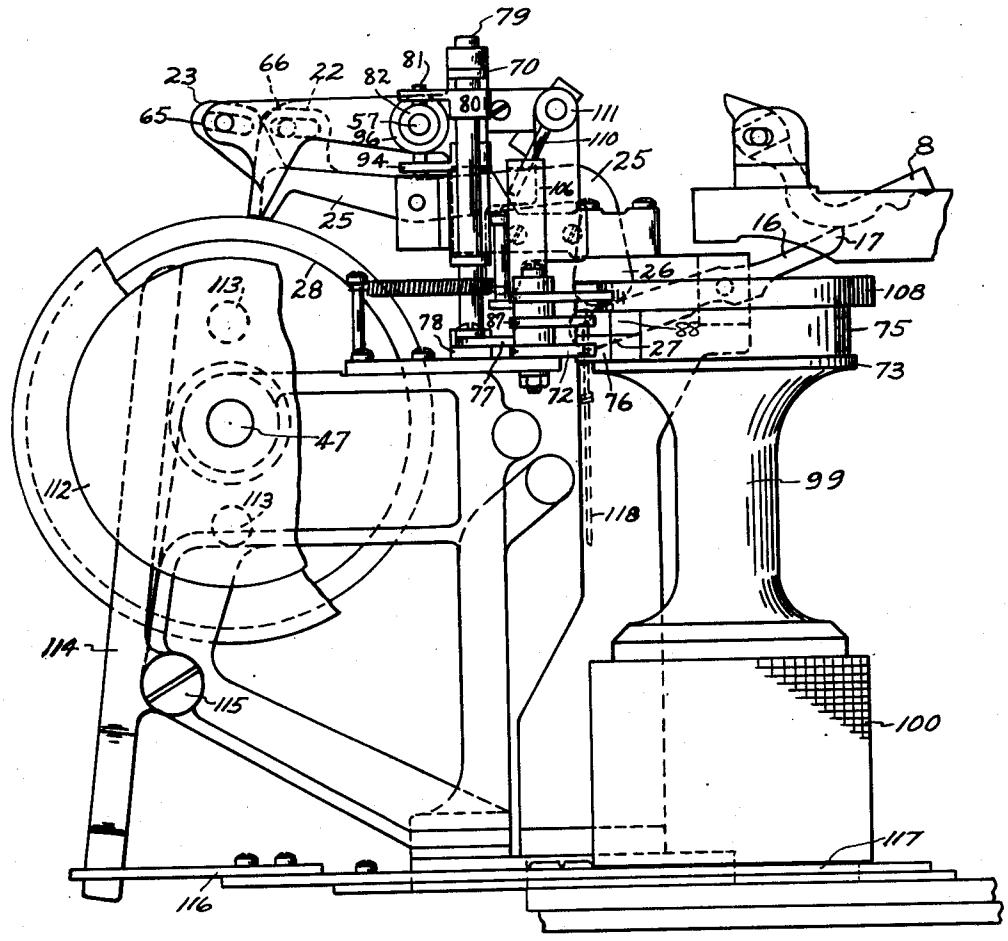
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YARN LEVER CONTROLLING MECHANISM

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FIG. 3.



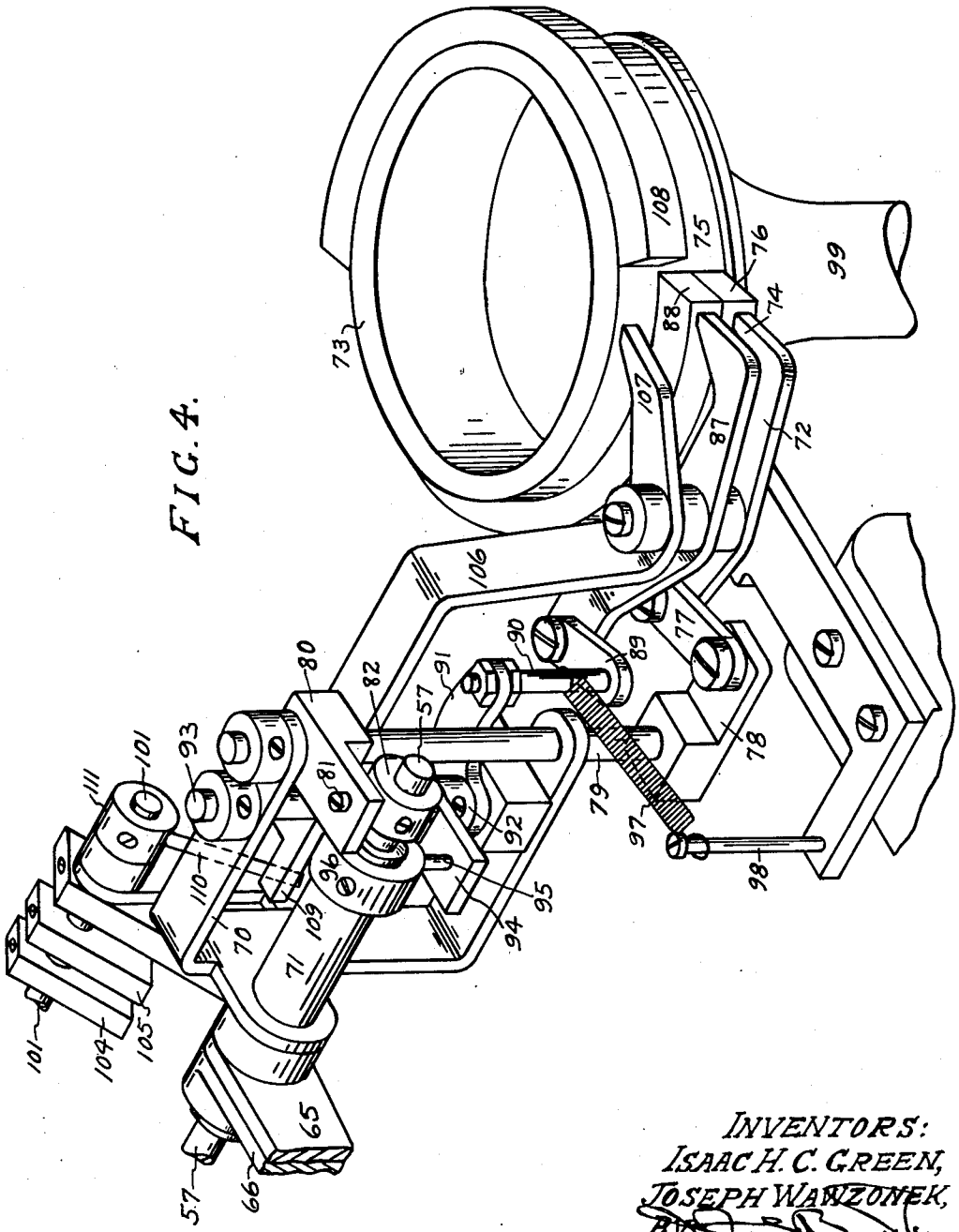
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YARN LEVER CONTROLLING MECHANISM

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FIG. 4.



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YARN LEVER CONTROLLING MECHANISM

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FIG. 5.

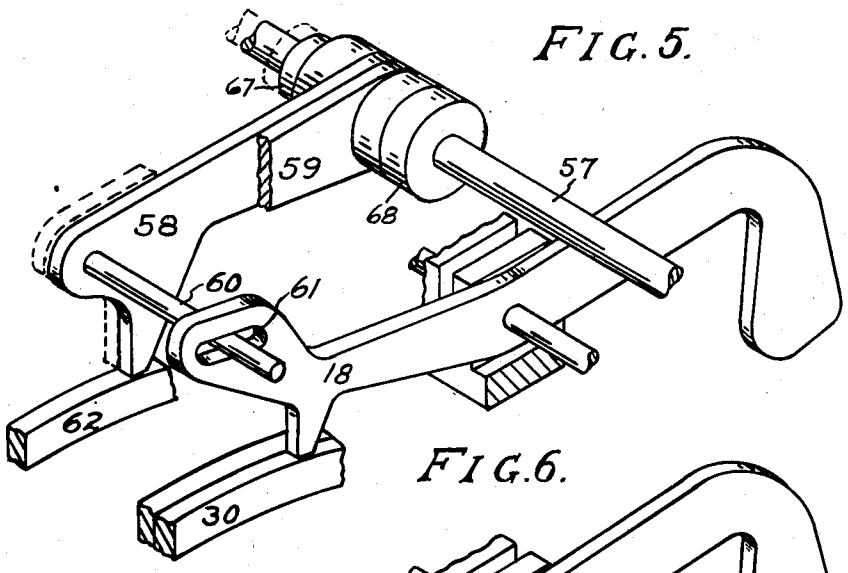


FIG. 6.

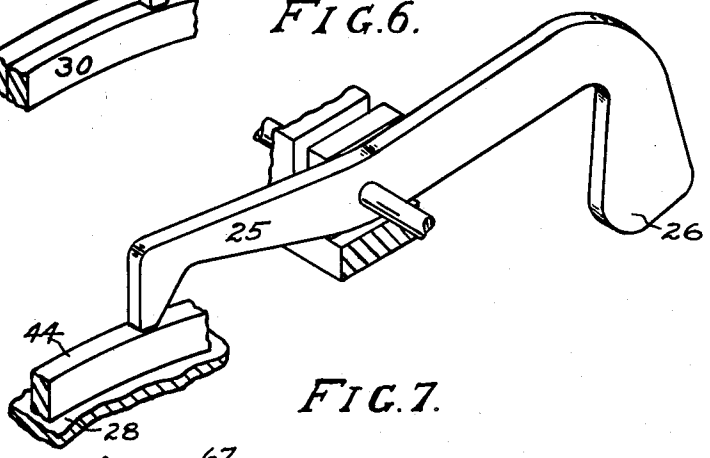
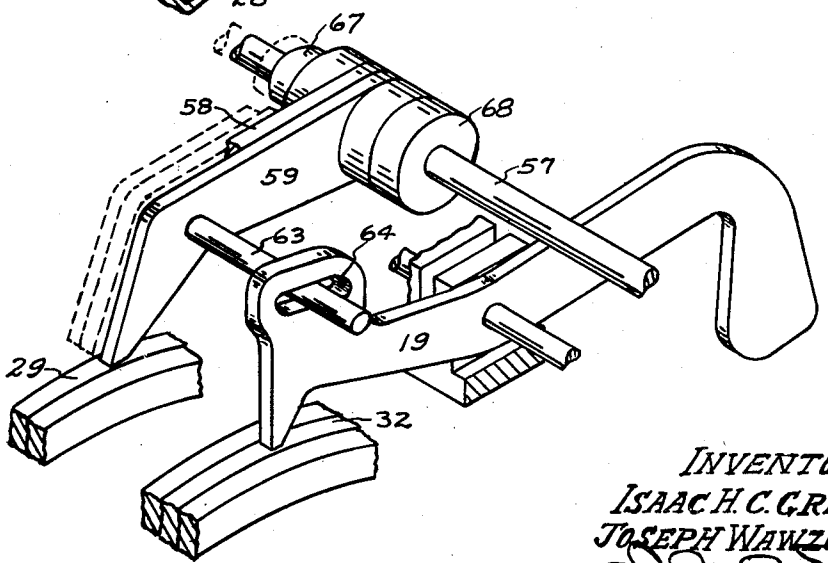


FIG. 7.



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2,625,808

YARN LEVER CONTROLLING MECHANISM

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Application June 19, 1951, Serial No. 232,326

13 Claims. (Cl. 66—138)

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This invention relates to a new and useful improvement in yarn lever controlling mechanisms for circular, independent needle, knitting machines. Its primary object is a mechanism which provides a very much larger number of variations in the operation of yarn levers than are possible upon a standard circular, independent needle knitting machine. Such an expanded yarn lever control is essential for knitting numerous varieties of patterned hosiery for which the mechanisms of the usual types of machine are entirely inadequate.

One type of yarn lever control embodying this invention is shown in the accompanying drawing of which:

Fig. 1 is a plan view;

Fig. 2 is a side elevation;

Fig. 3 is an end elevation;

Fig. 4 is a view on a larger scale of certain parts of the mechanism; and

Figs. 5, 6 and 7 are expanded views of certain other parts also on a larger scale.

As shown in Fig. 1, there are provided eight yarn levers 1—8 each capable of vertical pivotal movement in the usual manner. Each of these yarn levers is operated by a similarly mounted lever of which there are eight numbered 9—16. One end of each of these levers underlies a yarn lever, as best shown at 17 in Fig. 3, so that, when its end which is associated with the yarn lever is raised by depressing the other end, the yarn lever will be raised out of action. At other times, the yarn lever will be in its down or yarn feeding position.

The levers 9—16 are rocked by a corresponding series of rockers 18 to 25, an end of each of which overlies the inner end of a lever. For example, as shown in Fig. 3, the end 26 of rocker 25 overlies the inner end 27 of lever 16. The other end of each of rockers 18 to 25 overlies a drum 28 provided with a series of rows of cams by which the rockers can be operated. In the machine being described, there are eighteen cams 29—46 inclusive. Each of these rows of cams is capable of operating a rocker and each cam may consist of a complete circle around the drum or they may be sectional. In the former case, a rocker which is aligned with one of the cam rows will simply ride upon it without changing its position with the result that a yarn lever with which it is associated will be maintained in raised position. In the latter case, the rocker will ride upon the cam row to keep its yarn lever raised and then, when the end of a cam is reached, will drop to the surface of the drum and will permit its cam

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lever to swing down into yarn feeding position, unless it is prevented from doing so by other means.

As shown in Fig. 2, drum 28 is slidably mounted upon the shaft 47 so that it can move longitudinally of the shaft. In Fig. 2, drum 28 is positioned to the right. It is held there by a cam 48 acting against the resistance of springs 49. If cam 48 is turned so that its flat surface 50 (Fig. 1) is opposed to drum 28, the drum will be moved to the left by springs 49 a distance equal to the width of one of the cams 29—46. As a result of this, rockers 18—25 will be positioned above the drum cam rows to the right of those upon which they are shown in Fig. 1. In consequence of this, two different types of operation of each of these levers can be obtained or, if desired, each lever can be rendered inoperative with its associated yarn lever out of action. Therefore, by means of drum 28 alone, a very considerable number of different modes of operation for each of the yarn levers can be obtained.

The operating means by which the position of drum 28 is determined is shown in part at Fig. 2. Cam 48 is mounted on a shaft 51 rotatably mounted in a suitable bracket 52. A crank 53 is attached to shaft 51 and is connected by a rod 54 to a bell crank 55. The connection 56 to the other end of bell crank 55 extends to any suitable operating mechanism, such, for example, as a rocker and a cam drum (not shown). This mechanism is so arranged, of course, that cam 48 will be operated at the desired time either to move drum 28 to the right or to permit springs 49 to move it to the left as already described.

Another controlling means for certain of the yarn levers is also provided by this invention. In the form of the machine being described, rockers 18 and 19, 22 and 23 and, in consequence, yarn levers 1, 2, 5 and 6 are subject to this additional control. A shaft 57 is suitably mounted above rockers 18—25, as shown in Figs. 1, 2 and 5. Pivoted on this shaft are rockers 58 and 59. These are similar to the other rockers already described with the exception that rocker 58 is provided with a pin 60 which projects through a slot 61 in rocker 18. In the set-up being described, this rocker lies beyond the end of drum 28 as shown in Fig. 1. However, there are fixed to the end of drum 28 a small cam or cams 62 (Fig. 2) with which rocker 58 is engageable to produce a movement similar to that of the other rockers. By this arrangement, rocker 18 which normally is controlled by cam row 30 may be controlled in whole or in part by rocker 58.

The other rocker 59 (Figs. 1 and 7) similar to rocker 58 is also pivoted on shaft 57 and is provided with a similar pin 63 which projects through a slot 64 in the end of rocker 19. As shown in Fig. 1, rocker 59 rides upon cam 29 and, in consequence, rocker 19 can be made to move in accordance with the set-up of rocker 59 unless it is riding upon a cam of row 32 in which case, of course, the action of rocker 59 would be nullified.

In a similar manner, control of rockers 22 and 23 can be taken over by levers 65 and 66 which may be operated in a similar manner to levers 58 and 59. As shown in Fig. 1, rocker 65 is beyond the end of drum 28 and, since there are no cams fastened to this end of the drum, rocker 65 would be inoperative and the control of lever 23 would remain in cam 40. Lever 66, which is riding upon drum cam 46, is connected to rocker 22 in the same manner as the others which have been described. Consequently, control of lever 22 can be taken over by rocker 66 whenever cam row 38 permits it.

If drum 28 is shogged to the left, as already described, rockers 58, 59, 65 and 66 become repositioned. Specifically, rocker 58 is now in line with cam row 29 and, consequently, may be operated by that cam row and rocker 59 is now subject to control by cam row 30 (Fig. 1). Rockers 65 and 66 are off drum 28 and, consequently, inoperative. It will now be seen that rockers 18 and 19, 22 and 23 can be controlled by their own drum cams or by other drum cams through the agency of rockers 58 and 59, 65 and 66 so that the scope of the yarn lever control is increased again.

In addition to the above, rockers 58, 59, 65 and 66 can be moved bodily with shaft 57. As already stated, rockers 58 and 59 are pivoted on shaft 57. Their longitudinal position is determined by collars 67 and 68 adjustably affixed to shaft 57 which is slidably mounted in suitable brackets 69 and 70. Consequently, if shaft 57 is moved to the left, the cam rows with which rockers 58 and 59 are aligned will be changed. As shown in Fig. 2, rockers 58 and 59, 65 and 66 and drum 28 are positioned to the right. By moving shaft 57 to the left, levers 58 and 59 will be shifted to the cam row to the left and the control of rockers 18 and 19 correspondingly altered.

Rockers 65 and 66 are mounted upon a sleeve 71 slidable upon shaft 57 and means is provided for moving this sleeve and the rockers upon shaft 57. As already stated, rockers 65 and 66 are also in their right position. They can be moved to the left a distance equal to the width of one cam row of drum 28 so that the control of rockers 22 and 23 can be altered.

The means for moving rockers 58 and 59 with shaft 57, as described, is entirely separate from the means for similarly moving rockers 65 and 66. In consequence, rockers 58 and 59 can be moved independently of rockers 65 and 66 and vice versa. Also, of course, they can be moved at the same time in the same direction or, if positioned so as to permit it, can be moved in opposite directions. At the same time, it is possible to move drum 28 to the right or left as the case may be. Obviously, a multiude of different types of yarn lever controls are thus made possible depending upon the positions given to drum 28 and levers 58, 59, 65 and 66.

The longitudinal movement of shaft 57 may be obtained by any desired means. The means shown in the drawing consists of a rocker 72 so

associated with a drum 73 that one end 74 will ride upon the surface 75 of the drum or upon a cam or cams 76. To the other end of rocker 72 is pivoted one end of a link 77, the other end of which is pivoted to a crank 78 fixed to a shaft 79.

Another crank 80 is fixed to shaft 79 and is provided with a hole through which a pin 81 projects. Pin 81 is fixed to a collar 82 which in turn is fixed to shaft 57. Adjacent the other end of shaft 57 is a rotatable shaft 57' carrying a lever 83 (Fig. 1), one end of which is provided with a hole through which a pin 84 projects. Pin 84 is fixed to a collar 85 which in turn is fixed to shaft 57. Shaft 57' also carries a lever 83' from the outer end of which a spring 86 extends to some rigid part of the machine so that it will exert a swinging movement to shaft 57', as will be described.

From the above, it will be evident that when the end 74 of rocker 72 rides up onto a cam, such as 76, crank 80 will be swung to the right and shaft 57 will be moved to the right against the resistance of spring 86. It will also be evident that, when rocker 72 moves onto the surface 75 of drum 73, shaft 57 will be moved to the left by a spring 86 and lever 83'.

A somewhat similar mechanism is employed for shifting sleeve 71. As best shown in Figs. 1 and 4, a rocker 87 similar to rocker 72 is so positioned that one end will ride either upon surface 75 of drum 73 or upon a cam or cams 88. To the other end of rocker 87 is pivoted a link 89 to the other end of which is fixed a stud 90. Also affixed to stud 90 is one end of a crank 91 to the other end of which is brazed a collar 92. Collar 92 surrounds a shaft 93 and is fixed thereto by a set screw so that any movement of rocker 87 will be transmitted to shaft 93. Also, affixed to shaft 93 is another crank 94 provided with a hole through which a pin 95 extends. Pin 95 is fixed in a collar 96 which in turn is fixed to sleeve 71. A spring 97 extends between stud 90 and any suitable anchorage on the machine, such as pin 98.

When rocker 87 is riding on a cam, such as 88, sleeve 71 will be positioned to the right against the resistance of spring 97. When rocker 87 drops from a cam onto the surface 75 of drum 73, which is insured by spring 97, sleeve 71 will be shifted to the left. In this way, the rockers associated with shaft 57 and sleeve 71 can be moved either to the right or left at any desired time and in any desired relation, as already explained.

Drum 73 is also employed to control still another yarn lever controlling mechanism. This mechanism is, in general, the subject of pending application #191,385 filed October 21, 1950, but here it is used in combination with the other yarn controlling mechanism described above. As will be best seen from Figs. 1 and 4, it consists of a rockable shaft 101 upon which may be mounted any desired number of fingers. In Fig. 1, four are shown at 102, 103, 104 and 105. These fingers are positioned upon shaft 101 so as to overlie certain of the rockers which ride upon drum 28. As shown, these fingers overlie rockers 20, 21, 24 and 25 and are so proportioned that, when shaft 101 is rocked so that fingers 102—105 project downwardly, they will depress the rockers just mentioned so that they will not be operated by cams on drum 28 and so that the corresponding yarn levers 3, 4, 7 and 8 will be raised and held out of action. At other times, fingers 102—105 are inoperative so that these yarn levers can be controlled by other means.

It will be realized, of course, that any desired number of fingers may be used and that they may be positioned so as to control the operation of any desired yarn levers and that they also may be so arranged around shaft 101 that certain of them may be caused to operate at different times than others.

The rocking of shaft 101 is accomplished by a rocker 106 so pivoted that one end 107 will ride either upon the surface of drum 73 or upon a cam or cams, such as 108. When rocker 106 is riding upon the surface of a cam 108, its other end 109 will be swung clockwise. The connection between rocker 106 and shaft 101 is a pin 110 engageable with the end 109 of the rocker. This pin projects from a collar 111 attached to shaft 101. When rocker 106 is riding upon the surface 75 of drum 73, its end 109 will be swung away from pin 110 which will allow the pin and shaft 101 to rock in a clockwise direction. Contact between pin 110 and rocker 106 is maintained by a suitable spring (not shown) acting upon shaft 101. When the end 107 of rocker 106 rides up onto a cam, such as 108, its other end 109 will be swung in a clockwise direction and shaft 101 will be swung counterclockwise. In the arrangement shown in the drawing, blocks 102—105 become operative when rocker 106 rides up onto a cam 108. When the rocker is riding upon surface 75 of drum 73, the fingers 102—105 become inoperative. As already stated, these fingers can be positioned as desired to operate at any desired time.

In the machine being described, drum 73 is mounted on an extension 99 of a pattern drum 100 and is operated by the mechanism which operates the pattern drum. This is a desirable arrangement because the pattern drum may be turned by means of a drum on the same shaft as drum 28 so that the timing between the pattern mechanism and the yarn lever controls operated by drum 73 can be absolutely accurate.

A drum for this purpose is shown at 112 in Figs. 1, 2 and 3. As already stated, drum 112 is mounted on the same shaft as drum 28. On the side of drum 112 are mounted two rollers 113. A rocker 114 is so pivoted as at 115 that, when drum 112 is rotated, rollers 113 will cause it to rock. The lower end of rocker 114 is attached to a pawl 116 associated with a ratchet 117 affixed to the pattern drum whereby the pattern drum may be ratcheted around. This turning of the pattern drum will also cause a corresponding turning of control drum 73.

The machine being described is also provided with the yarn lever control mechanism common to most types of circular, independent needle, knitting machines. It is well known and, consequently, is shown only diagrammatically in Fig. 3. The levers 9 to 16, which are intermediate the yarn levers and the rockers 18—25 are connected singly or in multiple by wires to a drum or other mechanism whereby they are operated to move the respective yarn levers either into or out of yarn feeding position. Ordinarily, each wire and its associated mechanism is operated by an individual cam. This mechanism, identified in the drawings by the wire 118, is capable of removing any or all of the yarn levers out of action and free of all of the controls heretofore described and of permitting any or all of the yarn levers to become subject to any one or all of the controls heretofore described. Of course, if yarn levers are connected in multiple to a single wire, these necessarily operate simultaneously. The set-up in this respect is entirely flexible and depends upon the work to be done.

By way of summary, the mechanism of the invention involves a first means of operating yarn levers including the cam drum 28 and rockers such as 18, 19, 22, 23, and a second means for operating the same yarn levers including other rockers such as 58, 59, 65, 66, which are mechanically linked to the first mentioned rockers and adapted to follow other cam rows on the drum 28. Also, there is a yarn lever lock-out means identified by fingers 102—105 and another lock-out means identified by wire 118. It is evident that either one of the yarn changing means can affect the action of the other upon the yarn levers and can have no effect upon the action of either of the lock-out means but that either of the lock-out means can affect the action of the other lock-out means and the action of either or both of the yarn changing means.

In the appended claims, the phrase "cam row" is to be understood as meaning that portion of a drum surface with or without actual cams which is adapted to support a single rocker at a given time.

We claim:

1. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a rotatable drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row of said drum and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker.

2. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker and means for moving said other rocker from one cam row to another of said drum.

3. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker and means for excluding said yarn lever from control by said first and second means.

4. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, a second means for controlling said yarn lever which in-

cludes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker, means for moving said other rocker from one cam row to another of said drum and means for excluding said yarn lever from control by said first and second means.

5. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a rotatable drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, means for moving said drum to present a different cam row to said rocker, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row of said drum and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker.

6. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, means for moving said drum to present a different cam row to said rocker, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker and means for moving said other rocker from one cam row to another of said drum.

7. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, means for moving said drum to present a different cam row to said rocker, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker and means for excluding said yarn lever from control by said first and second means.

8. For a circular, independent needle, knitting machine, a yarn lever, a first means for controlling said yarn lever including a drum having a plurality of cam rows, a rocker adapted to ride upon a cam row, yarn lever operating linkage between said rocker and said yarn lever, means for moving said drum to present a different cam row to said rocker, a second means for controlling said yarn lever which includes another rocker adapted to be operated by another cam row and connecting means between said first mentioned rocker and said other rocker whereby said first mentioned rocker may be operated by said other rocker, means for moving said other rocker from one cam row to another of said drum, and means for excluding said yarn lever from control by said first and second means.

9. The invention as claimed in claim 2, and in which said last mentioned means includes a pattern drum and a cam drum integral therewith.

10. The invention as claimed in claim 4, and in which said means for moving said other rocker from one row to another of said drum and said means for excluding said yarn lever from control by said first and second means includes a pattern drum and a cam drum integral therewith.

11. The invention as claimed in claim 6, and in which said means for moving said other rocker includes a pattern drum and a cam drum integral therewith.

12. The invention as claimed in claim 8, and in which said means for moving said other rocker from one cam row to another of said drum includes a pattern drum and a cam drum integral therewith.

13. The invention as claimed in claim 8, and in which said means for excluding said yarn lever from control by said first and second means includes a pattern drum and a cam drum integral therewith.

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No references cited.