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PNEUMATIC DRAW-DOWN MEANS FOR A HOSIERY MACHINE

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Fig. 1.

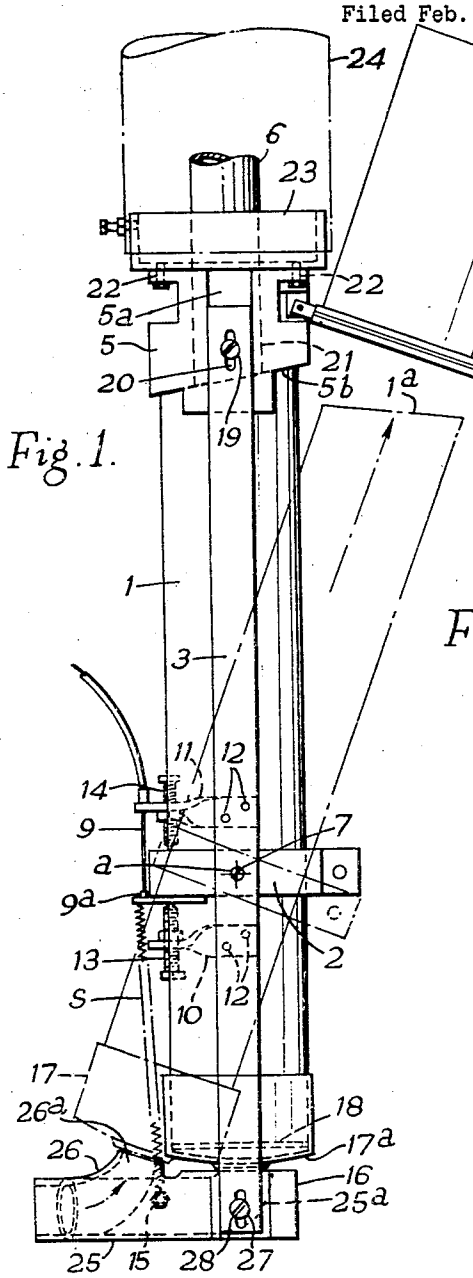
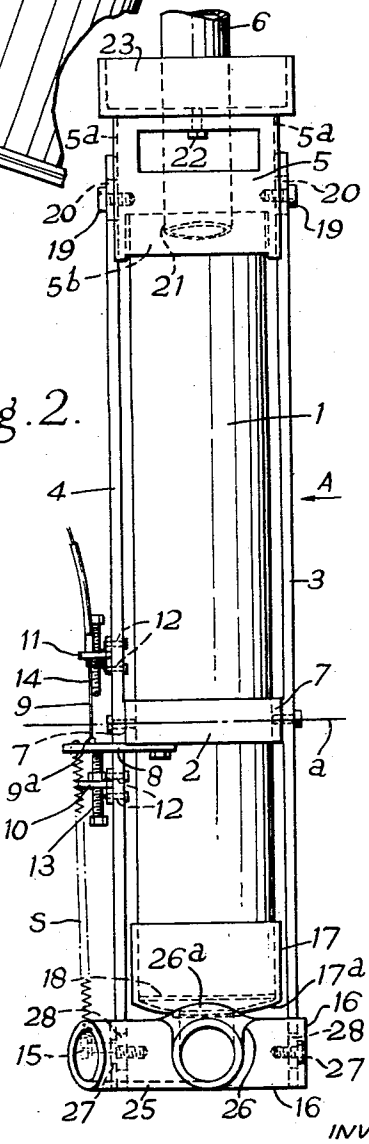


Fig. 2.



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PNEUMATIC DRAW-DOWN MEANS FOR A HOSIERY MACHINE

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This invention relates to pneumatic draw-down means for seamless hose knitting machines.

As known to those acquainted with the art concerned, means of this character are nowadays often provided on a circular seamless hose knitting machine for the purpose of drawing or "taking" down from the needle cylinder, by tension-exerting air suction, individually produced stockings, the drawn down articles, as they are successively released from the needles as a consequence of "press offs," being directed into a container from which they are ultimately drawn for processing.

But heretofore an air suction unit for this purpose has usually included at least one hinged flap operable to effect the release of stockings from a drawn-down tube for ejection into a container placed to receive them. Such flaps, however, in addition to complicating an air suction unit, also tend to stick or otherwise fail to operate, thereby preventing satisfactory functioning of the unit. Another disadvantage of an air suction unit as heretofore constructed and operable is that the draw-down tube, through which the successively produced stockings are drawn as and when pressed off, is subject only to suction so that in the result the inevitable dirt and foreign matter drawn into the tube builds up and fouls the tube.

Accordingly, the object of the present invention is to provide, in or for a seamless hose knitting machine, a generally improved air suction unit of a simple construction characterised by the absence of flaps, and one in which the draw-down tube is automatically maintained in a clean condition.

The improved air suction unit constituting this invention comprises a movably mounted draw-down tube through which air can be passed axially, the said tube being displaceable from one position in which its upper end is in communication with a tube leading to the interior of the needle cylinder and its lower end is registered with a suction tube, to another position in which its upper end is offset laterally with respect to the aforesaid tube leading to the needle cylinder and its lower end is registered with a blow or exhaust tube.

The idea is that when the movable draw-down tube is in the first mentioned position, in communication with the suction tube, it is adapted to receive from the needles the next pressed-off hose sucked down into it, whereas as a consequence of the said tube being thereupon moved into the second mentioned position, in communication with the blow or exhaust tube, not only is the pressed-off hose ejected upwardly from the tube into a container suitably placed to receive it, but any small amount of dirt or foreign matter which may happen to have been previously sucked into the tube will be blown out of the latter.

Thus, as will be appreciated, each time the lower end of the movable drawn-down tube is transferred from a position registering with the suction tube to a position registering with the blow or exhaust tube, or vice versa,

the direction of axial flow of air through the tube is reversed. In this way, by appropriately timing the movements of the draw-down tube and the consequent reversals of flow of air therethrough with the production cycle of the seamless hose knitting machine, the alternate downward sucking and upward blowing or exhausting of air through the tube not only drawn down successively knitted and pressed-off stockings into the tube and blows them out again, without any necessity for a hinged flap or flaps, but also maintains the tube in a clean condition by preventing any dirt or foreign matter from accumulating therein.

In pneumatic units as heretofore constructed, the draw-down tube has only had air drawn into it by suction; that is to say, the direction of the air has never been reversed.

In order that the invention may be more clearly understood and readily carried into practical effect, a specific constructional example of the improved air suction unit will now be described with reference to the accompanying drawings, wherein,

FIGURE 1 is a side view of the said unit as seen in the direction of the arrow A in FIGURE 2, and

FIGURE 2 is a rear view of the unit.

Referring to the drawings, it will be seen that the draw-down tube **1** is cylindrical. This tube is pivotally mounted at a location between its ends so that it is thereby adapted to be swung back and forth about a transverse pivotal axis *a* between the two positions indicated in respectively full and chain lines in FIGURE 1, the pivotal movements taking place in suitable timed relation with the operating cycle of the knitting machine (not shown).

Conveniently, and as shown, the pivoted draw-down tube **1** is embraced, between its ends, by a collar **2** mounted to turn about the diametrally extending axis *a* between two vertically disposed and suitably spaced carrier bars **3** and **4** (or like members) depending from a support component **5** which is adapted, in the manner hereinafter to be described, for connecting to the knitting machine. This support component **5** has fitted therein a tube **6** constituting a fixed upward extension of the pivoted draw-down tube **1** whenever this is in the full line position of FIGURE 1. The tube **6** is intended to extend up through the needle cylinder of the machine to which the air suction unit is fitted.

The draw-down tube **1** may advantageously be made of any suitable glass-like plastic, such as an acrylic ester, e.g. Perspex (registered trademark) or polystyrene. If the said tube is made principally of an opaque material, then it may be furnished with a transparent viewing window.

The aforementioned collar **2** embracing the cylindrical draw-down tube **1** has small holes formed therein at diametrically opposite points to receive aligned pintles or "trunnions" **7** set in the carrier bars **3** and **4** which, in the example illustrated, are spaced apart a distance equal to the external diameter of the collar **2**. Extending radially from one side of this collar is a small lug-like bracket **8** to which is attached one end **9***a* of a Bowden cable **9** the opposite end of which is adapted to be secured to a lever or other movable member (not shown) arranged to be actuated by or from a cam on the control drum of the seamless hose knitting machine. The arrangement is such that immediately after an individually produced hose is pressed off the machine, the Bowden cable **9** is first auto-

matically pulled to swing the pivoted draw-down tube from the vertical full-line status of FIGURE 1 into the inclined chain-line status of the same figure and is then released to permit of restoration of the tube into its vertical status. Small brackets **10** and **11** attached, e.g. by screws such as **12**, to the vertical carrier bar **4** are fitted with adjustable abutment screws **13** and **14** arranged to be contacted by the respectively opposite sides of the lug-like bracket **8** on the collar **2** as the tube **1** is swung to and fro. Thus, each time the draw-down tube **1** is swung from its vertical status into its inclined status, the top side of the lug-like bracket **8** contacts the leading end of the abutment screw **14**. Accordingly, adjustment of the screw **14** determines the inclined position of the tube **1**. Similarly, whenever the latter is returned to its vertical status, the underside of the lug-like bracket **8** comes into contact with the leading end of the abutment screw **13**.

For ensuring return of the draw-down tube to its vertical status each time it is released from its inclined status, there is provided a tension spring S the upper end of which is anchored to the lug-like bracket **8** whilst the lower end thereof is engaged with the shank of a screw **15** screwed into the side of a combined air suction and air blowing or exhausting component **16** hereinafter to be described.

The initially wholly open lower end portion of the draw-down tube **1** has secured thereon a cover **17** having a centrally apertured and outwardly curved bottom **17***a*. Within this cover is fitted a filter **18** which functions to hold back a pressed-off hose sucked into the pivoted tube.

The upper ends of the vertical carrier bars **3** and **4** are secured, by screws **19**, within vertical grooves **5***a* formed in opposite sides of the support component **5**. The screws **19** are screwed into tapped holes formed in the backs of the grooves **5***a* and extend through slots **20** in the carrier bars. In this way the carrier bars **3** and **4** are adjustable to vary the position of the pivoted draw-down tube **1** heightwise. The support component **5** is centrally bored at **21** from end to end to receive the lower portion of the fixed tube **6** arranged to project up through the needle cylinder of the seamless hose machine. Rigidly secured by screws **22** upon the flat top of the support component **5** is a deeply recessed circular connector member **23** whereby the air suction unit is adapted to be connected to the knitting machine through the medium of the quality tube **24**, i.e. the needle cylinder raising and lowering tube on the machine. The upper edge **1***a* of the pivoted draw-down tube **1** is obliquely disposed to seat against a correspondingly inclined face **5***b* formed on the underside of the support component **5**. The lower edge of the fixed tube **6** is also similarly inclined. Accordingly, whenever the pivoted draw-down tube **1** is permitted to swing into its vertical position in which its upper end seats against the underside of the support component **5**, the fixed tube **6** constitutes, in effect, an upper extension of the pivoted tube **1**.

The air suction and air blowing or exhausting component **16** consists, in the specific example illustrated, of a one-piece casting in which are provided two bores constituting respectively a mainly straight horizontal suction tube **25** having an upwardly curved inlet end **25***a* and a practically wholly upwardly curved blow or exhaust tube **26**. The component **16** is secured, in an adjustable manner, between the lower end of the two carrier bars **3** and **4**. In this connection screws **27**, extending through vertical slots **28** in the said carrier bars, are screwed into un-bored portions of the component **16**.

The suction and blow or exhaust tubes are adapted to be connected respectively to the intake and output sides of a vacuum motor (not shown). The inlet end **25***a* of the suction tube **25** is vertically disposed and so located as to be immediately below the pivoted draw-down tube **1** when this is in its vertical position i.e. the full-line position of FIGURE 1. The outlet end **26***a* of the blow or exhaust tube **26**, on the other hand, is offset with respect

to the inlet end of the suction tube, and is inclined from the vertical so as to be co-axial with the draw-down tube **1** whenever this is swung into its inclined hose-ejecting position indicated in chain lines in FIGURE 1.

At **29** in FIGURE 1 is depicted a container which is combined with the herein described air suction unit and is suitably placed to receive pressed-off hose ejected upwardly into it from the tube **1**. With the unit in use, each time the draw-down tube **1** is in its vertical full-line position (FIGURE 1), in communication with the suction tube **25**, it receives from the needles of the knitting machine the next pressed-off hose sucked down into it. But each time the tube **1** is swung into its ejection position, indicated in chain lines, it is then placed in communication with the blow or exhaust tube **26** so that, upon reversal of the flow of air, a pressed-off hose already in the bottom of the tube **1** will be automatically ejected upwardly from this tube into the container **29**.

The bottom of the container **29** is closed with the exception of the formation therein of an offset hole which registers with the upper end of the draw-down tube **1** when the latter is in its inclined ejection position. Thus, a hose blown up into the container through the hole in the bottom thereof simply falls back on to this bottom and is retained in the container.

I claim:

1. For application to a seamless hose knitting machine furnished with a needle cylinder and a tube for raising and lowering the same, a pneumatic draw-down unit for drawing-down from the cylinder individually produced stockings, said unit comprising, in combination, a support component, means adapted to connect said component to the aforesaid needle cylinder raising and lowering tube, a fixed tube which is set in the support component and extends upwardly for communication with the interior of the needle cylinder, members depending from the said support component, an air suction tube and an air blowing tube attached to said depending members, an upright pneumatic draw-down tube pivotally mounted between these members and through which air can be passed axially, and means for swinging said draw-down tube from one position in which its upper end is in communication with the fixed tube and its lower end is in register with the air sucton tube, to another position in which its upper end is offset laterally with respect to the fixed tube and its lower end is in register with the air blowing tube, and vice versa, whereby each stocking in turn first sucked down into the draw-down tube is ejected upwardly from the latter.

2. A pneumatic draw-down unit according to claim 1, which includes a container secured to the support component and placed to receive stockings ejected upwardly from the pivoted draw-down tube.

3. For application to a seamless hose knitting machine furnished with a needle cylinder and a tube for raising and lowering the same, a pneumatic draw-down unit for drawing-down from the cylinder individually produced stockings, said unit comprising, in combination, a support component, means adapted to connect said component to the aforesaid needle cylinder raising and lowering tube, a fixed tube which is set in the support component and extends upwardly for communication with the interior of the needle cylinder, a pair of spaced carrier bars which are attached at their upper ends to, and depend from, the said support component, an air suction tube and a relatively offset air blowing tube attached to the lower ends of the said carrier bars, a pneumatic draw-down tube through which air can be passed axially, a collar which embraces the draw-down tube between its ends, diametrically opposed trunnion pins associated with the collar and the carrier bars and by means of which the said collar and hence also the draw-down tube is pivotally mounted to turn about an axis transverse to that of the last mentioned tube, means for swinging the collar from a horizontal position in which the draw-down tube is vertical with its upper end in communication with the fixed tube and its

lower end in register with the air suction tube, to another position in which the draw-down tube is inclined with its upper end offset laterally with respect to the fixed tube and its lower end in register with the air blowing tube, and vice versa.

4. A pneumatic draw-down unit according to claim 3, wherein the collar has small holes formed therein at diametrically opposite points to receive trunnions set in the two carrier bars, and the latter are spaced apart a distance equal to the external diameter of the said collar.

5. A pneumatic draw-down unit according to claim 3, wherein the draw-down tube is made of a transparent glass-like plastic.

6. A pneumatic draw-down unit according to claim 3, wherein there is secured to the collar an outwardly extending bracket to which is attached one end of a Bowden cable for swinging the draw-down tube to and fro between the two defined positions.

7. For application to a seamless hose knitting machine furnished with a needle cylinder and a tube for raising and lowering the same, a pneumatic draw-down unit for drawing-down from the cylinder individually produced stockings, said unit comprising, in combination, a support component, means adapted to connect said component to the aforesaid needle cylinder raising and lowering tube, a fixed tube which is set in the support component and extends upwardly for communication with the interior of the needle cylinder, a pair of spaced carrier bars which are attached at their upper ends to, and depend from, the said support component, an air suction tube, and a relatively offset air blowing tube attached to the lower ends of the said carrier bars, a pneumatic draw-down tube through which air can be passed axially, a collar which embraces the draw-down tube between its ends, diametrically opposed trunnion pins associated with the collar and the carrier bars and by means of which the said collar and hence also the draw-down tube is pivotally mounted to turn about an axis transverse to that of the last mentioned tube, a bracket which is secured to and extends outwardly from the collar, a Bowden cable which is attached to said bracket and is operable to swing the collar from a horizontal position in which the draw-down tube is vertical with its upper end in communication with the fixed tube and its lower end in register with the air suction tube, to another position in which the draw-down tube is inclined with its upper end offset laterally with respect to the fixed tube and its lower end in register with the air blowing tube, and vice versa, further brackets attached to one of the two carrier bars, and adjustable abutment screws which are set in the last mentioned brackets and are arranged to be contacted by the respectively opposite sides of the bracket on the collar as the draw-down tube is swung to and fro between the two defined positions.

8. A pneumatic draw-down unit according to claim 7, wherein a spring is provided to ensure the return of the draw-down tube to its vertical position each time it is released from its inclined position.

9. A pneumatic drawn-down unit according to claim 7, which includes a tension spring one end of which is anchored to the bracket on the collar whilst the other end is anchored to a fixed component containing the air suction and the air blowing tubes.

10. A pneumatic drawn-down unit according to claim 7, wherein the initially open lower end of the draw-down tube has secured thereon a cover having an apertured bottom, and within this cover is fitted a filter which functions to hold back a stocking sucked down into the said tube.

11. For application to a seamless hose knitting machine furnished with a needle cylinder and a tube for raising and lowering the latter, a pneumatic draw-down unit for sucking down from the cylinder and ejecting individually produced stockings, said unit comprising, in combination, a support component having an inclined face on its underside and a central vertical bore therein, an annular connector secured upon the top of the said support component and adapted to be secured upon the lower end of the aforementioned needle cylinder raising and lowering tube, a fixed tube which is set in the vertical bore of the support component and extends upwardly from the latter for communication with the interior of the needle cylinder, a vertically disposed pair of spaced flat section carrier bars the upper ends of which are attached and adjustable heightwise relatively to said support component, an air flow component which is secured in an adjustable manner between the lower ends of the two carrier bars, said last mentioned component having formed therein bores constituting an air suction tube with a vertically disposed inlet end and an air blowing tube the outlet end of which is offset with respect to the inlet end of the said suction tube and is inclined from the vertical, an upright pneumatic draw-down tube through which air can be passed axially, a cover which is secured to the initially open lower end of said draw-down tube and has a centrally apertured bottom, an air filter fitted within the said cover, a collar which embraces the draw-down tube between its ends, diametrally opposed trunnion pins associated with the collar and the carrier bars and by means of which the said collar is pivotally mounted to turn about an axis transverse to that of the draw-down tube, and means for swinging the collar from a horizontal position in which the draw-down tube is vertical with its upper end in communication with the fixed tube and its lower end in register with the air suction tube, to another position in which the draw-down tube is inclined with its upper end offset laterally with respect to the fixed tube and its lower end in register with the air blowing tube, and vice versa.

12. A pneumatic draw-down unit according to claim 11, wherein there is secured to the collar an upwardly extending bracket to which is attached one end of a Bowden cable for swinging the draw-down tube to and fro between the two defined positions.

13. For application to a seamless hose knitting machine furnished with a needle cylinder and a tube for raising and lowering the latter, a pneumatic draw-down unit for sucking down from the cylinder and ejecting individually produced stockings, said unit comprising, in combination, a support component having an inclined face on its underside and a central vertical bore therein, an annular connector secured upon the top of the said support component and adapted to be secured upon the lower end of the aforementioned needle cylinder raising and lowering tube, a fixed tube which is set in the vertical bore of the support component and extends upwardly from the latter for communication with the interior of the needle cylinder, a vertically disposed pair of spaced flat section carrier bars the upper ends of which are attached and adjustable heightwise relatively to said support component, an air flow component which is secured in an adjustable manner between the lower ends of the two carrier bars, said last mentioned component having formed therein bores constituting an air suction tube with a vertically disposed inlet end and an air blowing tube the outlet end of which is offset with respect to the inlet end of the said suction tube and is inclined from the vertical, an upright pneumatic draw-down tube through which air can be passed axially, a cover which is secured to the initially open lower end of said draw-down tube and has a centrally apertured bottom, an air filter fitted within the said cover, a collar which embraces the draw-down tube between its ends, diametrally opposed trunnion pins associated with the collar and the carrier bars and by means of which the said collar is pivotally mounted to turn about an axis transverse to that of the draw-down tube, a bracket which is secured to and extends outwardly from the collar, a Bowden cable which is attached to said bracket and is operable to swing the collar from a hori-

zontal position in which the draw-down tube is vertical with its upper end in communication with the fixed tube and its lower end in register with the air suction tube, to another position in which the draw-down tube is inclined with its upper end offset laterally with respect to the fixed tube and its lower end in register with the air blowing tube, and vice versa, further brackets attached to one of the two carrier bars, and adjustable abutment screws which are set in the last mentioned brackets and are arranged to be contacted by the respectively opposite sides of the

bracket on the collar as the draw-down tube is swung to and for between the two defined positions.

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