June 6, 1967 B. A. MONK 3,323,330

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 1

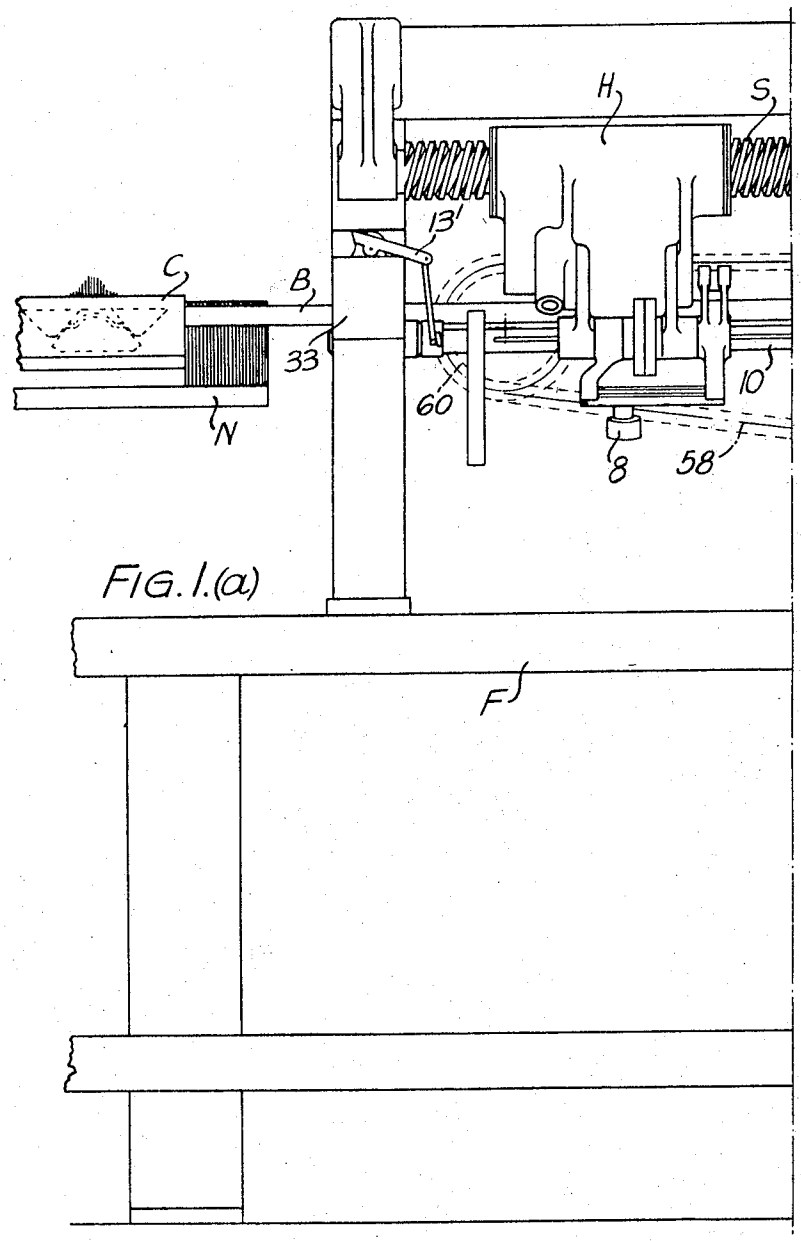


FIG. 1.(a)

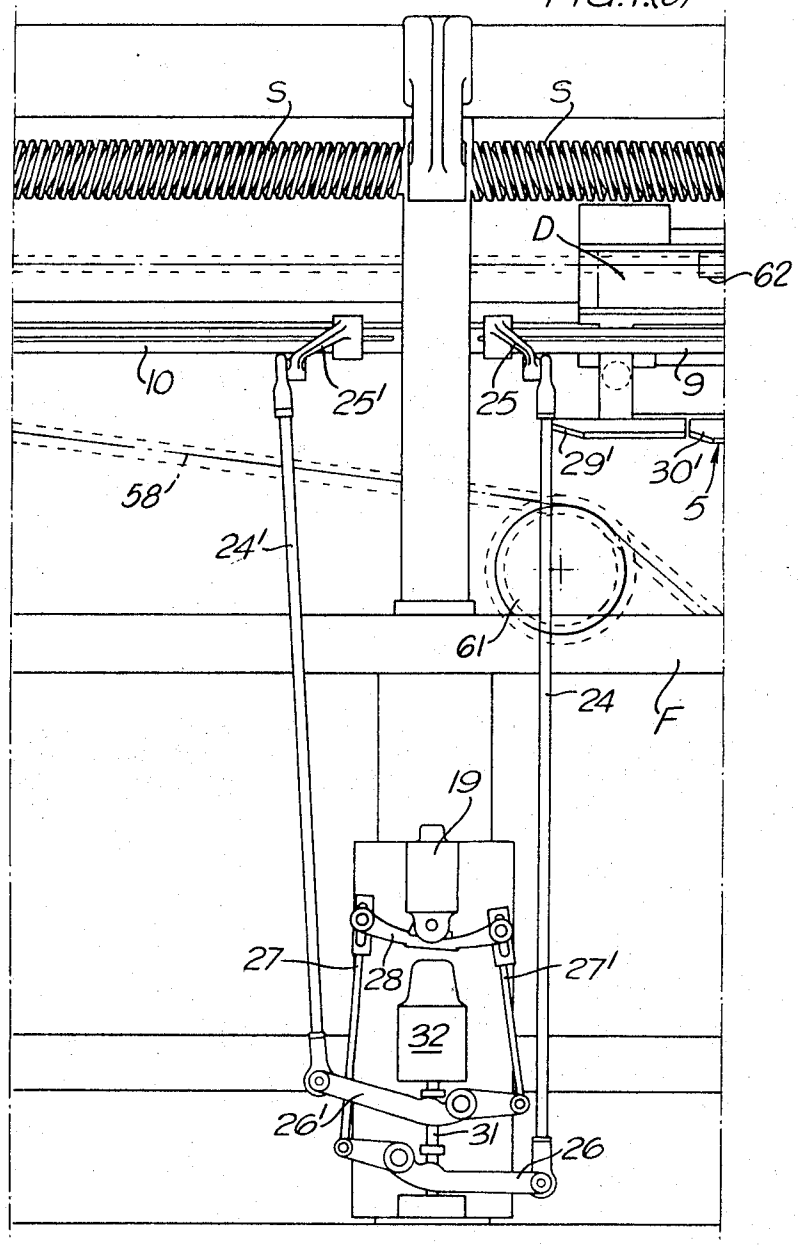
Inventor:
Brian Arthur Monk
By Baldwin & Wight
Attorneys

June 6, 1967 B. A. MONK 3,323,330

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 2

FIG. 1.(b)



Inventor:
Brian Arthur Monk
By Baldwin & Wight
Attorneys

June 6, 1967 B. A. MONK 3,323,330

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 3

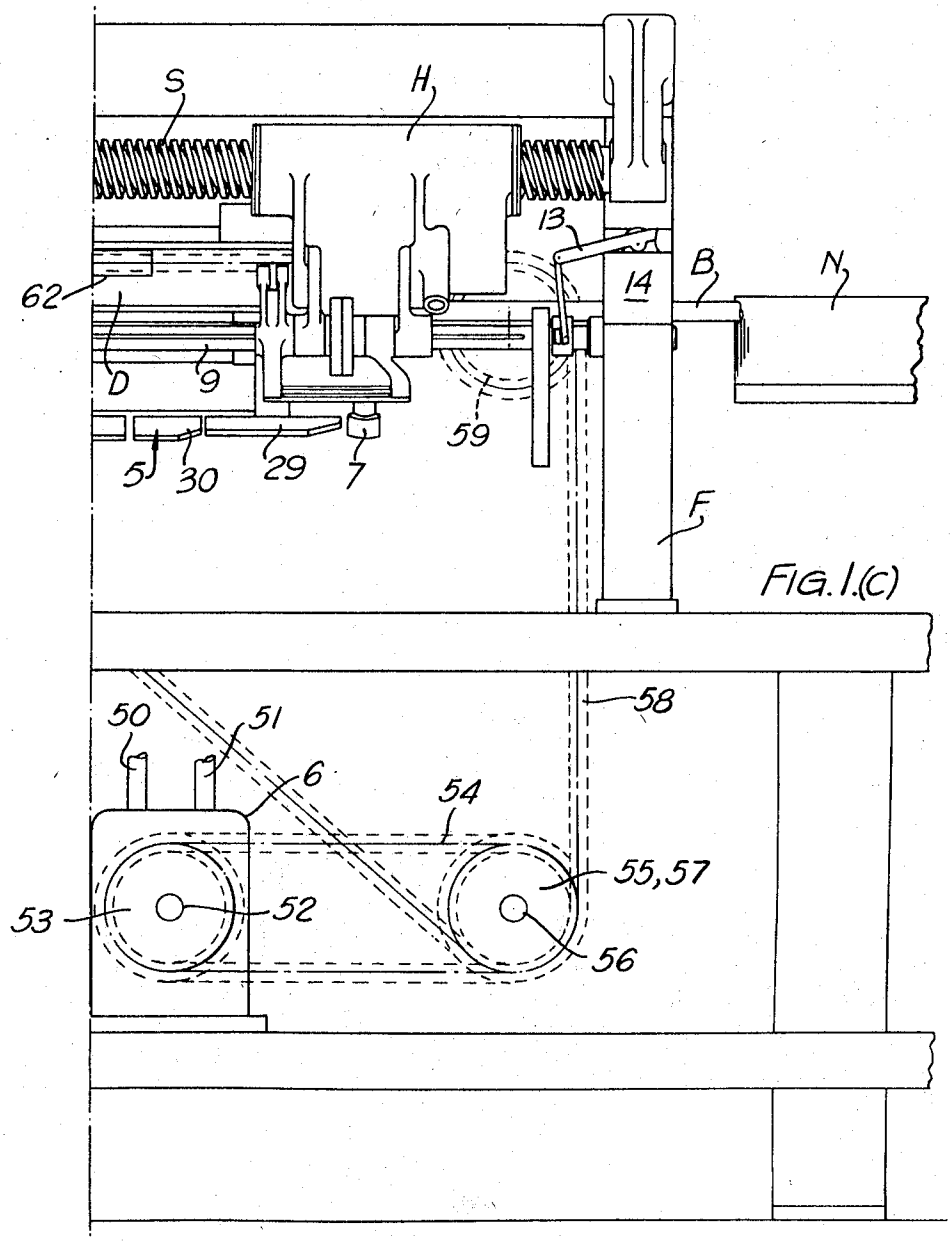


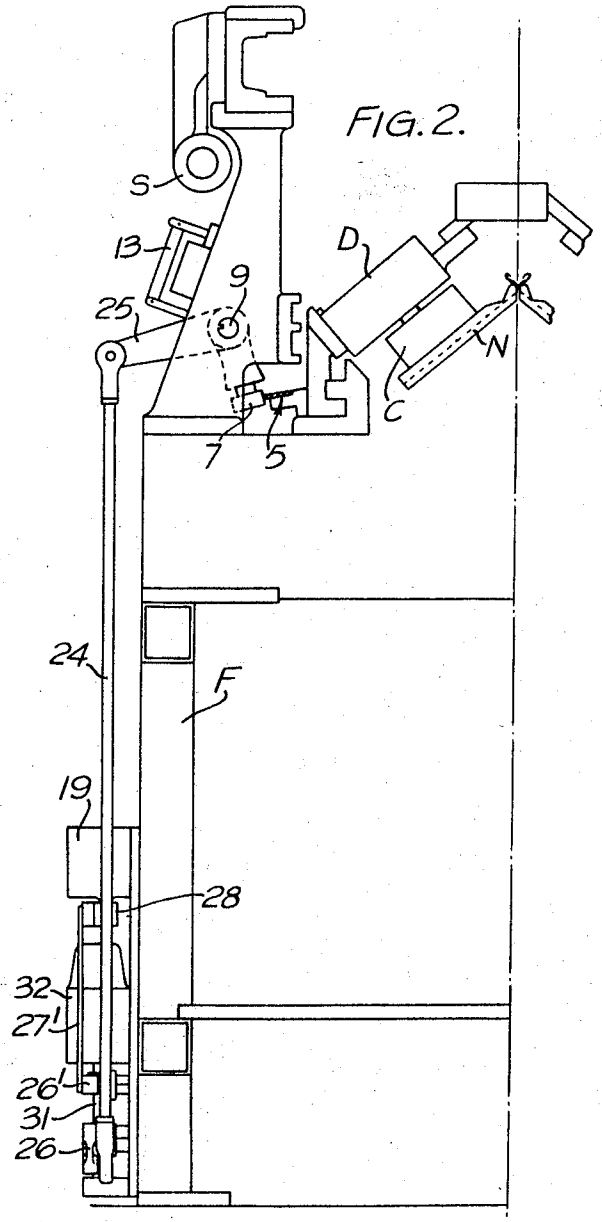
FIG. 1.(C)

Inventor:
Brian Arthur Monk
By Baldwin & Wight
Attorneys

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 4

FIG. 2.



Inventor:
Brian Arthur Monk
BY Baldwin & Wight
Attorneys

June 6, 1967 B. A. MONK 3,323,330

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 5

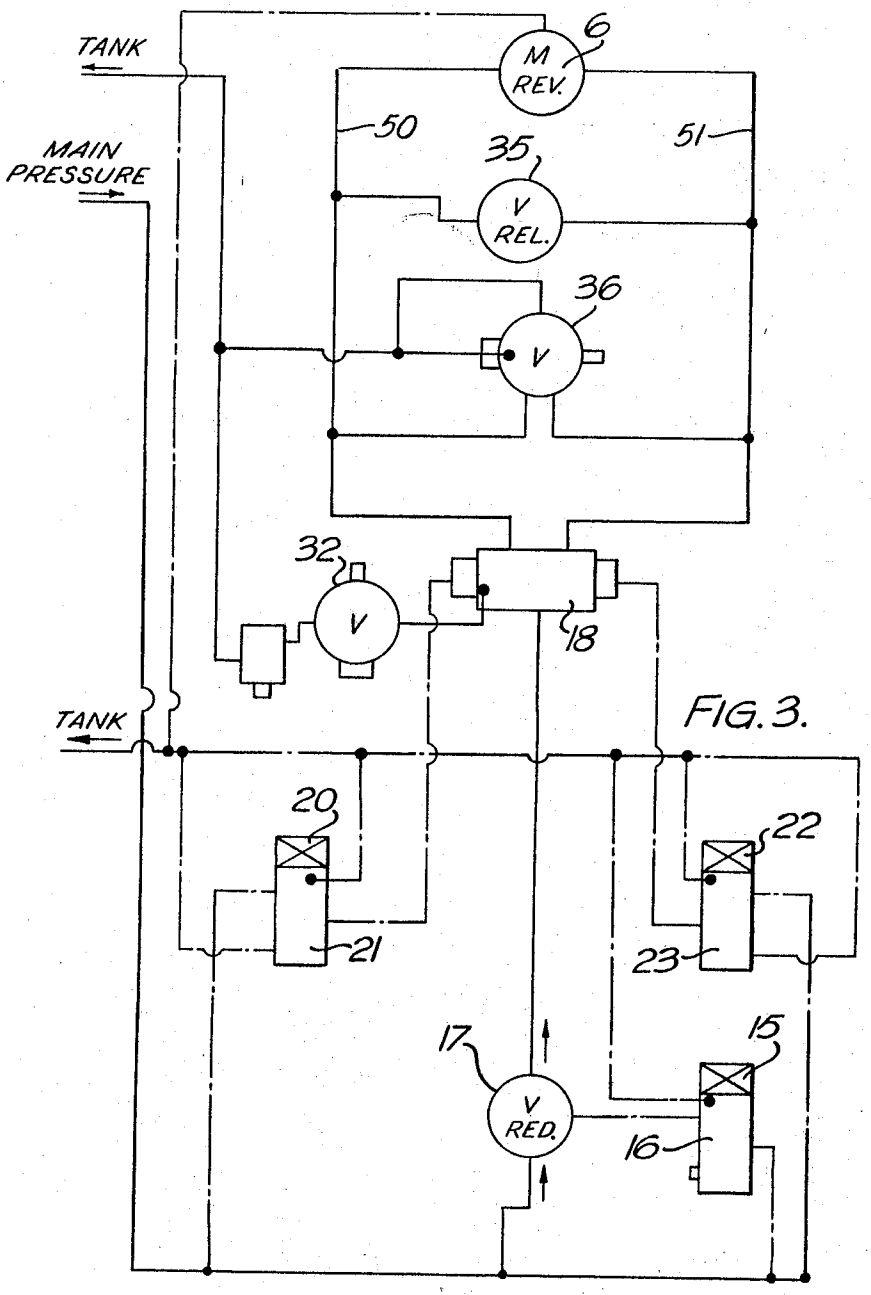


FIG. 3.

Inventor:
Brian Arthur Monk
BY Baldwin & Wight
Attorneys

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 6

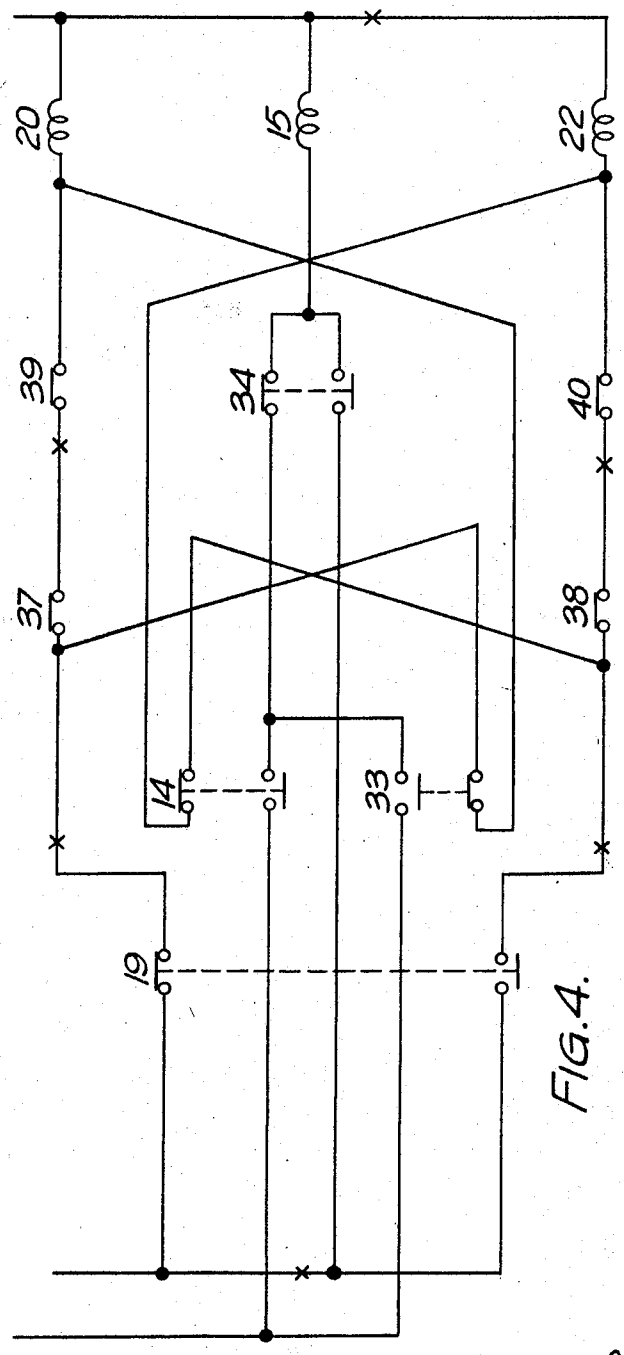


FIG. 4.

Inventor:
Brian Arthur Monk
BY Baldwin & Wight
Attorneys

June 6, 1967 B. A. MONK 3,323,330

FLAT BED RIB KNITTING MACHINES

Filed Aug. 24, 1964 7 Sheets-Sheet 7

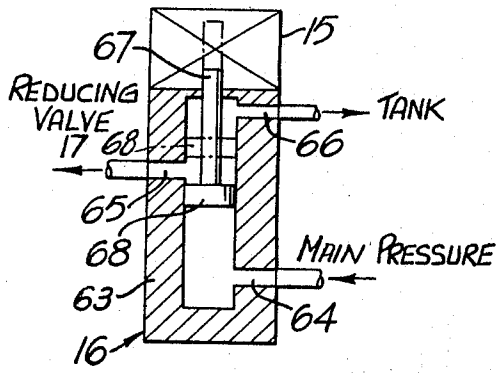
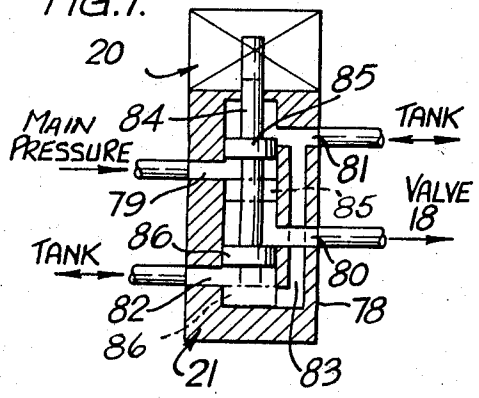


FIG. 5.

FIG. 7.



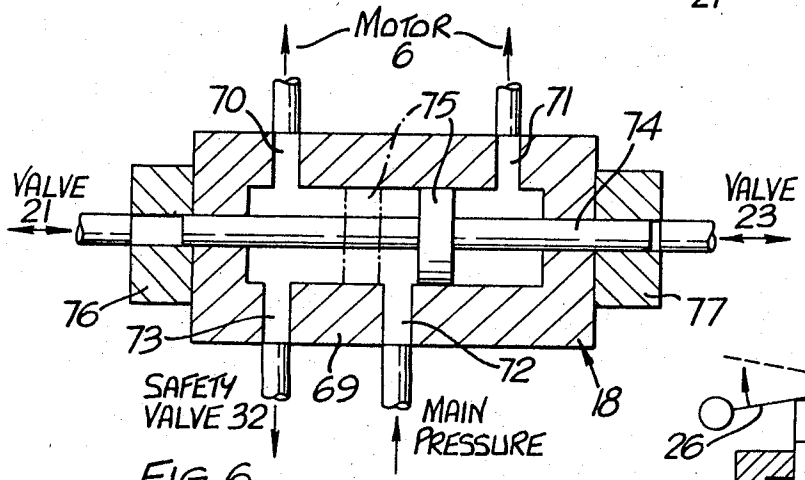


FIG. 6.

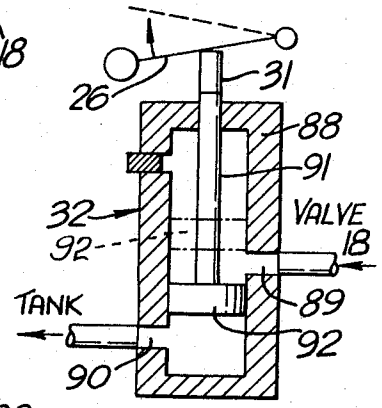
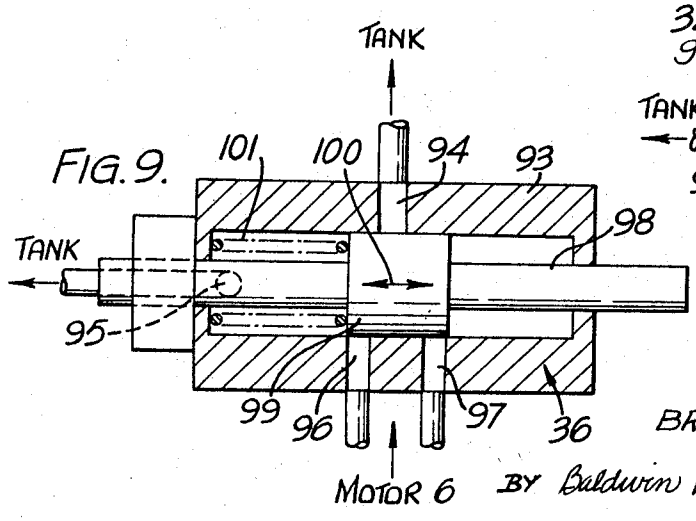


FIG. 8.

FIG. 9.



INVENTOR
BRIAN ARTHUR MONK

BY Baldwin Wight Diller & Brown

ATTORNEYS

United States Patent Office

3,323,330

Patented June 6, 1967

3,323,330

FLAT BED RIB KNITTING MACHINES

Brian Arthur Monk, Linby, England, assignor to S. A. Monk (Sutton-in-Ashfield) Limited, Sutton-in-Ashfield, England, a company of Great Britain

Filed Aug. 24, 1964, Ser. No. 391,488

Claims priority, application Great Britain, Aug. 29, 1963, 34,213/63

11 Claims. (Cl. 66—82)

This invention relates to flat bed knitting machines and is concerned particularly with a drive mechanism for the cam boxes, or alternatively the slur cocks, of such machines.

Cam boxes or slur cocks are provided to reciprocate lengthwise of the, or each, needle bed to actuate the needles and will hereinafter be referred to as the needle actuating means.

According to the present invention, in a flat bed knitting machine the needle actuating means are operated by electro-hydraulic means, the electro-hydraulic circuit including switch devices, operated via variable limit determining means, for controlling the movement, and the stroke, of the needle actuating means.

Preferably, the variable limit determining means comprise cam-actuated roller contacts mounted on convenient parts of the machine, e.g. the fashioning screw nut housings or the selvedge needle selection means, the positions of which are manually or automatically varied according to the knitting width required, the roller contacts being slidably mounted on operating rods which are angularly rotatable to actuate the switch devices which control hydraulic valves.

The invention is illustrated by way of example, as applied to a multi-head flat bed knitting machine having a central control division and a plurality of knitting divisions, in the accompanying drawings, in which,

FIGURE 1*a*, 1*b* and 1*c* are front elevational views showing part of the control division incorporating the drive mechanism and parts of two associated knitting divisions.

FIGURE 2 is a half end elevation corresponding to FIGURE 1, 1*b*, and 1*c*,

FIGURE 3 is a hydraulic circuit layout diagram,

FIGURE 4 is an electric circuit diagram,

FIGURE 5 is a diagrammatic sectional view through a typical braking valve,

FIGURE 6 is a diagrammatic sectional view through a typical pressure operated distributor valve,

FIGURE 7 is a diagrammatic sectional view through a typical pilot valve,

FIGURE 8 is a diagrammatic sectional view through a typical safety valve, and

FIGURE 9 is a diagrammatic sectional view through a typical bypass valve.

Referring to the drawings, there is shown generally in FIGURES 1 and 2 the main support framework F of the knitting division of the machine, needle beds N arranged in adjacent knitting divisions, a cam box C associated with one of the needle beds N, driven means D by which the cam boxes C are reciprocated relative to the needle bed, a connecting bar B for coupling the driven means D with cam boxes C, and nut housing H normally used for positioning fashioning mechanisms (not shown) for fashioning the selvedges of the garment piece being knitted, said nut housing being mounted for lengthwise movement on L.H. and R.H. fashioning screws S.

The above description covers known features in a multi-head knitting machine and the invention will be described with reference to a machine having such features.

In accordance with the present invention, there is provided a cam plate 5 which may be formed in one or more

sections and is fixedly secured to the driven means D, reciprocated and positioned by a conventional reversible hydraulic motor 6 (FIGURES 1*c* and 3) coupled thereto in a conventional manner to be described in more detail hereinafter, that effect reciprocation of the needle actuating means, e.g. cam boxes C for slur cocks, over the needle beds N. The cam plate 5 is adapted, according to its direction of movement, to enter into engagement with either a roller 7 or a roller 8, the rollers being keyed to, but slidably mounted on, operating rods 9 and 10. The rollers 7, 8 form part of attachments which are fixed to the respective nut housings H of L.H. and R.H. fashioning screws S, it being understood that the rollers 7, 8 with the nut housings H are moved lengthwise of the fashioning screws S according to the knitting width required.

During movement of the driven means D and thus also of the needle actuating means C from left to right of FIGURE 1, angular rotation of the operating rod 9, due to displacement of the roller 7 by the cam plate 5, is effective to actuate, via a linkage 13, a braking switch 14 which energises a solenoid 15 (FIGURES 3 and 4) and causes operation of a braking valve 16 (FIGURE 3) which, via a pressure reducing valve 17, directs fluid under pressure to a main slide valve 18, which is coupled directly to the motor 6, to slow down the speed of movement of the cam plate 5 and thus also of the needle actuating means C and the drive means D.

Angular movement of the rod 9 is also effective to operate a change-over switch 19 (FIGURES 1*b*, 2 and 4) which operates to (FIGURES 3 and 4) de-energise a solenoid 20 controlling a pilot slide valve 21 (FIGURE 3) for effecting movement of the cam 5 and the needle actuating means C from left to right, and to energise a solenoid 22 (FIGURES 3 and 4) controlling a second pilot slide valve 23 (FIGURE 3) for causing return movement of the cam 5 and the needle actuating means C, i.e. from right to left. Operation of the change-over or reversing switch 19 is effected by a connecting rod 24 (FIGURE 1*b*) which, at one end, is pivotally connected to a lever 25 secured to the operating rod 9, and at its other end, is pivotally connected to one arm of a bellcrank lever 26, the other arm of which is connected, via a secondary connecting rod 27, to a link 28 which actuates the switch 19.

Obviously, the braking switch 14 and the reversing switch 19 must be operated in sequence, and for this purpose, the cam plate 5 is of stepped formation to provide two operating faces 29 and 30 (FIGURE 1*c*), the face 29 serving to turn the rod 9 through a small angle to operate the braking switch 14, and the face 30 serving to turn the rod 9 through a greater angle to operate the reversing switch 19.

In the event of failure of the reversing switch 19, or its associated valves, the roller 7 will override the cam face 30 and this will result in still further rotation of the rod 9 which causes one arm of the bellcrank lever 26 to operate, via a collared spindle 31 (FIGURE 1*b*), a safety stop valve 32 which is normally inoperative.

The operation during movement of the cam plate 5 and the needle actuating means C, and thus also the driven means D, from right to left of FIGURES 1*a* and 1*b* is the same as that described above, cam faces 29′ and 30′ engaging the roller 8 to operate, via linkage 13′, a braking switch 33, and thus also the solenoid 15 and braking valve 16, and, via linkage 24′ to 27′, the link 28 which engages the reversing switch 19. It will be seen that the link 28 and the switch 19 are common to both directions of movement, the switch being of the over-centre type so that actuation of the switch by the link 28, which pivots about the switch centre, can be effected by either linkage system. Furthermore, the

safety stop valve 32 is also common to both directions of movement.

In order to provide slow running of the cam 5 and the needle actuating means C throughout the length of each stroke, which is sometimes desirable, a further switch 34 (FIGURE 4) is provided in the circuit, this switch being operable to energize the solenoid 15 continually so that the braking valve 16 (FIGURE 3) is continually operated. Such a requirement is made necessary to meet certain knitting operations where high speed is detrimental.

Furthermore, in order to prevent damage to the drive motor 6, in the event of an obstruction preventing proper operation of the machine, e.g. breakage of a needle, an overload valve 35 (FIGURE 3) is provided in the hydraulic circuit.

When it is necessary or advisable, to move the needle actuating means C manually, a by-pass valve 36 (FIGURE 3) is provided to short-circuit the pressure-fluid lines and to allow free circulation of the fluid.

In order to stop the needle actuating means exactly at the end of a stroke for fashioning purposes, or for any other purpose, switches 37, 38 and 39, 40 (FIGURE 4) are provided in the lines supplying current to the solenoids 20 and 22. Assuming again that the needle actuating means are travelling from left to right and solenoid 20 is energised, and it is required to stop at the end of that particular stroke, either pair of switches 37, 38 or 39, 40 are opened during the stroke, but the actuating means continue to travel due to the fact that there is an alternative source of supply to the solenoid 20 from switch 33, and it is only when the switch 19 changes over at the end of the stroke that the actuating means C stop. It will be seen, therefore, that the switches 14 and 33 serve two purposes; firstly they serve to operate the braking valve 16 and secondly they provide an alternative current supply to the solenoids 20 and 22 when the switches 37, 38 or 39, 40 are opened to stop the needle actuating means at the end of a stroke.

The general structure of the invention and the operation thereof has been set forth above without specific reference as to the manner in which the driven means D are driven from the reversible motor 6 or as to the specific construction of the various control valves. These are conventional elements, but a detailed description thereof is believed to be desirable at this time so that one may have a full understanding as to how to carry out the invention.

As shown in FIGURES 1*a*, 1*b* and 1*c*, the reversible motor 6 in driven, in the manner previously described, by fluid under pressure which enters through the pipe 50 or the pipe 51 according to the direction in which the motor 6 is to rotate.

The motor 6 has a drive spindle 52 to which a sprocket 53 is fixed for rotation therewith. The sprocket 53 drives, through a chain 54, a sprocket 55 mounted on a shaft 56. The shaft 56 has secured thereto for rotation therewith a second sprocket 57 which drives an endless chain 58 which is passed over guide sprockets 59 and 60 and over a tension sprocket 61. The driven means D is coupled to the chain 58 at 62 and is caused to reciprocate in the manner and at the speed dictated by the motor 6.

Referring now to FIGURES 5 through 9 of the drawings, it will be seen that there are illustrated the specific details of the various conventional hydraulic valves which form parts of the hydraulic system of this invention, and which details of the hydraulic valves will now be described.

The details of the braking valve 16 are found in FIGURE 5. The braking valve 16 comprises a housing 63 having a port 64 which is connected to the main pressure line for receiving fluid under pressure therefrom, a port 65 leading to the reducing valve 17 and a port 66 which is connected to the tank or reservoir from which the supply of fluid for the hydraulic system is obtained. A plunger 67 operated by the solenoid 15 is provided with a piston head or valve element 68 which is slidable in the housing 63. In the position shown in FIGURE 5, the braking valve 16 is inoperative. When it is desired to operate the valve for the purposes hereinbefore described, the solenoid 15 is effected to move the valve element 68 into the position shown in dotted lines so that the fluid under pressure is passed through the port 65 to the reducing valve 17.

As is shown in FIGURE 6, the main slide valve or distributor valve 18 comprises a housing 69 having a port 70 connected to one side of the motor 6, a port 71 connected to the other side of the motor 6, a port 72 connected to the main pressure line by way of the reducing valve 17 and the braking valve 16, and a port 73 connected to the safety valve 32. A piston rod 74 having a valve element or piston head 75 fixed thereto is positioned within the housing 69 so that its ends extend respectively into a cylinder block 76 and a cylinder block 77. The bore of the cylinder block 76 is connected to the valve 21 while the bore of the cylinder block 77 is connected to the valve 23. In the position shown in FIGURE 6, main pressure fluid is being passed through the port 70 to drive the motor 6 in one direction. When it is desired to reverse the direction of rotation of the motor 6, the valves 21 and 23 are operated so that fluid under pressure is applied to the end of the piston rod 74 in the block 77 and the pressure previously applied to the end of the piston rod 4 through the valve 21 is released. This causes the valve element 75 to move into the dotted line position so that fluid under pressure is passed through the port 71 to the opposite side of the motor 6, thereby reversing the direction of rotation thereof.

The details of a valve typical of the valves 21 and 23 are shown in FIGURE 7. For descriptive purposes, only the valve 21 will be described, although the valve 23 will be of identical construction. The valve 21 comprises a housing 78 having a port 79 connected to the main pressure line, a port 80 connected to the valve 18 for controlling the operation thereof, and two ports 81 and 82 both of which are connected to the tank or reservoir. The port 81 is connected by means of a bypass passage 83 to a secondary port opening out into the base of the housing. A piston rod 78 having two spaced valve elements or piston heads 85 and 86 is mounted within the housing 78. In the position shown in the drawing, the valve 21 is operative to allow fluid under pressure to pass to the valve 18 and to allow communication between the ports 81 and 82 by the bypass passage 83. In the inoperative position of the valve 21, where the valve elements are moved into the positions shown in dotted lines, it will be seen that the fluid under pressure is bypassed to the tank or reservoir by the port 81 and that fluid returned from the valve 18 is passed through the tank or reservoir via the port 82. In this position the passage 83 is blocked by the valve element 86. It is to be understood that the valves 21 and 23 are mirror images of one another and that, in operation, the valve elements of one valve are always in the opposition position to those of the other valve, i.e. one is operative and the other is inoperative.

Referring now to FIGURE 8, it will be seen that the safety valve 32 comprises a housing 88 having a port 89 connected to the valve 18 and a port 90 connected to the tank or reservoir. A plunger 91 having a valve element or a piston head 92 is mounted in the housing 88 with a free end of the plunger 91 being coupled to the collared spindle 31 for operation by the bellcrank lever 26 in the manner hereinbefore described. In the position shown in the drawing, the valve 32 is inoperative. However, in order to release pressure in the valve 18 and thus in the system generally, the valve element 92 is moved into the dotted line position thereof so that

the fluid passes through the port **90** to the tank or reservoir.

The bypass valve **36** is illustrated in FIGURE 9 as comprising a housing **93** having ports **94** and **95** connected to the tank or reservoir and ports **96** and **97** connected to the hydraulic motor **6**. A piston rod **98** which extends beyond both ends of the housing **93** is provided with a valve element or piston head **99** which is of a length to cover both of the ports **96** and **97** at the same time. If it is desired to move the actuating means C manually, either end of the piston rod **98** may be depressed to move the valve element **99** in either direction as indicated by the arrow **100** so that either the port **96** is in communicaion with the port **94** or the port **97** is in communication with the port **94** thereby bypassing the pressure fluid. The valve element **99** is biased into an inoperative position by a coil spring **101** and the port **95** is provided to allow any fluid in the housing to flow back to the tank or reservoir.

It is to be understood that the invention is not restricted to the specific valves of FIGURES 5 through 9, and any other conventional valves which will function in the same manner may be substituted therefor.

It will be seen, therefore, that the invention provides a simple but efficient means for accurately controlling the stroke of the needle actuating means in that, by simply varying the positions of the rollers **7** and **8** according to the knitting width required, the needle actuating means are slowed down and reversed, or are caused to move slowly throughout their stroke and are reversed, at the end of their stroke. Furthermore, the electrical circuit is particularly advantageous in that it has been designed to use as few electrical components as possible in order to ensure reliability. In this respect, it will be noted that no relays whatsoever are used in the main drive circuit.

It will be obvious that the invention is applicable with special reference to multi-head knitting machines since it provides a simple manner in which to control the needle actuating means of all the knitting divisions simultaneously from a single control division.

What I claim is:

1. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control division to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, fashioning mechanisms arranged in each of said knitting divisions, adjustable means operatively connected to said fashioning mechanisms the positions of which determine the knitting width of a garment piece, said driven means being operated by electro-hydraulic means which include a hydraulic circuit, valves arranged in said hydraulic circuit for controlling the speed and direction of movement of said driven means, mechanically operated electric switch means connected to pilot valves in said hydraulic circuit for reversing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means.

2. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control division to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, fashioning mechanisms arranged in each of said knitting divisions, adjustable means operatively connected to said fashioning mechainsms the positions of which determine the knitting width of a garment piece, said driven means being operated by electro-hydraulic means which include a hydraulic circuit, valves arranged in said hydraulic circuit for controlling the speed and direction of movement of said driven means, mechanically operated electric switch means for actuating braking valves in said hydraulic circuit when said driven means is nearing the end of a stroke, mechanically operated electric switch means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means.

3. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control division to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, fashioning mechanisms arranged in each of said knitting divisions, nut housings adjustably mounted on L.H. and R.H. fashioning screws and operatively connected to said fashioning mechanisms for determining the knitting width of a garment piece, said driven means being operated by electro-hydraulic means which include a hydraulic circuit having hydraulic valves for controlling the speed and direction of movement of said driven means, mechanically operated electric switch means for actuating braking valves in said hydraulic circuit when said driven means is nearing the end of a stroke, mechanically operated electric switch means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means, said limit determining means consisting of a cam plate secured to and movable with said driven member, and a contact roller mounted on each of said nut housings for engagement by said cam plate during movement of the latter, said rollers being operatively coupled to said electric switch means.

4. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control division to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, a pair of spaced co-operating adjustable means the positions of which determine the knitting width of a garment piece, said driven means being operated by electrohydraulic means which include a hydraulic circuit having hydraulic valves for controlling the speed and direction of movement of said driven means, mechanically operated electric switch means for actuating braking valves in said hydraulic circuit when said driven means in nearing the end of a stroke, mechanically operated electric switch means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means, said limit determining means consisting of a cam plate secured to and movable with said driven member, and a contact roller mounted on each of said adjustable means for engagement by said cam plate during movement of the latter, said rollers being operatively coupled to each of said electric switch means.

5. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control divison to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, a pair of spaced co-operating adjustable means the positions of which determine the knitting width of a garment piece, said driven means being operated by electrohydraulic means which include a hydraulic circuit having hydraulic valves for controlling the speed and direction of movement of said driven means, mechanically operated electric switch means for actuating braking valves in said

hydraulic circuit when said driven means is nearing the end of a stroke, mechanically operated electric switch means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means, said limit determining means consisting of a cam plate secured to and movable with said driven member, and a contact roller mounted on each of said adjustable means for engagement by said cam plate during movement of the latter, an angularly rotatable operating rod associated with each of said rollers and to which said contact rollers are keyed in such manner as to allow lengthwise movement thereof relative to said operating rods while permitting of angular rotation of said rods to take place under the action of said rollers, a first linkage extending between each of said operating rods and said switch means for actuating said braking valves, and a second linkage extending between each of said operating rods and said electric switch means operating asid reversing valves.

6. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control division to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting divisions and operatively connected to said driven means, a pair of spaced co-operating adjustable means the positions of which determine the knitting width of a garment piece, said driven means being operated by electrohydraulic means which include a hydraulic circuit having hydraulic valves for controlling the seed and direction of movement of said driven means, mechanically operated electric switch means for actuating braking valves in said hydraulic circuit when said driven means is nearing the end of a stroke, mechanically operated electric switch means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means, said limit determining means consisting of a cam plate secured to and movable with said driven member, a contact roller mounted on each of said adjustable means for engagement by said cam plate during movement of the latter, an angularly rotatable operating rod associated with each of said rollers and to which said contact rollers are keyed in such manner as to allow lengthwise movement thereof relative to said operating rods while permitting of angular rotation of said rods to take place under the action of said rollers, a first linkage extending between each of said operating rods and said switch means for actuating said braking valves, and a second linkage extending between each of said operating rods and said electric switch means operating said reversing valves said cam plate being of stepped formation so that said contact rollers are adapted to cause angular rotation of said control rods into at least two distinct positions, movement into a first position causing via said first linkage actuation of said braking valves, and movement into a second position causing via said second linkage actuation of said reversing valves.

7. A multi-head full fashioned flat bed knitting machine comprising a plurality of knitting divisions, a control division, driven means arranged in said control divisions to carry out reciprocatory movement lengthwise of the machine, needle actuating means arranged in said knitting

divisions and operatively connected to said driven means, a pair of spaced co-operating adjustable means the positions of which determine the knitting width of a garment piece, said driven means being operated by electro-hydraulic means which include a hydraulic circuit having hydraulic valves for controlling the speed and direction of movement of said driven means, a mechanically operated electric switch associated with each of said adjustable means for actuating braking valves in said hydraulic circuit when said driven means is nearing the end of a stroke, a mechanically operated electric switch common to both of said adjustable means connected to pilot valves operating said reversing valves in said hydraulic circuit for changing the direction of movement of said driven means, and variable limit determining means for controlling the stroke of said driven means, said limit determining means consisting of a cam plate secured to and movable with said driven member, a contact roller mounted on each of said adjustable means for engagement by said cam plate during movement of the latter, an angularly rotatable operating rod associated with each of said rollers and to which said contact rollers are keyed in such manner as to allow lengthwise movement thereof relative to said operating rods while permitting of angular rotation of said rods to take place under the action of said rollers, a first linkage extending between each of said operating rods and said switch means for actuating said braking valves, and a second linkage extending between each of said operating rods and said electric switch means operating said reversing valves, said cam plate being of stepped formation so that said contact rollers are adapted to cause angular rotation of said control rods into at least two distinct positions, movement into a first position causing via said first linkage actuation of said braking valves, and movement into a second position causing via said second linkage actuation of said reversing valves.

8. A knitting machine as claimed in claim **7**, including switch means for causing continuous operation of said braking valves so that said driven means moves slowly throughout the length of its stroke.

9. A knitting machine as claimed in claim **8**, including switch means for stopping the movement of said driven means at the end of a stroke.

10. A knitting machine as claimed in claim **9**, including an overload valve which becomes operative to isolate the drive motor in the event of mechanical failure of the machine.

11. A knitting machine as claimed in claim **10**, including a by-pass valve to permit of manual operation of said driven means.

References Cited

UNITED STATES PATENTS

1,977,729	10/1934	Lieberknecht	66—82
2,442,822	6/1948	Monk	66—82
2,939,304	6/1960	Kreienbuhl et al.	66—126
3,089,322	5/1963	Bruce et al.	66—154
3,158,013	11/1964	Monday	66—56

FOREIGN PATENTS

17,050	7/1897	Great Britain.

MERVIN STEIN, *Primary Examiner.*

R. FELDBAUM, *Assistant Examiner.*