United States Patent

[11] **3,587,251**

[72] Inventor **Armando Vincoli**
Brescia, Italy

[21] Appl. No. **806,106**
[22] Filed **Mar. 11, 1969**
[45] Patented **June 28, 1971**
[32] Priority **Mar. 11, 1969**
[33] **Italy**
[31] **32656**

[73] Assignee Santoni & C-S.P.A. Brescia, Italy

[54] DEVICE FOR THE OPERATION OF MEMBERS IN CIRCULAR MACHINES FOR STOCKINGS, SOCKS AND THE LIKE

3 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **66/8,** 66/125, 184/6

[51] **Int. Cl.** **D04b 15/80,** D04b 15/82, D04b 35/28

[50] **Field of Search** ..... 66/8, 125, 133, 138, 168 (Cursory), 154 (A); 184/6 (Z), 55 (A) (Cursory); 137/624.2

[56] **References Cited**

UNITED STATES PATENTS

2,035,083	3/1936	Mattern	137/624.2X
2,416,933	3/1947	Lynam et al.	66/154(A)
2,691,428	10/1954	Thomas	184/6(Z)
2,725,734	12/1955	Oberly	66/8
2,789,922	4/1957	Allen	184/6(Z)(UX)
3,078,960	2/1963	Minton	66/8X
3,243,975	4/1966	Lawson et al.	66/125X
3,372,708	3/1968	Hotchkin	137/624.2
3,481,431	12/1969	Dorsey	66/8X

FOREIGN PATENTS

1,287,447	2/1962	France	66/8
264,396	1/1927	Great Britain	137/624.2
892,332	3/1962	Great Britain	66/154(A)
800,085	9/1950	Germany	66/8
568,742	11/1957	Italy	66/8

Primary Examiner—Wm. Carter Reynolds
Attorney—Waters, Roditi, Schwartz & Nissen

ABSTRACT: Circular knitting machine, particularly for the manufacture of stockings and the like, which includes only one manifold for controlling members or groups of members to be simultaneously by a fluid pressure actuated, there being provided independent valves controlling said members or groups of member. The members which are controlled are a displaceable guide, the displaceable needles, and an atomizer for spraying lubricant onto the parts of the machine to be lubricated.

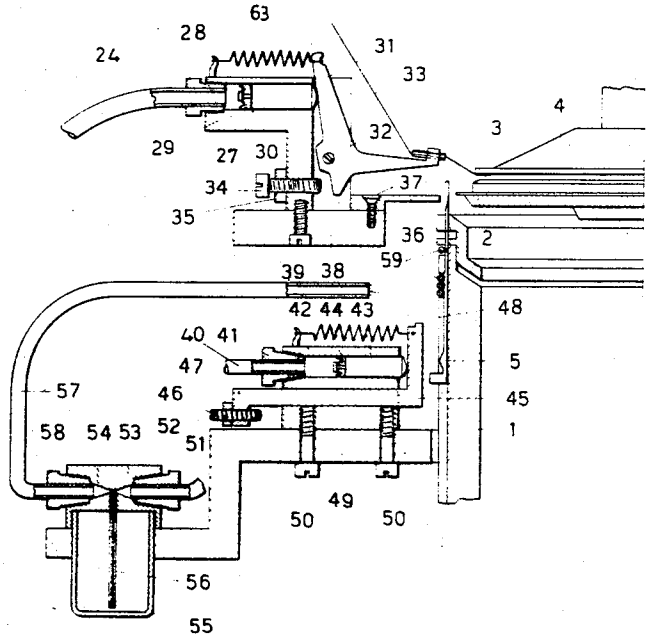
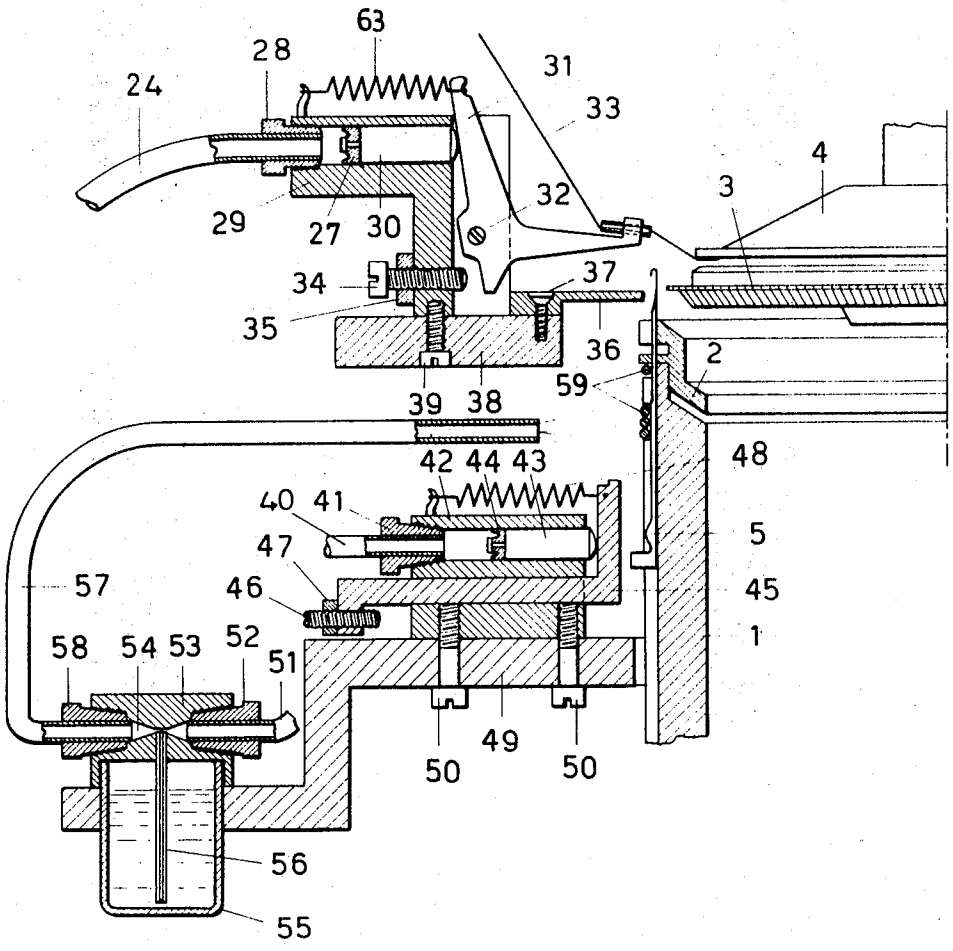


Fig. 1


63
28
24
31
33
4
3
32
29
27
30
34
37
35
36
2
59
39
38
48
42
44
43
40
41
5
47
57
46
45
58
54
53
52
51
1
49
50
50
56
55

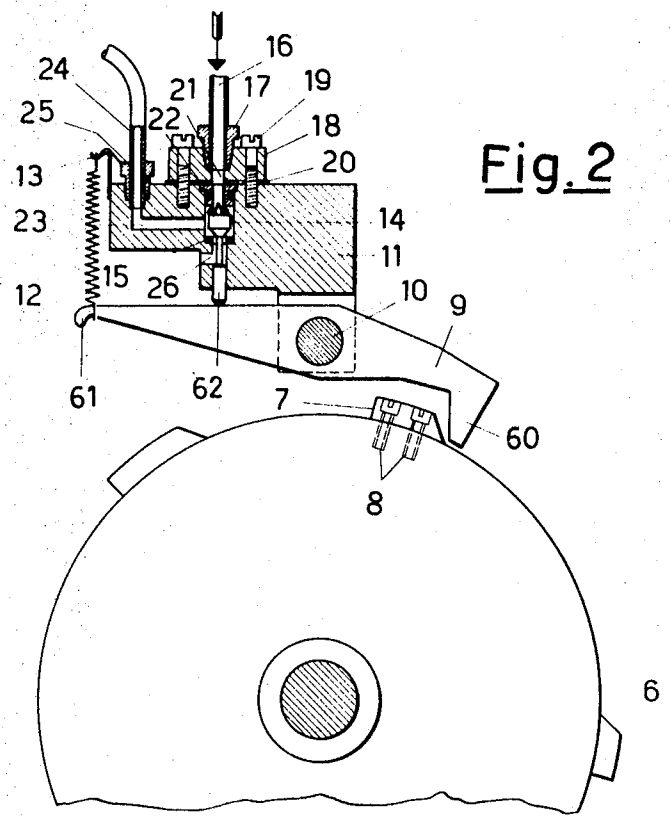

16
24
21
17
19
25
22
18
20
13
14
23
11
15
26
10
12
9
61
62
7
60
8
6

Fig. 2

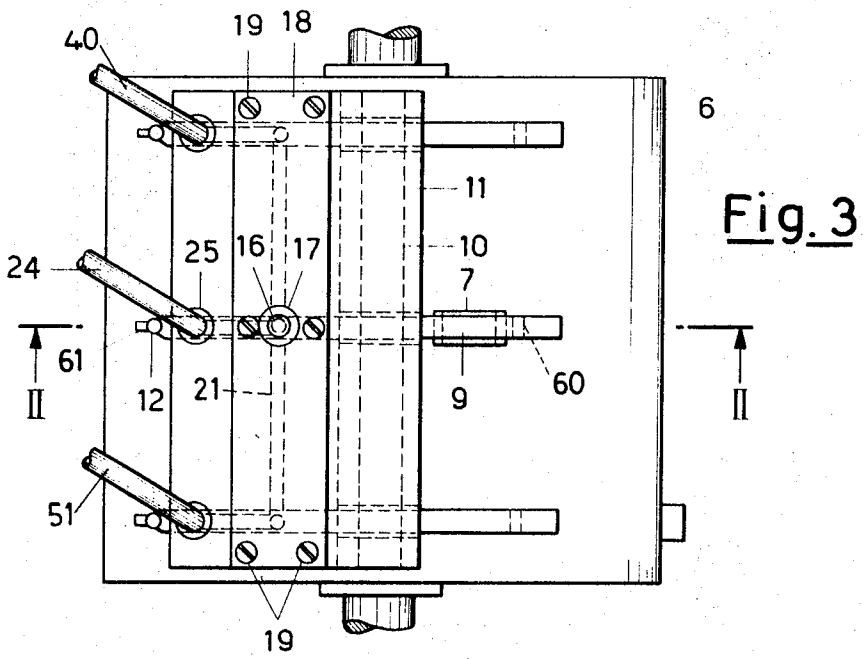

40
19
18
6
11
25
16
17
10
24
7
61
12
21
9
60
II
II
51
19

Fig. 3

DEVICE FOR THE OPERATION OF MEMBERS IN CIRCULAR MACHINES FOR STOCKINGS, SOCKS AND THE LIKE

This invention relates to circular knitting machines for the manufacture of stockings, socks and similar tubular manufactured articles and relates in particular to a device for the operation of members, such as thread guides, latches etc. in these machines.

In the early machines of this type which were furnished with a single feed, the majority of the members were situated in a single part and it was relatively easy to operate these members with rods, caps and levers directly from a control drum underneath, but in modern machines with multiple feeds where the feed units (in numbers of 2, 4, 6, 8 and even 12) are arranged in diallike arrangement around the cylinder, the problem of operating the members has caused considerable difficulties and complications in arriving at the members to be operated with mechanical transmissions starting from the normal control drum. It is to be noted that some of these members, for example the thread guides, are mounted in many machines on a support which can be raised in order to render the needle cylinder more accessible for inspection. Consequently the transmission from the control drum to the respective members must be such as to allow the raising action of the thread guide support.

Lately in order to obtain this, small drums have been used, one for each group of thread guides relative to one feed, said drums being rigid with the thread guide support and being set in movement according to a predetermined cycle by the principle control drum by way of metallic cables sliding in sheaths.

Similar difficulties also arise in the operation of the locks or the sliding saddles for raising and lowering the needles, the under-needles, etc. Although these saddles are supported by fixed plates, they are located radially all around the cylinder and hence their operation becomes difficult if starting from control means which are not radial.

The principal object of this invention is to provide apparatus for eliminating the above-mentioned disadvantages and for considerably simplifying the operation of the members in circular knitting machines by obviating the constructive complications of the solutions adopted up to now.

This is attained in the invention by a device for the operation of movable members in circular knitting machines, particularly for the manufacture of stockings and the like, which includes a source of compressed fluid, particularly compressed air, a distributor for said compressed fluid having only one manifold, a plurality of valves communicating with said manifold and mechanically operated by the control drum of the machine, each valve being connected by a tube with operating means adapted to act on the respective member or group of members to be simultaneously actuated.

The said operating means connected to the feed tube of the compressed fluid can comprise a piston which moves in a cylinder and acts directly or indirectly on the member to be operated or they can comprise a metallic flexible bellows or the like.

The compressed fluid to be used in the device according to the invention is preferably compressed air since many circular machines are already furnished with a pneumatic installation for other operations, such as for putting the knitted fabric in tension, for eliminating cut filaments, etc.

The lubrication of the movable members in circular machines is also of primary importance in order to guarantee the duration of the members, especially in machines with multiple feeds and elevated rotational velocities. Normally lubrication is carried out by means of dripping or mechanical spraying.

However according to this invention it is seen that a particularly efficient lubrication can be obtained by also utilizing the compressed air in order to atomize the lubricating oil and by directing jets of an atomized oil-air mixture onto the members in movement.

The invention will be described below in more detail by way of example with reference to the accompanying drawings in which:

FIG. 1 is a sectional diagrammatic view of one half of the upper part of the needle cylinder of a circular machine for stockings, with certain members to be operated by the device according to the invention, namely a thread guide, a saddle for raising needles and an atomizer for oil, and

FIGS. 2 and 3 are, respectively, a sectional view of the distributor of the compressed fluid through the line II–II of FIG. 3 and a plan view.

FIG. 1 of the drawing illustrates the upper part of the cylinder 1 in longitudinal axial section with the internal crown 2 of the sinkers, with the cover complex carrying the disc for the hooks 3 and the thread intake opening 4. The needles 5 are arranged in the peripheral slits of the cylinder 1 and are held in position by the springs 59.

FIGS. 2 and 3 show in addition the normal control drum 6 with teeth on its periphery, such as that indicated by 7, fixed by means of screws 8. The rotation of the drum 6 around its axis is controlled in the known way by a ratchet gear of the machine (not shown).

Above the drum 6 there is a fixed support 11 on to which a body 18 is fixed by means of screws 19 and with the interpositioning of a gasket 20, and which contains a manifold 21 for feeding all the valves provided in the support 11.

The compressed air coming from a source which is not shown arrives at the manifold 21 by way of a tube 16 fixed by a threaded conical connector 17 to the body 18.

In FIG. 2 a valve 14 is shown in section arranged in the support 11 and from FIG. 3 it is seen that there are as many valves provided in line as there are members to be operated or groups of members which must be operated simultaneously, all these valves fed by the manifold 21. As all these valves are constructed identically and operate in a like manner, only one of them will be described in detail, namely that shown in FIG. 2.

The support 11 carries a pivot 10 on which as many levers 9 are pivoted as there are valves 14. Each lever 9 has one extremity in the form of a point 60 and this pointed extremity pointed 60 is maintained in contact with the respective peripheral ring of the drum by the teeth 7 arranged on a corresponding ring on the circumference of the drum 6 and a spring acting between the other extremity 61 of a lever 9 and a plate 13 rigidly fixed to the support 11. The lever 9 acts on a prolongation 62 of the valve 14 which can move between a raised position (shown in FIG. 2) in which it closes the hole of a plug 22 through which the compressed air from the manifold 21 arrives and a lowered position in which it opens said hole of the plug 22 and rests on a rubber ring 15 so closing the passage towards a discharge hole 26. In the first position of the valve 14 a pipe 23 provided in the support 11 is connected to the discharge hole 26 and in the second position the pipe 23 is connected to the manifold 21. When the pointed end of the lever 9 is not in contact with a tooth 7 of the drum 6 a spring 12 causes the raising of the valve 14 so maintaining it in its first position. When on the other hand the point 60 of the lever 9 is raised by a tooth 7, the lever itself releases the valve 14 which under the action of the pressure of the compressed fluid lowers itself into said second position.

A tube 24 fixed to the support 11 is connected to the pipe 23 by means of a threaded conical connector 25. The various tubes 24, 40 and 51 which start from the support 11 connect together at the pneumatic means for operating the various controlled members, of which three are indicated by way of example in FIG. 1.

One of said members shown by way of example is a thread guide 31 pivoted at 32 to a support 29 fixed by means of a screw 39 to the cover 38 of the machine. A cylinder is formed in the support 29 to which at one end the arrival tube 24 for the compressed air from the valve 14 is connected by means of a threaded conical connector 28. A piston 30 with a gasket 27 which is airtight slides in the cylinder and leaves the cylinder

at the end opposite the connector 28 in order to act directly on the thread guide 31.

By means of the thrust action of the piston 30, when compressed air arrives from the tube 24, the thread guide 31 is lowered against the action of a spring 63 and the thread 32 which arrives from a reel which is not shown is carried into a position in which it can be picked up by needles 5. A screw 34 with a nut 35 serves as an adjustable end stop for the thread guide 31 and permits the adjusting of the active position of the thread guide with respect to the resting plane 36 fixed by means of the screw 37 to the cover 38.

A second exemplified member to be operated is a camlike saddle 45 which slides in a support 42 fixed by means of screws 50 to a fixed plate 49. This saddle 45 is intended to act on the needles 5 in order to cause their raising and its radial travel is limited and adjustable by means of a screw 46 with a nut 47 screwed to a projection of the saddle 45 and such as to hit against the support 42. In the support 42 a cylinder is formed which is connected by means of a tube 40 to a second valve in the support 11. The tube 40 is fixed to the support 42 by means of a conical connector 41 and a piston 43 with a gasket 44 slides in the cylinder. This piston acts directly on the saddle 45 such that it moves it against the action of a spring 48.

Finally the drawing illustrates an oil atomizer which is operated by a third valve in the support 11. A tank 55 containing lubricating oil has a cover 53 to which a tube 51 coming from the support 11 is fixed by means of a conical connector 58 carries the atomized oil-air mixture to the point to be lubricated. A venturi chamber 54 is formed in the cover 53 from which a calibrated tube 56 leaves and dips into the tank 55. When compressed air enters the chamber 54 through the tube 51 the oil is reclaimed from the tank and the atomized mixture which is formed leaves through the tube 57. The tank 55 is suitably supported by the fixed plate 49.

The working of the device for operation according to the invention as described above is clear.

When the point 60 of the lever 9 fixed to a determined valve 14 is not raised by a tooth 7 of the control drum 6, the flow of compressed air is interrupted, the respective feed tube for the air is connected to discharge and the relative member to be operated is in the rest position (position shown in FIG. 1). When however the point 60 of a lever 9 is raised by a tooth 7, the respective valve 14 is opened thus simultaneously closing the discharge and the compressed air reaches the pneumatic cylinder thus making the piston move and carrying the relative member into the working position. In the case of the atomizer, when the valve is opened, the lubrication feed is made to operate.

It is clear that the instant in which a certain member is made to operate depends upon the position of the respective teeth on the control drum and that the duration of the operation depends upon the length of the teeth. By rearranging prearranging the teeth in a suitable manner it is possible therefore to vary the work program according to the necessities of the manufacturing cycle.

The device for operating according to the invention presents obvious advantages of simplicity, small dimensions and elimination of the complicated kinematic mechanisms of known devices.

It is evident that the embodiment of the invention is not limited to the form described and illustrated by way of example. Thus for example instead of compressed air it is possible to use another compressed fluid. The cylinders with the operating pistons can be substituted by other means, for example those of the metallic flexible bellows type.

In addition the application of the device is not limited to the members exemplified and can be extended to other movable members of the machine.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

I claim:

1. A circular knitting machine, comprising displaceable thread guide means, displaceable needles movable between a first inoperative position in which the thread in the guide means cannot engage the needles and a second, operative position in which the thread in the guide means can engage the needles when the thread guide means is displaced to an operative position thereof, atomizer means for spraying a lubricant onto the parts of the machine to be lubricated, a source of compressed fluid, an operating means for displacing said thread guide means, an operating means for displacing said needles, an operating means for said atomizer means, and control means for operating the operating means of the thread guide means, the needles and the atomizer means respectively all from said source of compressed fluid, said control means including a distributor connected to said source and containing a single manifold for the compressed fluid, each respective operating means comprising a valve means for controlling flow of fluid from the manifold to the respective operating means thereby controlling the operation thereof, and a rotatable control drum with teeth thereon, lever means associated with said drum and with respective valve means to control opening and closing thereof in accordance with the position of the teeth on the control drum.

2. A machine as claimed in claim 1 wherein said respective valve means are aligned in a common support and are slidable in said distributor, each lever means including a pivotal lever member having one end in contact with said drum and a remote portion in contact with a respective valve means for displacing the same.

3. A machine as claimed in claim 2 wherein said operating means for the thread guide means comprises a displaceable piston, and said operating means for the needles includes a displaceable piston, each piston being coupled to said manifold via its respective valve means for being selectively displaced by the compressed fluid when the valve means is opened.