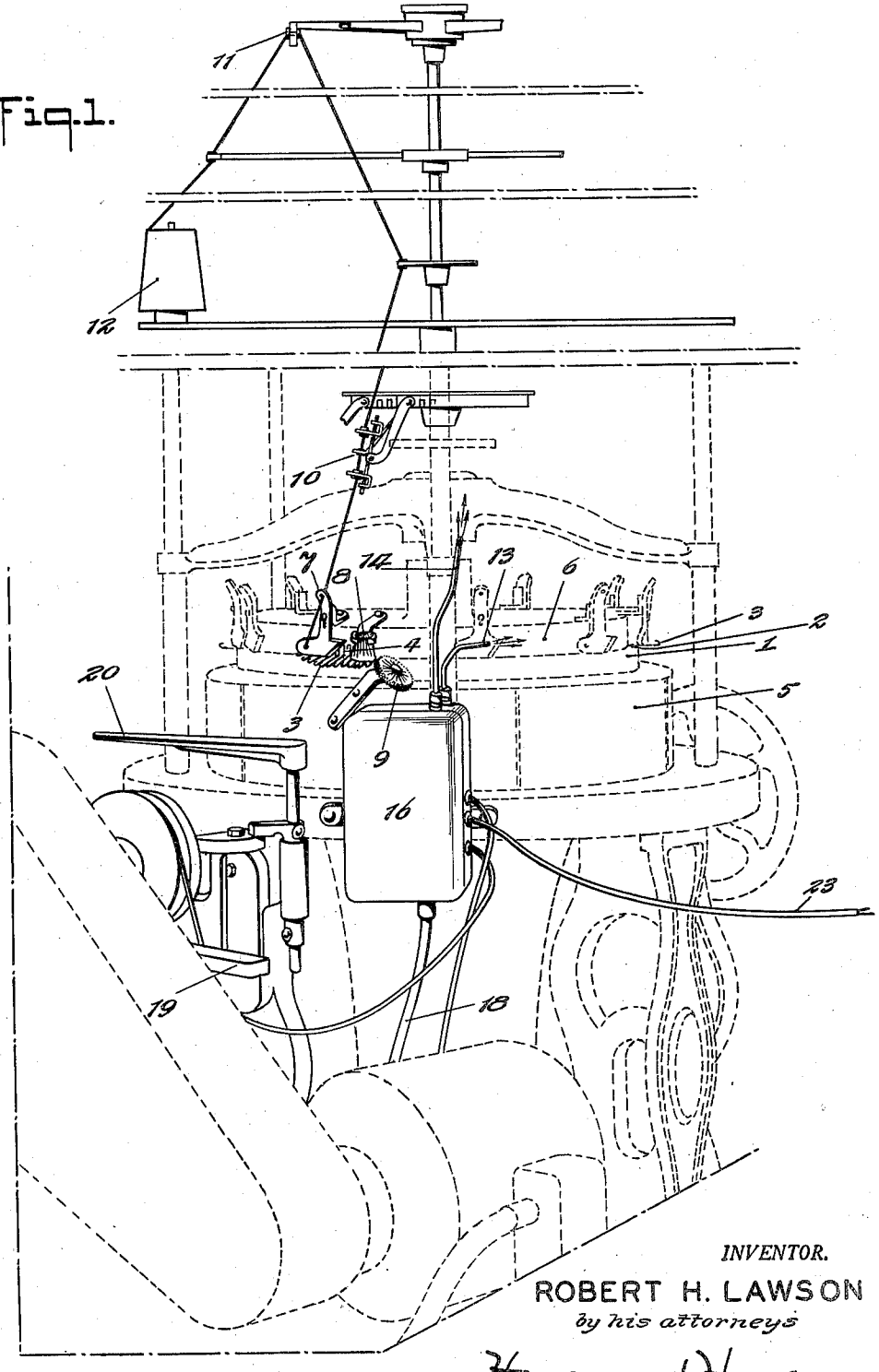
Sept. 12, 1950 R. H. LAWSON 2,522,183

CIRCULAR KNITTING MACHINE WITH AIR CLEANER

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Fig. 1.



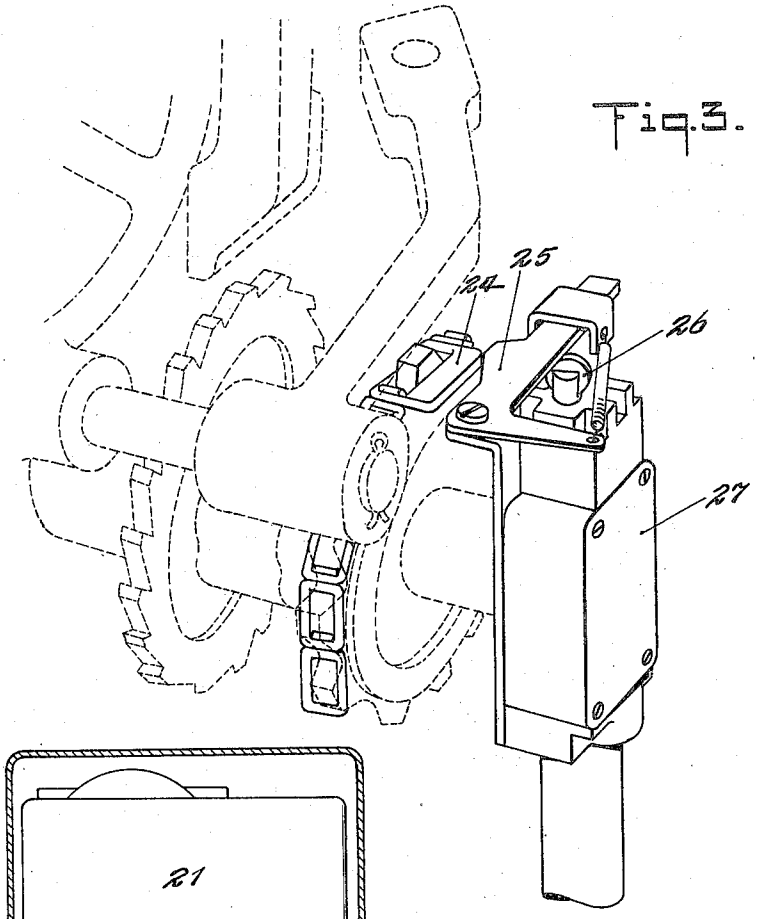
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Fig. 3.



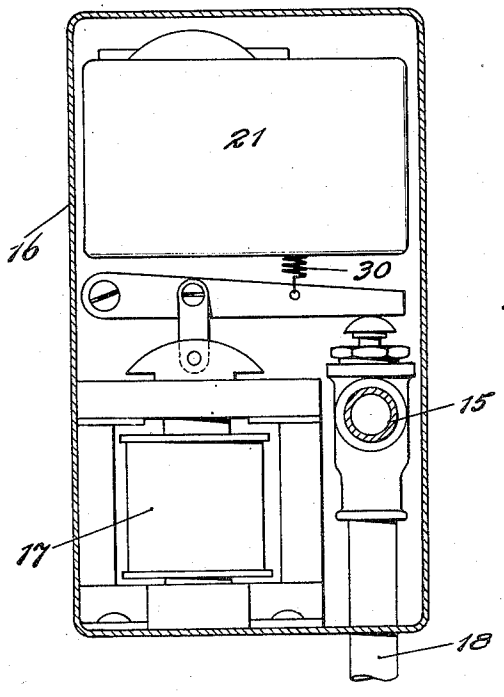


Fig. 2.

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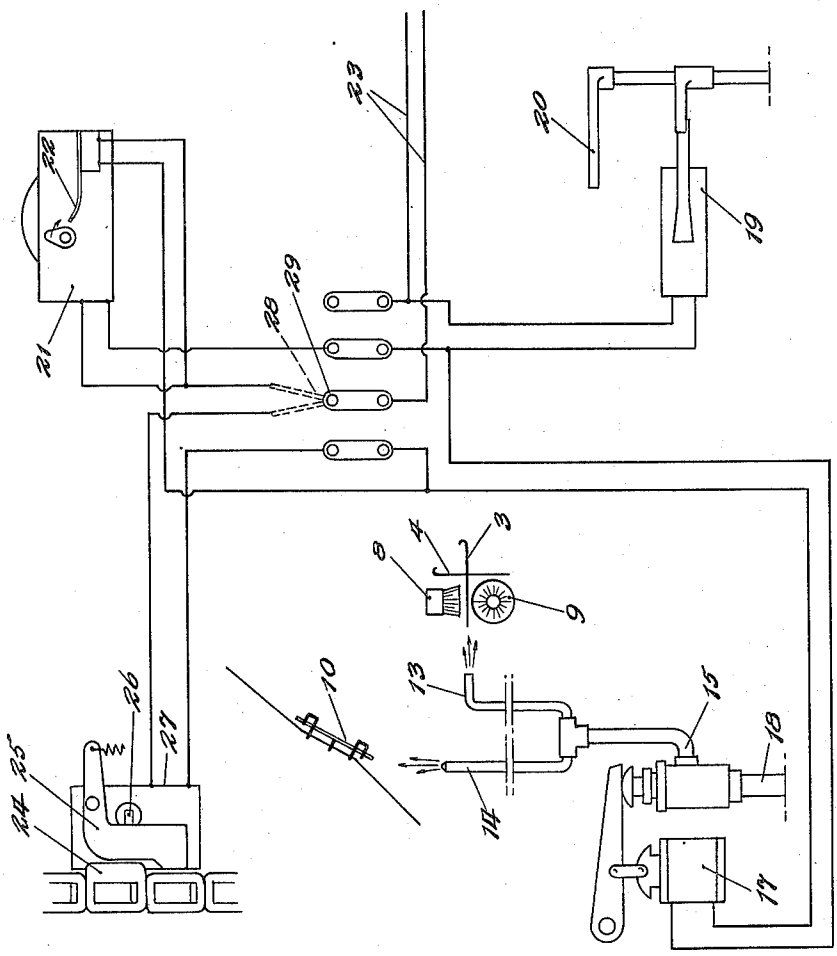


Fig. 4.

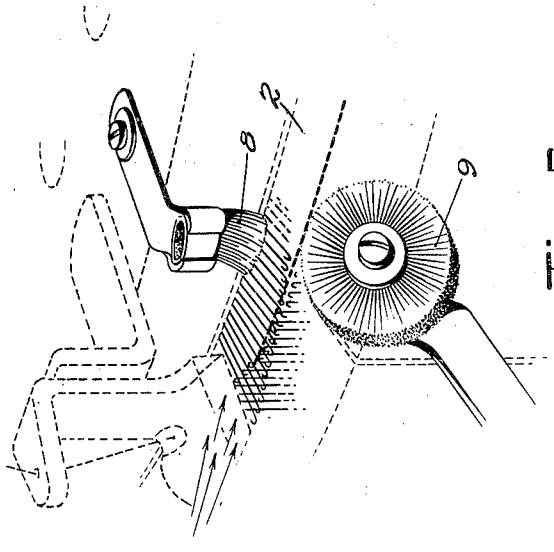


Fig. 5

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2,522,183

CIRCULAR KNITTING MACHINE WITH AIR CLEANER

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10 Claims. (Cl. 66—168)

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This invention relates to a circular knitting machine with air cleaner and more particularly to cleaning mechanism for such machines having stationary needle cylinders. One of the great problems in circular knitting machinery, and particularly underwear machines, is the removal of lint. Brushes of various types have heretofore been known to clean the needles, and compressed air has also been employed. Owing to the delicate nature of the yarn and the knitting operation, and the complexity of moving air jets, devices heretofore known have not been entirely satisfactory in underwear machines having stationary needle cylinders. My invention contemplates a combination of brushes and compressed air which is so coordinated that the machine clears away the lint automatically at all points where it can cause trouble, without in any way disturbing the knitting functions.

In the drawings:

Figure 1 is a perspective view of pertinent parts of a rib underwear machine having a stationary needle cylinder and dial, on which my novel air cleaner has been attached;

Figure 2 is a view in vertical section through the air valve control box with the cover removed;

Figure 3 is a perspective view of a pattern chain form of control for the air jets when the machine is knitting successive garments, as distinguished from continuous fabric;

Figure 4 is a developed wiring diagram of the attachment shown in Figs. 1, 2 and 3; while

Figure 5 is a perspective view on an enlarged scale of the brushes and needles, showing the direction of the air blast.

In a circular underwear knitting machine with stationary needle cylinder containing independent needles, neither brushes nor air jets alone provide satisfactory means of cleaning lint off the machine. I have found that brushes revolving about the needle cylinder can be combined successfully with an intermittently operated stationary air jet to keep the lint off the knitting elements. I also provide a special jet for the yarn detectors as well.

In the example shown in the drawings there is a rib fabric underwear knitting machine having a stationary needle cylinder 1, dial 2 and independent cylinder and dial latch needles 4, 3. Around the needle cylinder revolves a cam cylinder 5 and above the dial needles 3 there is a cap 6 containing the dial needle cams and carrying the yarn guides 7. The dial 2 extends outwardly a short distance beyond the cap. Also mounted on the dial cap is a fixed brush 8 whose bristles

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face downward. I prefer to mount this brush close to the periphery of the cap and in contact with the upper face of the dial. In this position the brush tends to roll the lint up into balls as the brush moves around the dial.

The brush arrangement which I have described will collect the lint from the needles, dial and cylinder all around the machine, but some means must be provided to dispose of the small balls of lint rolled up by the fixed brush and the loose lint gathered by the revolving brush hereinafter described. For this purpose I employ an intermittent fixed air jet located outside the machine at a single fixed point on the circumference. There is a small jet 13 directed against the brushes at a tangent to the needle cylinder, as shown in Fig. 1. By directing this stationary jet tangentially of the machine, the balls of lint and the loose lint are easily blown off the machine when the air is turned on and the brushes pass the air jet. I find that it is necessary to work this air jet only periodically, and the intermittent action is obtained advantageously by mechanism which will be hereinafter described.

On the revolving cam cylinder 5 is mounted a revolving brush 9. This is mounted at such an angle and elevation that it revolves about its own axis as it is carried around the needle cylinder. It serves to collect lint at the verge or edge of the cylinder 1 and dial 2, being in engagement with the needles. The yarns come to the yarn guides 7 through lower yarn detectors 10, upper yarn detectors 11 and yarn bobbins 12. There are ten feeds in the machine shown in the drawings. Both the upper and lower yarn detectors are at higher elevations than the yarn guides and the needle cylinder.

The jet 13 which constitutes the air jet for the brushes and needles is located fairly close to the brushes and is so strong that it might upset the yarn or the detectors if it were located adjacent the detectors. However, the lint on the detectors has merely settled there by gravity. I therefore provide a jet 14 in the general neighborhood of the air jet 13 and needle cylinder, which jet 14 has a small orifice and is aimed upwardly at either the upper or the lower yarn detectors and generally in a direction counter to the direction of movement of the yarn toward the needles. The small orifice gives a small volume of air well directed. The air will dissipate itself sufficiently before reaching the detectors so that it will not trip them or disarrange the yarns. On the other hand, the lint is so much lighter than the detectors that the small amount of compressed air easily lifts the lint off the detectors.

The two jets 13, 14 are held in action long enough every time they are operated so that they will clean the brushes and all the yarn detectors. For this purpose I find that an air blast operating for two or three successive revolutions out of every ninety-six will clean the brushes and float the lint from the detectors satisfactorily. In this way from a single source of compressed air I have provided two types of air cleaner, the cooperative action with the brushes cleaning all the needles, and the direct action cleaning the detectors.

The controls for making the air jets intermittent will now be set forth. As can be seen in Figs. 2 and 4 of the drawings, the jets 13, 14 receive their air from an air valve 15 located in a main control box 16. This air valve is operated by a solenoid 17 which open the valve when the solenoid is energized. In this way any electric failure allows the air valve to close under the impulse of a spring such as tension spring 30. The air valve gets its compressed air from an air supply 18. In the drawings the supply is shown as a pipe.

The wires to the electric solenoid which controls the air valve pass through a master switch 19 controlled by the starting lever 20 of the machine (Fig. 1). In case the machine stops for any reason while the air is turned on, this ensures that the air will be turned off.

When the machine is making shaped garments and it is desired to cut the cloth at a definite point, I find it desirable to control the operation of the air jets in synchronized operation with the sequence of operations of the machine. For example, if cloth is being made with plain fabric between tuck work such as is used in underwear to obtain shaping or fashioning, or with tight and loose fabric such as is used in foundation garments, then it is desirable that the air be turned on at the line where the fabric is to be cut. On the other hand, if straight fabric is being made I have found it desirable to control the solenoid on a time basis independently of the operation of the machine. For this purpose I have provided a clock motor 21 which may be connected to the electric current supply 23 by separate wires through the master switch 19. I have found it desirable to turn the air on every two minutes and to keep it on for a sufficient time to allow the machine to make two or three revolutions. In this case the clock motor would have a two-minute cycle, i. e., thirty revolutions per hour. Other cycles may be used. A clock motor switch 22 may be placed in series between the electric current supply 23 and the solenoid 17.

When controlling the operation of the air jets in time with the machine itself, I use a special lug 24 on the main pattern chain to swing a pivoted lever 25 over a roller 26, thereby depressing the roller (Fig. 3). Depression of the roller operates a special electric switch 27. This is adapted to be connected in series between the current supply 23 and the solenoid 17. The circuit including the clock motor 21 and clock switch 22, or the circuit including the chain lug 24 and switch 27, may be connected alternately into the current supply solenoid circuit by a two-point switch 28 (Fig. 4) or by simply changing the wires under the binding post 29.

It will be seen that while my cleaner occupies only the minimum space around the bedplate and knitting elements, it is well adapted to cleaning all around the machine and with means suited to the conditions at every point.

I claim:

1. A circular knitting machine having a stationary needle cylinder, independent needles therein and one or more brushes revolving about the needle cylinder in close proximity to the needles to collect the lint, in combination with a stationary compressed air jet adapted to blow lint off the brushes when they pass the jet, and means to operate the air jet intermittently.

2. A circular knitting machine according to claim 1 in which the jet is directed tangentially to the needle circle so as to blow the lint off the machine.

3. A circular knitting machine having a stationary needle cylinder and a fixed brush revolving about the needle cylinder in contact with the needles whereby the brush tends to roll up the lint in balls, in combination with a compressed air supply and a stationary jet connected thereto adapted to blow the balls of lint away from the fixed brush when the brush passes the jet, and means adapted to operate the air jet intermittently.

4. A circular knitting machine according to claim 1, in combination with broken yarn detectors located above the needles and a second jet connected with the air supply some distances below the detectors adapted to blow air upwardly against the detectors to lift off the latter any lint resting on them.

5. In a circular knitting machine according to claim 1, the provision of an air valve to control the air jet and an electric solenoid adapted when energized to open the air valve, in combination with a starting lever for the machine and an electric circuit for the solenoid adapted to be controlled by the movements of the starting lever.

6. A circular knitting machine according to claim 5, in combination with a pattern chain, a lug on the pattern chain and an electric switch adapted to be closed by said lug, said switch being in the circuit with the solenoid and the starting lever, whereby the pattern chain lug controls the intermittent operation of the air valve.

7. A circular knitting machine according to claim 1, in which there is an air valve to control the air jet, an electric solenoid adapted when energized to open the air valve, and an electric circuit for the solenoid, in combination with a clock motor and an electric switch in the circuit with the solenoid controlled by the clock motor, whereby the clock motor controls the operation of the air jet.

8. A circular knitting machine according to claim 1, in which there is an air valve to control the air jet, an electric solenoid adapted when energized to open the air valve, a starting lever for the machine and an electric circuit for the solenoid adapted to be controlled by the movements of the starting lever, the connections between the starting lever and the electric switch in the solenoid circuit being such that when the starting lever moves to inoperative position the air jet will be shut off.

9. A circular knitting machine according to claim 8, in which there is a two-point master control switch in the solenoid circuit, a clock motor, an electric switch controlled by the motor connected to one point of the master switch, in combination with a pattern chain, a pattern lug thereon and an electric switch controlled thereby connected to the other point of the master switch, whereby the intermittent operation of the air jet can be controlled either from the operations of the machine or independently thereof.

10. Apparatus for cleaning a circular knitting machine having a stationary needle cylinder and a stationary dial, series of independent needles therein, one or more brushes adapted to revolve around the needle cylinder in close proximity to the needles, a stationary compressed air jet located adjacent the needle cylinder adapted to blow the lint off the brushes when they pass the jet, and means to operate the air jet intermittently.

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