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A. ABRAMS ETAL

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CLEANING APPARATUS FOR KNITTING MACHINES

Filed April 16, 1964

2 Sheets-Sheet 1

FIG. 2

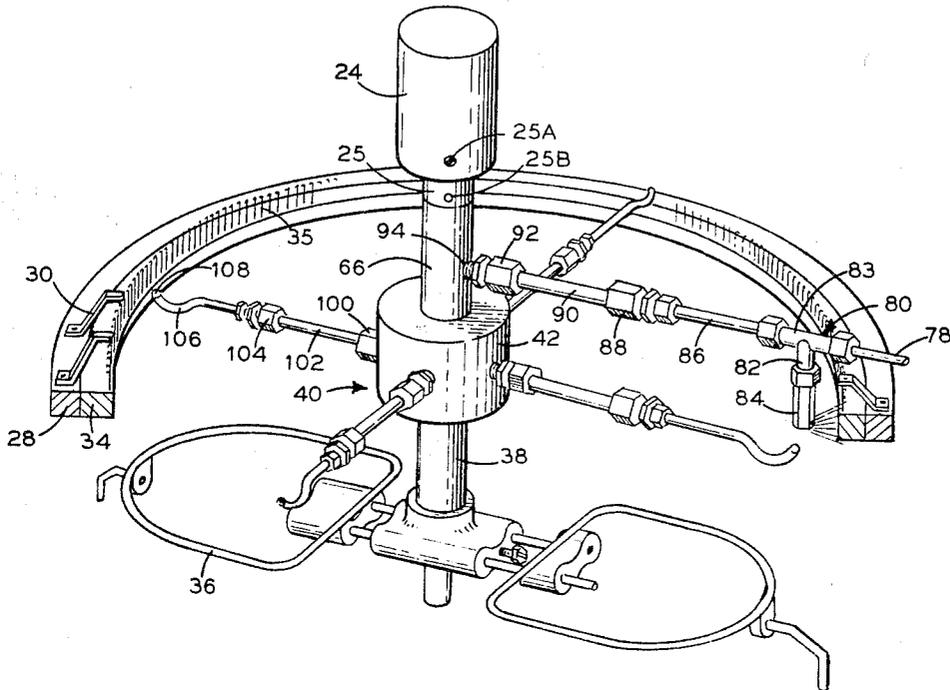
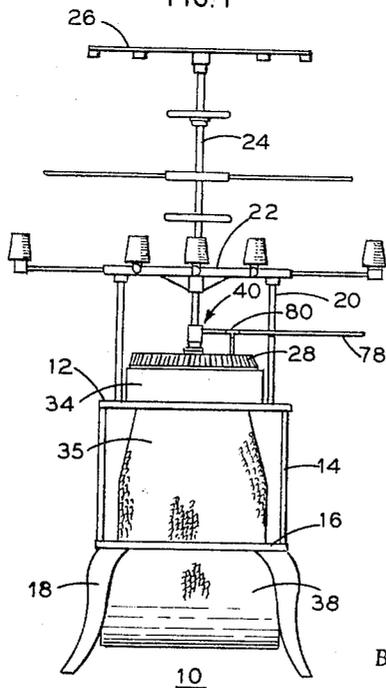


FIG. 1



INVENTORS  
Abraham Abrams  
Rolland L. Tetrault  
BY  
*Samuel S. Sorensen*  
ATTORNEY

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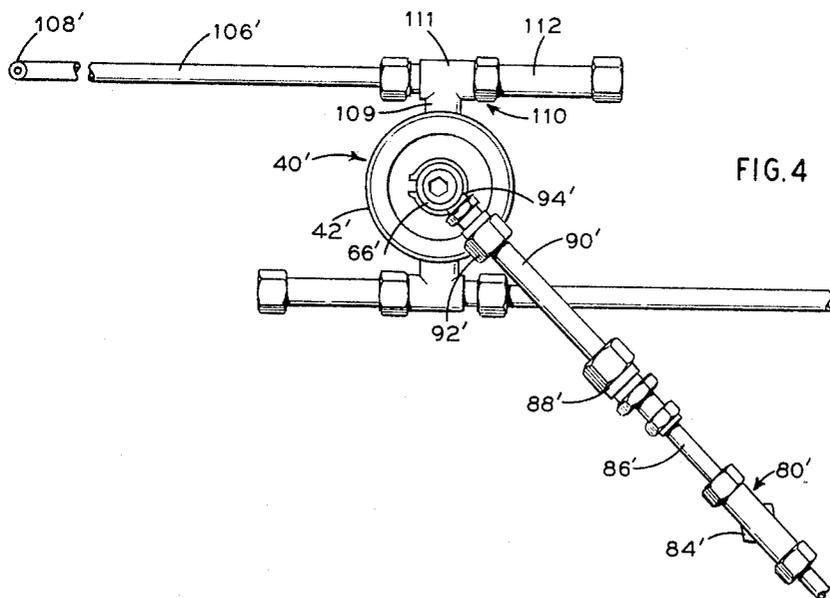
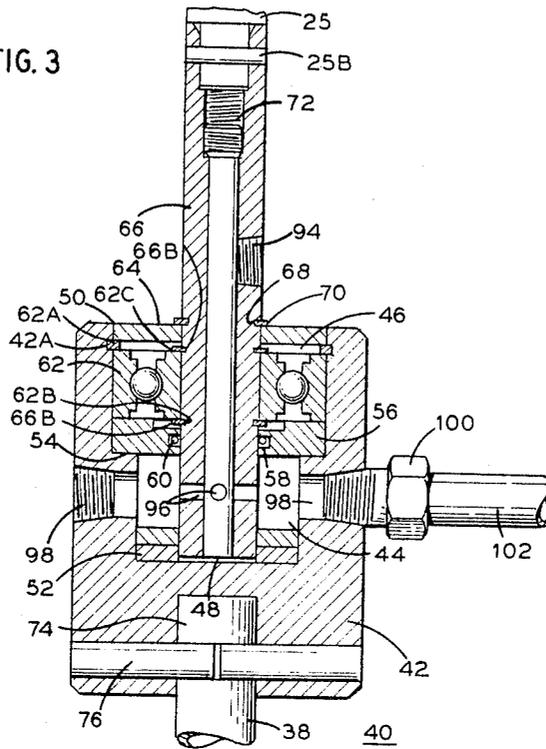
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CLEANING APPARATUS FOR KNITTING MACHINES

Filed April 16, 1964

2 Sheets-Sheet 2

FIG. 3



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**CLEANING APPARATUS FOR KNITTING MACHINES**

Abraham Abrams, Roslyn Heights, and Rolland L. Te-  
 trault, Huntington, N.Y., assignors to Uniwave, Inc.,  
 Farmingdale, N.Y., a corporation of New York  
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 14 Claims. (Cl. 66-168)

This invention relates to the cleaning of knitting machines and more particularly to apparatus for blowing lint and other foreign objects away from critical parts of knitting machines.

In knitting mills, dust in the atmosphere, lint and sizing material in the yarn and other foreign particles accumulate on the knitting machinery. When these particles build up on critical moving parts of the machines such as the needles, sinkers, carriers and other vital parts malfunctioning or breakage may occur which slows production and adds to the cost of operation. Initially, operators periodically vacuumed or applied compressed air against the critical parts to dislodge the foreign particles. However, as the technology progressed built-in vacuuming and blowing devices were incorporated in the knitting machine. In general, such devices worked well for straight line knitting machines. Circular knitting machines, on the other hand, presented their own unique problems because it was necessary to clean both rotating and stationary circular arrays of parts.

In the past, there has been proposed cleaning apparatus for circular knitting machines wherein a rotating source of compressed air is disposed within the rotating cylinder of the machine. However, because there is generally required a rotating joint in such a device and since the device must operate for extended periods of time, heretofore available devices broke down. Either air seals were broken or the bearings in the device failed because of kinematic forces.

It is accordingly, a general object of the invention to provide an improved knitting machine cleaning apparatus.

It is another object of the invention to provide an improved circular knitting machine cleaning apparatus.

It is a further object of the invention to provide circular knitting machine apparatus including rotary sealed joints that is rugged, reliable and inexpensive.

Broadly, the invention contemplates apparatus for cleaning a knitting machine which has a rotatable part and a stationary part. The stationary part is on the axis of rotation of the rotatable part. There is a member included in the rotatable part which is positioned on the axis of rotation of the latter. The cleaning apparatus includes a body having a chamber. The axis of the body is colinear with the axis of rotation of the rotatable part. The chamber has an open first end and a closed second end. Within the chamber are bearing means. A hollow shaft is positioned along the axis of rotation and extends into the chamber so that a portion of the hollow shaft engages the bearing means. An air seal is disposed about the hollow shaft in the region of the open end of the chamber so that the chamber is sealed off from the surroundings. The hollow shaft is connected to the stationary part and the body is connected to the member of the rotatable part. Accordingly, the connecting means, the body and the hollow shaft are positioned on the axis of rotation of the rotatable part. There is an air conduit in the hollow shaft, in a region thereof external to the

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chamber. The air conduit is adapted to receive air under pressure. There is an outlet in the hollow shaft in the region thereof within the chamber. At least one passageway is provided in the body from the chamber to the exterior of the body so that pressurized air may be discharged therefrom to the knitting machine.

Heretofore, cleaning devices have been designed for particular circular knitting machines. Accordingly, whenever there became available another circular knitting machine with a different output diameter, it was necessary to redesign parts of the cleaning device. According to a feature of the invention there is provided a universal cleaning device which can be used with circular knitting machines of various output diameters and different orientations of operating parts.

Another feature of the invention is concerned with the optimum utilization of parts of the cleaning device to clean both stationary and moving elements of the knitting machine.

Other objects, features and advantages of the invention will be apparent from the following detailed description of the invention when read with the accompanying drawings which show, by way of example and not limitation, various embodiments of the invention. In the drawings:

FIGURE 1 is a diagrammatic elevational view of a knitting machine utilizing the invention;

FIGURE 2 is a perspective view, partially broken away, of the cleaning apparatus of the invention cooperating with particular parts of the knitting machine of FIGURE 1;

FIGURE 3 is an axial section of the cleaning apparatus of FIGURE 2; and

FIGURE 4 is a top view of an alternate embodiment of the cleaning apparatus in accordance with the invention.

Referring to FIGURES 1 and 2, a conventional circular knitting machine 10 is shown comprising a support plate 12 connected via uprights 14 to a base 16 supported by legs 18. Upwardly extending from plate 12 are rods 20 which fixedly support bobbin carrier 22. A stationary central rod 24 is the support for the stop motion carrier 26.

Conventionally mounted on plate 12 is the stationary carrier ring 28 for the yarn carriers 30. Yarn carriers 30 are one site in the knitting machine where there is a build up of lint and dust. Operatively disposed within carrier ring 28 is a conventional needle and sinker cylinder 34. Needles 35 are another site of lint and dust accumulation. Cylinder 34 is rotatable and driven by a source of rotary power (not shown). It should be noted that the axis of rotation of cylinder 34 is the central axis of the knitting machine 10 and that central rod 24 is colinear therewith. As tubular fabric 35 is formed it passes over spreader 36 and is collected on reel 38. Spreader 36 is a rotatable part including a shaft 38 which is a member positioned on the central axis of the knitting machine. Shaft 38 is rotated in synchronism with cylinder 34 by conventional means (not shown).

Connected between the top of shaft 38 and the bottom of rod 24 is cleaner 40. The cleaner 40 (FIGURES 2 and 3) includes a body 42 with a chamber therein. The chamber has first and second compartments 44 and 46 which communicate with each other. Compartment 44 has a closed end 48 and compartment 46 has an open end 50. Fixed against end 48 is an apertured bearing 52. It should be noted that the cross-section of chamber 44 is less than the cross-section of chamber 46 to provide an

abutment 54. In compartment 46 and fixed against abutment 54, is an apertured retainer 56. Within the wall defining the aperture is an annular groove 58. Fitted into annular groove 58 is an O-ring 60 of flexible material such as rubber. O-ring 60 is so dimensioned that in its uncompressed state it extends slightly into the aperture, i.e. beyond the peripheral edge of the inner wall of retainer 56. Fitted against retainer 56 is a conventional apertured ball-bearing race ring assembly 62. Snap ring 62A fitted in groove 42A locks assembly 62 in body 42. An apertured cover plate 64, acting as a dust shield is positioned against assembly 62 to close off the open end of the second compartment 46.

A hollow shaft 66 is connected to rod 24 and disposed along the central axis of knitting machine 10. Shaft 66 extends into the chamber to the end 48 of compartment 44 via the apertures in cover plate 64, assembly 62, retainer 56 and bearing 52. The outer diameter of shaft 66 is so dimensioned to provide a smoothly slidable fit in these apertures. Snap ring 62B fitted in groove 66B prevents upward movement of shaft 66. Snap ring 62C fitted in groove 66C prevents downward movement of shaft 66. It should also be noted that by providing two axially displaced bearings, i.e. assembly 62 and bearing 52, for shaft 66 a highly reliable dynamic support is obtained.

A circumferential groove 68 is cut in shaft 66 in the region thereof just adjacent to cover plate 64. Fitted into groove 68 is a retainer ring 70 that presses against cover plate 64. Accordingly, the combination of groove 68, retainer ring 70 and cover plate 64 provide a dust and air seal for the chamber. Also, the O-ring 60 pressing against shaft 66 provides a positive air seal for the compartment 44 which is the primary air seal of the chamber. The top end of shaft 66 is sealed by a screw and thread assembly 72 with conventional sealing compound along the interface of the screw and thread.

A rod extension 25 is fitted into an axial recess in the bottom of stationary rod 24 and restrained against rotation by set screw 25A (FIGURE 2). The bottom end of rod extension 25 is turned down and fitted into the top of hollow shaft 66. Pin 25B (FIGURE 3) locks shaft 66 to rod extension 25.

Rotatable shaft 38 is accommodated by hole 74 opposite end 48 of compartment 44 and pinned therein by groove pin 76. Accordingly, as spreader shaft 38 rotates body 42 rotates about fixed hollow shaft 66.

The air system will now be described. Compressed air from a source not shown passed via conduit 78 (FIGURE 2) to the T-section 80 which is adjacent the needle and sinker ring 34. Extending from the upright portion 82 of T-section 80 is a nozzle port 84 directed towards the needles and sinkers. Since the port 84 is stationary and the ring 34 rotates, all needles and sinkers move past port 84 and are cleaned of lint and dust by pressurized air emitted from port 84. Tube 86 extends from crossbar portion 83 of section 80 to a smaller diameter input of telescoping fitting 88. Tube 90 which is connected to the larger diameter output of fitting 88 has its other end connected to fitting 92 which is fitted into inlet 94 of shaft 66. It should be noted that the combination of tubes 86 and 90 and telescoping fitting 88 permit radial adjustment of nozzle 84. Hence, the cleaning device 40 can be used with different output diameter circular knitting machines.

Pressurized air enters hollow shaft 66 via inlet 94 (FIGURE 3) and passes via transverse bores 96 therein to compartment 44. Passageways 98 in body 42 have fittings 100 therein for connecting tubes 102 to compartment 44 so that pressurized air is delivered to tubes 102. A typical tube 102 (FIGURE 2) is connected to the larger diameter input of telescoping fitting 104. The smaller diameter output of fitting 104 is connected to a bendable tube 106. A nozzle 108 is at the end of tube 106. The nozzles 108 traverse a circular path opposite the carrier ring 28 so that pressurized air from compartment 44 is directed

against the carriers sequentially. It should be noted that by making the tubes 106 of bendable material it is possible to accurately preaim the jets of air at desired stationary targets. Furthermore, by providing the telescoping combination of tubes 102 and 106 and telescoping fittings 104, the cleaning device 40 can be readily adapted to circular knitting machines of different output diameters.

It should be noted that when the output diameter of the knitting machine falls below a certain diameter, radially telescoping arrangements cannot be easily employed. Therefore, to cope with such a situation, the alternate embodiment of FIGURE 4 may be employed. Since the embodiment of FIGURE 4 is in most respects similar to the embodiment of FIGURE 4 is in most respects similar to the embodiment of FIGURES 2 and 3 primed reference characters will be employed for like elements and only the differences will be described in detail. In particular, a T-section telescoping fitting 110 replaces the in-line telescoping fitting 104 of FIGURE 2. The upright portion 109 is fitted in the passageway of body 42'. Extending from one end of crossbar portion 111 is closed-end tube 112. Slidably fitted in and extending from the other end of crossbar portion 111 of T-section telescoping fitting 110 is tube 106'. It should be noted that the diameter of tube 112 is larger than the diameter of tube 106'. Accordingly, when tube 106' retracts it slides through crossbar 111 and is accommodated within tube 112. With such an arrangement it is possible to cover a much larger range of output diameters with a single cleaning device.

There has thus been shown improved cleaning apparatus for knitting machines which by employing a novel rotary joint provides a more rugged, reliable and universal cleaning device for circular knitting machines. Furthermore, by employing various types of telescoping means the universality of the device is enhanced.

There will now be obvious to those skilled in the art many modifications and variations which satisfy many or all of the objects of the invention but which do not depart from the spirit thereof as defined by the appended claims.

What is claimed is:

1. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, bearing means in said chamber, a hollow shaft including first and second ends and extending along said axis of rotation and through said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end of said hollow shaft extending within said chamber for engaging said bearing means, an air seal means disposed about said hollow shaft in the region of the first end of said chamber, means for connecting said hollow shaft to said stationary part, means for connecting said body to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof external to said body and adapted to receive air under pressure, an outlet in said hollow shaft in the region thereof within said chamber, and at least one passageway through said body in the region thereof between said air seal means and the second end of said body for providing an egress for air under pressure.

2. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus com-

prising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, bearing means in said chamber, a hollow shaft including first and second ends and extending along said axis of rotation and through said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end of said hollow shaft extending within said chamber for engaging said bearing means, an air seal means disposed about said hollow shaft in the region of the first end of said chamber, means for connecting said hollow shaft to said stationary part, means for connecting said body to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof external to said body and adapted to receive air under pressure, an outlet in said hollow shaft in the region thereof within said chamber, at least one passageway through said body in the region thereof between said air seal means and the second end of said body and a telescoping hollow tube fitted in said passageway for providing an egress for air under pressure.

3. The apparatus of claim 2 wherein at least the end portion of said hollow tube remote from said passageway is bendable so that pressurized air can be aimed at desired portions of said knitting machine.

4. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, bearing means in said chamber, a hollow shaft including first and second ends and extending along said axis of rotation and through said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end of said hollow shaft extending within said chamber for engaging said bearing means, an air seal means disposed about said hollow shaft in the region of the first end of said chamber, means for connecting said hollow shaft to said stationary part, means for connecting said body to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof external to said body and adapted to receive air under pressure, an outlet in said hollow shaft in the region thereof within said chamber, at least one passageway through said body in the region thereof between said air seal means and the second end of said body for providing an egress for air under pressure, a hollow T-fitting, the end of the upright portion of said T-fitting being fitted into said passageway and a telescoping hollow tube fitted in and extending from the crossbar portion of said T-fitting.

5. Apparatus for cleaning a circular knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part, a stationary part disposed on said axis of rotation and axially displaced from said member, a cylinder including needles and sinkers rotatable about said axis of rotation and a stationary carrier ring operatively disposed with respect to said cylinder, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, bearing means in said chamber, a hollow shaft including first and second ends and extending along said axis of rotation and through said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end of said hollow shaft extending within said chamber for

engaging said bearing means, an air seal means disposed about said hollow shaft in the region of the first end of said chamber, means for connecting said hollow shaft to said stationary part, means for connecting said body to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an outlet in said hollow shaft in the region thereof within said chamber, at least one passageway through said body in the region thereof between said air seal means and the second end of said body for providing an egress for air under pressure, a hollow tube fitted in said passageway and extending outwardly from said body toward said stationary carrier ring, air conduit means connected to said hollow shaft in the region thereof which is external to said body and adapted to receive air under pressure, a portion of said air conduit means being disposed opposite said rotatable cylinder, and a port in said portion of said air conduit means for guiding pressurized air against the needles and sinkers of said cylinder.

6. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, an apertured abutment means in said chamber, the first end of said chamber being open, the second end of said chamber being closed, apertured bearing means in said chamber and positioned against said second end of said chamber, abutment means, an annular groove in the wall of said abutment means defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge of said annular groove, an apertured ball-bearing race means in said chamber and positioned against said abutment means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft connected to said stationary part, the second end of said hollow rod being opposite the second end of said chamber, said O-ring providing an air seal between the first and second ends of said chamber, means for connecting said body in the region of the second end of said chamber to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof which is outside said body and adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region thereof disposed between said abutment means and said second end of said chamber and at least one passageway through said body in the region thereof between said abutment means and said second end of said chamber for providing an egress for air under pressure.

7. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, an apertured abutment means in said chamber, apertured bearing means in said chamber and positioned at the second end thereof, an annular groove in the wall of said abutment means defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge thereof, an apertured ball-bearing race means in said chamber and positioned against said abutment means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft being connected to said

stationary part, the second end being opposite the second end of said chamber, said O-ring providing an air seal between the first and second ends of said chamber, means for connecting said body in the region of the second end of said chamber to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof which is external said body and adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region thereof disposed between said abutment means and the second end of said chamber, at least one passageway through said body in the region between said abutment means and the second end of said body, and a telescoping hollow tube fitted in the passageway through said body for providing an egress for air under pressure.

8. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, an apertured abutment means in said chamber, apertured bearing means in said chamber and positioned at the second end thereof, an annular groove in the wall of said abutment means defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge thereof, an apertured ball-bearing race means in said chamber and positioned against said abutment means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end being opposite the second end of said chamber, said O-ring providing an air seal between the first and second ends of said chamber, means for connecting said body in the region of the second end of said chamber to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis for rotation, an air conduit in said hollow shaft in the region thereof which is external said body and adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region thereof disposed between said abutment means and the second end of said chamber, at least one passageway through said body in the region between said abutment means and the second end of said body for providing an egress for air under pressure, a hollow T-fitting, the end of the upright portion of said T-fitting being fitted into the passageway of said body, and a telescoping hollow tube fitted in and extending from the crossbar portion of said T-fitting.

9. Apparatus for cleaning a circular knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part, a stationary part disposed on said axis of rotation and axially displaced from said member, a cylinder including needles and sinkers rotatable about said axis of rotation and a stationary carrier ring operatively disposed with respect to said cylinder, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, an apertured abutment means in said chamber, apertured bearing means in said chamber and positioned at the second end thereof, an annular groove in the wall of said abutment means defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge thereof, an apertured ball-bearing race means in said chamber and positioned against said abutment means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring

and said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end being opposite the second end of said chamber, said O-ring providing an air seal between the first and second ends of said chamber, means for connecting said body in the region of the second end of said chamber to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, at least one transverse bore in said hollow shaft in the region thereof disposed between said abutment means and the second end of said chamber, at least one passageway through said body in the region between said abutment means and the second end of said body for providing an egress for air under pressure, a hollow tube fitted in said passageway and extending laterally from said body toward said stationary carrier ring, air conduit means connected to said hollow shaft in the region thereof external to said body and adapted to receive air under pressure, a portion of said air conduit means being disposed opposite said rotatable cylinder, and a port in said portion of said air conduit means for guiding pressurized air against the needles and sinkers of said cylinder.

10. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber, the first end of said chamber being open and the second end of said chamber being closed, an apertured abutment means in said chamber, apertured bearing means in said chamber and positioned at the second end thereof, an annular groove in the wall of said abutment means defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge thereof, an apertured ball-bearing race means in said chamber and positioned against said abutment means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft being connected to said stationary part, the second end being opposite the second end of said chamber, said O-ring providing an air seal between the first and second ends of said chamber, means for connecting said body in the region of the second end of said chamber to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof which is external said body adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region thereof disposed between said abutment means and the second end of said chamber, at least one passageway through said body in the region between said abutment means and the second end of said body for providing an egress for air under pressure, an apertured cover plate disposed about said hollow shaft and positioned against said ball-bearing race means, a peripheral groove in said hollow shaft in the region thereof adjacent said ball-bearing race means, and a retaining ring fitted in said groove and abutting said cover plate for covering the first end of said chamber and providing a dust seal between said chamber and the region external thereto.

11. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber having first and second communicating compartments axially adjacent each other, said first compartment having a cross-section less than the cross-section of said second compartment for providing an abutment in the region of adjacent first ends

of said compartments, the second end of said first compartment being closed, the second end of said second compartment being open, apertured bearing means in said first compartment and positioned against the second end thereof, an apertured retainer in said second compartment and positioned against said abutment, an annular groove in the wall of said retainer defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge of said annular groove, an apertured ball-bearing race means in said second compartment and positioned against said retainer, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft connected to said stationary part, the second end being opposite the second end of said first compartment, said O-ring providing an air seal between said compartments, means for connecting said body in the region of the second end of said first compartment to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof which is outside said body adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region of said first compartment, and at least one passageway through said body in the region of said first compartment for providing an egress for air under pressure.

12. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber having first and second communicating compartments axially adjacent each other, said first compartment having a cross-section less than the cross-section of said second compartment for providing an abutment in the region of adjacent first ends of said compartments, the second end of said first compartment being closed, the second end of said second compartment being open, apertured bearing means in said first compartment and positioned against the second end thereof, an apertured retainer in said second compartment and positioned against said abutment, an annular groove in the wall of said retainer defining the aperture, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge of said annular groove, an apertured ball-bearing race means in said second compartment and positioned against said retainer, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said ball-bearing race means, said O-ring and said bearing means, the first end of said hollow shaft connected to said stationary part, the second end being opposite the second end of said first compartment, said O-ring providing an air seal between said compartments, means for connecting said body in the region of the second end of said first compartment to the member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit in said hollow shaft in the region thereof which is outside said body adapted to receive air under pressure, at least one transverse bore in said hollow shaft in the region of said first compartment, at least one passageway through said body in the region of said first compartment, and a telescoping hollow tube fitted in said passageway.

13. Apparatus for cleaning a knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part and a stationary part disposed on said axis of rotation and axially displaced from said member, said apparatus comprising a body including a chamber having first and second communicating compartments axially adjacent each other, said first compartment having a cross-section less than the

cross-section of said second compartment for providing an abutment on the region of the first ends of said compartments, the second end of said first compartment being closed, the second end of said second compartment being open, apertured bearing means disposed within said first compartment and against the second end thereof, an apertured retainer including an annular groove in the wall defining the aperture, said retainer disposed in said compartment and positioned against said abutment, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge of said annular groove, an apertured ball-bearing race means in said second compartment and positioned against said retainer, an apertured cover plate at the second end of said second compartment and abutting said ball-bearing race means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said cover plate, said ball-bearing race means, said flexible O-ring and said bearing means, the first end of said hollow shaft being fixed to said stationary part, the second end of said hollow shaft being adjacent the second end of said first compartment, said flexible O-ring providing an air seal between said compartments, a circumferential groove in the outer wall of said hollow shaft, a retainer ring in said circumferential groove and abutting said cover plate for providing an air seal between said second compartment and the region external to said chamber, means for connecting said body in the region of the second end of said first compartment to said member of said rotatable part whereby the axes of said hollow shaft, said body and said connecting means are disposed along said axis of rotation, an air conduit means in said hollow shaft in the region thereof which is outside said body and adapted to receive air under pressure, a transverse bore in said hollow shaft in the region of said first compartment, and at least one passageway through said body in the region of said first compartment for providing an egress for pressurized air.

14. Apparatus for cleaning a circular knitting machine of the type having a rotatable part including a member disposed on the axis of rotation of said rotatable part, a stationary part disposed on said axis of rotation and axially displaced from said member, a cylinder including needles and sinkers rotatable about said axis of rotation and a stationary carrier ring operatively disposed with respect to said cylinder, said apparatus comprising a body including a chamber having first and second communicating compartments axially adjacent each other, said first compartment having a cross-section less than the cross-section of said second compartment for providing an abutment in the region of the first ends of said compartments, the second end of said first compartment being closed, the second end of said second compartment being open, apertured bearing means disposed within said first compartment and against the second end thereof, an apertured retainer including an annular groove in the wall defining the aperture, said retainer disposed in said second compartment and positioned against said abutment, a flexible O-ring fitted in said annular groove and extending beyond the peripheral edge of said annular groove, an apertured ball-bearing race means in said second compartment and positioned against said retainer, an apertured cover plate at the second end of said second compartment and abutting said ball-bearing race means, a hollow shaft including first and second ends and extending along said axis of rotation and through the apertures of said cover plate, said ball-bearing race means, said flexible O-ring and said bearing means, the first end of said hollow shaft being fixed to said stationary part, the second end of said hollow shaft being opposite the second end of said first compartment, said flexible O-ring providing an air seal between said compartments, a circumferential groove in the outer wall of said hollow shaft, a retainer ring disposed in said circumferential groove and abutting said cover plate for providing an air seal between said second compartment and the region external to said chamber, means for connecting said body in the region of the sec-

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ond end of said first compartment to said member of  
 said rotatable part whereby the axes of said hollow shaft,  
 said body and said connecting means are disposed along  
 said axis of rotation, a transverse bore in said hollow  
 shaft in the region of said first compartment, a passage-  
 way through said body in the region of said first com-  
 partment, a hollow tube fitted in said passageway and ex-  
 tending laterally from said body toward said stationary  
 carrier ring, air conduit means connected to said hollow  
 shaft in the region thereof which is outside said body and  
 adapted to receive air under pressure, a portion of said  
 air conduit means being disposed opposite said rotatable  
 cylinder, and a port in said portion of said air conduit

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means for guiding pressurized air against the needles and  
 sinkers of said cylinder.

**References Cited by the Examiner**

UNITED STATES PATENTS

2,325,023	7/1943	Allred	66—168 X
2,422,514	6/1947	Allen	66—168
2,620,642	12/1952	Hoyt	66—168
2,648,209	8/1953	Reinhardt et al.	66—168

DONALD W. PARKER, *Primary Examiner.*

R. FELDBAUM, *Assistant Examiner.*