May 8, 1956 D. GLUCK 2,744,363

DEVICE FOR CONTROLLING BELT ALIGNMENT

Filed Nov. 18, 1953

Fig. 1

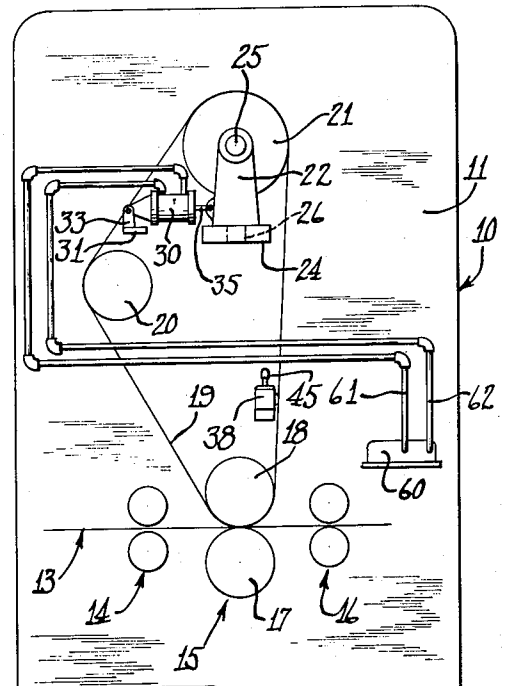


Fig. 2

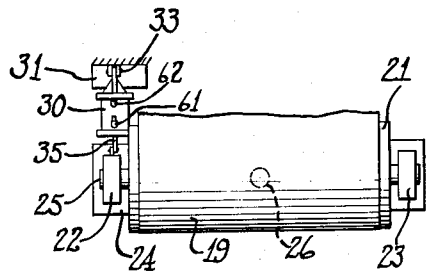


Fig. 3

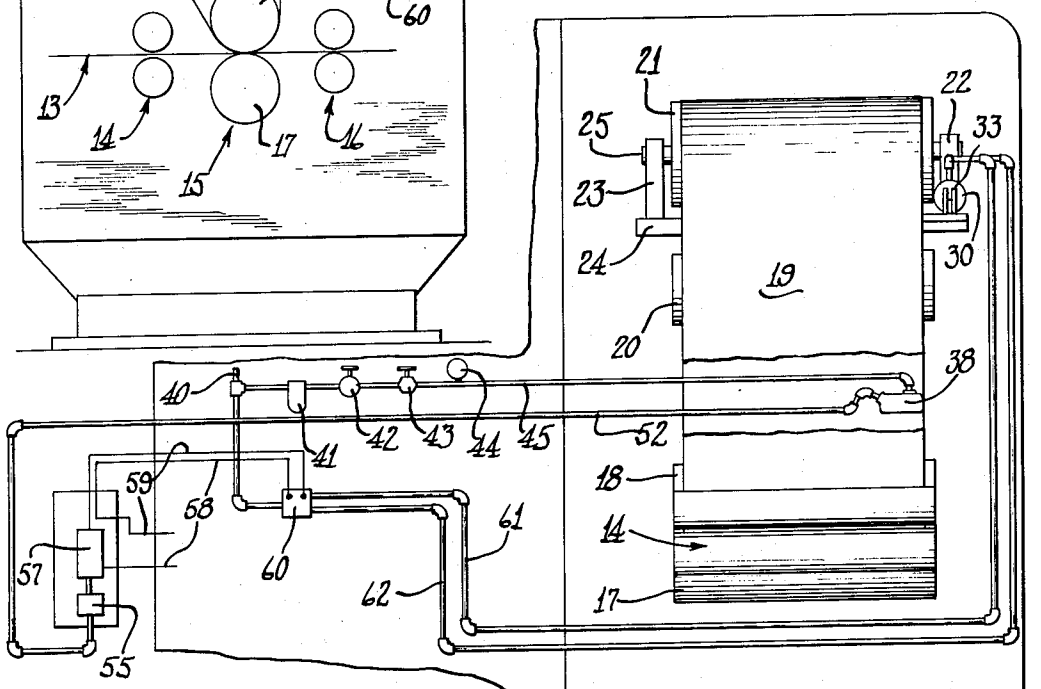


Fig. 4

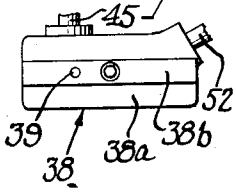
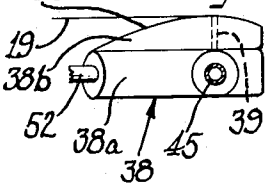


Fig. 5



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DEVICE FOR CONTROLLING BELT ALIGNMENT

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3 Claims. (Cl. 51—139)

This invention relates to a belt control device or the like, and is particularly concerned with a belt control system for laterally oscillating the belt of a polishing machine.

In polishing machines, it is very desirable to have a belt control system which is reliable in operation. A failure in the belt control results in a broken belt and represents a considerable loss in time and money.

It is therefore an important object of the present invention to provide a belt control system which is capable of relatively trouble-free operation.

It is a further object of the present invention to provide a belt control system which requires less maintenance time than existing systems.

It is another object of the present invention to provide a belt control system having a minimum of moving parts.

It is still another object of the present invention to provide a novel belt control device for cooperation with a belt to provide pressure variations indicative of the position of the belt relative to the device.

It is another and further object and feature of the present invention to provide a belt control device constructed to maintain the belt in obstructing relation to a pressure discharge orifice.

It is yet a further object of the present invention to provide a belt control device wherein the belt is maintained in obstructive relation to a pressure discharge orifice in spite of any accidental lateral travel of the belt edge beyond the orifice.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying sheet of drawings, in which:

On the drawings:

Figure 1 is a diagrammatic front elevational view of a polishing machine incorporating a belt control system according to the present invention;

Figure 2 is a fragmentary diagrammatic plan view of a portion of the structure of Figure 1;

Figure 3 is a fragmentary diagrammatic left side elevational view of the structure of Figure 1 and indicating diagrammatically the pneumatic and electric control circuit of the system of the present invention;

Figure 4 is a diagrammatic side elevational view of an air eye block constructed in accordance with the present invention; and

Figure 5 is a diagrammatic top plan view of the structure of Figure 4 and illustrating the manner in which the edge of the belt cooperates with the air eye block.

As shown on the drawings:

The belt control system of the present invention is particularly adapted for controlling lateral oscillation of a polishing belt in a polishing machine and has been illustrated in the drawings in this application. As indicated in Figure 1, the polishing machine **10** includes a frame **11** which is constructed to receive elongated sheet material **13** in the conventional manner by means of rollers **14**, **15** and **16**. For polishing the surface of the material **13** as it passes between the rollers **17** and **18**, a polishing belt **19** is trained around the upper roller **18** for polishing contact with the surface of the material **13**. The belt **19** is disposed in a closed loop and is trained around an idler roll **20** and a tracking roll **21** which is adapted to oscillate about a central vertical axis to shift the position of the belt **19** laterally relative to the sheet material **13**. The details of construction of the means for feeding the sheet **13** and for mounting the polishing belt **19** for lateral oscillation relative thereto are all conventional and have been indicated only diagrammatically.

The tracking roll **21** is illustrated as being mounted by means of a yoke including upstanding journal members **22** and **23** journalling opposite ends of the tracking roll shaft **25** and secured to a base **24** which is suitably mounted by the frame work for oscillation on a vertical axis. The vertical axis of oscillation may coincide with the axis of the recess **26** indicated in Figures 1 and 2. For oscillating the tracking roll **21**, a double acting cylinder **30** has been diagrammatically illustrated as being mounted by means of a lug **33** from a platform **31** secured with the framework **11** of the machine. The double acting cylinder is indicated as having a piston arm **35** connected with the journal member **22** for oscillating the tracking roll about its central vertical axis as best seen in Figure 2.

For controlling the oscillation of the tracking roll **21**, an air eye block **38** is provided for producing a change in pressure in response to a change in the position of the belt **19** relative thereto. In particular, the air eye block **38** constitutes an air discharge member having a discharge orifice **39** adjacent one edge of the belt **19** and arranged to be obstructed by the belt. The belt control system is designed so that obstruction of the orifice **39** of the member **38** causes oscillation of the tracking roll in a direction to move the belt **19** away from the orifice **39**. The system is further constructed so that when the belt moves out of obstructing relation to the orifice **39**, the control system is actuated to oscillate the tracking roll **21** in the opposite direction and to begin movement of the belt in the opposite lateral direction toward obstructing relation to the orifice **39**. In this manner, the belt **19** is continuously oscillated during the polishing operation.

As indicated in Figure 3, pressure is supplied to the chamber within the block **38** from the air supply conduit **40** through a filter **41**, an air regulator **42** set to approximately ten pounds per square inch, a safety valve **43** set at fifteen pounds per square inch to protect the mercoid switch **57**, and an air gauge **44**. Air at a predetermined pressure is thus applied to the central chamber of the member **38** by means of the conduit **45** for discharge through the orifice **39**. A further air conduit **52** is in communication with the chamber of the member **38** and transmits the pressure thereof through an air pressure gauge **55** to a mercoid switch **57**. The mercoid switch may have a range from zero to fifteen pounds per square inch and may be responsive to a minimum pressure differential of one-half pound per square inch. It has been found that obstruction of the orifice **39** of the member **38** may cause an increase in pressure in the line **52** of from two to six pounds for the system herein described.

It will be understood that actuation of the mercoid switch **57** due to obstruction of the orifice **39** by the belt will cause actuation of the solenoid valve **60** by means of electrical conductors **58** and **59** to connect air pressure from the line **40** to the line **62**. As seen in Figure 1, this causes pressure to be applied to the left end of cylinder **30** to extend the piston **35** and move the belt

39 rearwardly away from the discharge orifice 39. When the discharge orifice 39 is unobstructed, pressure in the line 52 decreases causing the mercoid switch 57 to again be actuated (for example, to open a pair of electric contacts in line 58) to shift solenoid valve 60 to supply pressure to line 61 and oscillate the tracking roll in the opposite direction to move the belt forwardly again.

Figures 4 and 5 illustrate in detail an air eye block according to the present invention. The air eye block comprises a body portion 38*a* having the central air chamber therein and a wear plate member 38*b* having the orifice 39 extending therethrough. It will be observed that the wear plate 38*b* has a generally arcuate upper surface 38*c* which has its highest point at the outlet of the orifice 39. This configuration of the wear plate has been found to allow Bernoulli's principle to work effectively to tend to hold the belt over the orifice. The expected blowing of the belt away from the orifice therefore does not occur. Further, it has been found that with the shape of the wear plate as indicated in Figure 5 that if the edge of the belt accidentally travels past the orifice 39, the belt is still maintained against the aperture in obstructing relation thereto so as to insure operation of the system to move the belt rearwardly out of obstructing relation to the orifice.

It will be readily appreciated that since air pressure such as required in the present system is readily available, the present invention is readily installed for use with existing equipment. Further, it will be observed that the only moving part of the edge sensing system is the mercoid switch so that maintenance difficulties are kept at a minimum. Also, since air is blown out of the orifice rather than being drawn in, there is no tendency for foreign matter to accumulate in the system. The operation of the system of the present invention has been proved very satisfactory and quite trouble-free.

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a system for effecting continuous lateral oscillation of a web traveling over a tracking roll, the improvement comprising a web sensing system consisting essentially of a single air discharge member having a chamber therein and disposed for cooperation with one lateral edge only of said web, said discharge member having an air outlet communicating with said chamber for obstruction by said one lateral edge of said web, a fluid conduit connecting with the chamber of said air discharge member, a pressure responsive electric switch in said conduit and actuated by the change in pressure in said chamber resulting from obstruction of said outlet, and means controlled by said switch to oscillate said tracking roll to move said web away from said outlet upon obstruction thereof by the web, and to move said web toward said outlet upon non-obstruction thereof by said web, said means thereby being operative to continuously laterally oscillate said web.

2. A system for effecting continuous lateral oscillation of a web, comprising means for laterally oscillating said web in opposite lateral directions, a web sensing system consisting essentially of a single air discharge member having a chamber therein and disposed for cooperation with one lateral edge only of said web, said discharge member having an outlet communicating with said chamber for obstruction by said one lateral edge of said web, pressure responsive means communicating with said chamber of said air discharge member and actuated by the change of pressure in said chamber resulting from obstruction of said outlet, and actuating means controlled by said pressure responsive means to actuate said web lateral shifting means to move said web away from said outlet upon obstruction thereof by the web, and to move said web toward said outlet upon non-obstruction thereof by said web, said actuating means thereby being operative to continuously laterally oscillate said web.

3. A system for effecting continuous lateral oscillation of a web, comprising means for shifting said web selectively in opposite lateral directions, oppositely acting cylinder and piston means operable to actuate said shifting means to shift the web in the respective opposite directions and having one pressure line for supplying pressure thereto to shift the web toward an extreme lateral direction and having a second pressure line for supplying pressure thereto to shift the web away from said extreme lateral direction, a solenoid valve controlling supply of the pressure to said pressure lines and operable in deenergized condition thereof to supply pressure to one of said lines and operable in an energized condition thereof to supply pressure to the other of said lines, edge sensing means cooperable with an edge of the web and actuated by movement of the web to said extreme lateral position, electric means controlled by said edge sensing means and controlling energization of said solenoid valve and operative to energize and deenergize said valve in response to actuation and deactuation of said edge sensing means to condition said solenoid valve alternately to shift said web away from said extreme position when the web actuates said edge sensing means and to shift said web toward said extreme position after the edge sensing means has been deactuated, whereby the web continually oscillates toward and away from said extreme position under the control of the edge sensing means.

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