WEB FEEDING APPARATUS

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Filed: May 15, 1973

Appl. No.: 360,494

U.S. Cl. 83/98, 83/102, 83/402, 226/97, 271/195
Int. Cl. B26d 7/06, B65h 17/32
Field of Search 83/98, 99, 102, 402; 226/97; 271/195

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Abstract

Web feeding apparatus including a web diverting device which is controllable to cause a free leading end of a web to take a selected one of two alternative paths. The web diverting device comprises a pair of facing surfaces which diverge from each other in the web feeding direction whereby each defines a respective one of the two alternative paths. Air feed devices are arranged to direct a flow of air over either one of the said surfaces as selected in the direction of web feed, to draw the web to that surface.

4 Claims, 1 Drawing Figure
WEB FEEDING APPARATUS

This invention relates to web feeding apparatus and has particular, but not exclusive, application to the feeding of paper webs to winding devices for winding the webs into rolls.

One intended application of the invention is in winding machines for winding wallpaper into standard length rolls for supply to the retail trade. The wallpaper is usually fed as a continuous web to such machines from a large reel and in its feed is severed to form the tail end of one roll and the leading free end of the next roll. Where the winding machine has a single winding head it is necessary to provide a “hold” system for the leading end of the next roll until the winding head is ready to receive it following completion and removal of the preceding roll. This results in a build up of web in the “hold” system which has to be eliminated by high acceleration of the winding head at the start of the next winding operation. The high acceleration can lead to damage or breaking of heavy embossed wallpaper and webs of low tensile strength.

As an alternative to the use of a single winding head and a hold system, two winding heads can be used so that at the end of a winding operation on one head the leading free end for the next roll is diverted to the other winding head to provide in effect an uninterrupted winding operation. In attempting to design a machine to operate in this way considerable difficulties have been encountered in diverting the leading end of the web for the next roll after the severing operation. Attempts have been made to use mechanical fingers and suction rollers for changing the direction of the web. Problems arise in the use of fingers because there is no gap between the severed ends of the web through which fingers can be inserted and it is undesirable to create a gap by removing a transverse strip from the web. The use of suction rollers leads to difficulties in removing the web from the rollers after it has been diverted and problems arise from windage created by the suction rollers having to rotate at high speeds.

The object of this invention is to provide web feeding apparatus including a web diverting device which does not suffer from the aforesaid disadvantages.

According to this invention there is provided web feeding apparatus including a web diverting device which is controllable to cause a free leading end of a web to take a selected one of two alternative paths, the web diverting device comprising a pair of facing surfaces which diverge from each other in the web feeding direction whereby each defines a respective one of the two alternative paths, and means for directing a flow of air over either one of said surfaces as selected whereby the free leading end of a web passing between the facing surfaces is drawn to the one over which the flow of air is directed.

In accordance with the so-called Coanda effect the air flow will tend to follow the surface over which it is directed and in accordance with well-known fluid flow boundary layer theory (Bernouille Law) the web will be drawn towards the surface over which the air flow is directed because of the drop in pressure between the web and said surface caused by the air flow.

The flow of air provides lubrication between the surfaces and the web and constrains the web to follow the contour of the plate surfaces.

In application of the invention to a winding machine having two winding heads and web severing means, the web severing means may operate by passing through the diverting device or the latter may be positioned between severing means and the winding heads.

One embodiment of the invention as applied to a winding machine for wallpaper rolls will now be described by way of example with reference to the accompanying diagrammatic drawing.

The winding machine has two winding heads 1 and 2 of well known construction. The web 30 is fed into the machine over a guide plate 3, then over guide rollers 4 and 5, through nip rollers 6 and 7 and thence through the diverting device 9 to one or other of the winding heads 1 and 2 as will be described.

The diverting device 9 comprises two facing plates 10 and 11 which extend parallel to each other for a length and are then curved to diverge from each other in the direction of web feed. Thus the plate 10 defines the web feed path to the winding head 1 and the plate 11 defines the web feed path to the winding head 2. Associated with the plates 10 and 11 are respective air feed devices 12 and 13 which are located in gaps in the parallel portions of the plates 10 and 11 and have orifices 14 through which air is fed, the orifices being directed so that the air from device 12 flows downwardly over the surface of plate 10 and the air from device 13 flows downwardly over the surface of plate 11 as shown by the arrows.

A plate 15 of inverted ‘V’ form is disposed below the plates 10 and 11. One arm 16 of the V converges towards the plate 10 to define with the plate 10 a narrow guide throat 17 leading to the winding head 1. The other arm 18 of the V similarly defines with the plate 11 a narrowing guide throat 19 leading to the winding head 2.

Severing means in the form of blades 20 and 21 are disposed to pass through transverse gaps in the plates 10 and 11 respectively, at the position where the plates 10 and 11 commence to diverge, to sever the web 40 transversely. The blades 20 and 21 are pneumatically operated through double acting air cylinders 22 and 23 and in their forward projecting position after severing the web, as shown for the blade 20, form a gate closing the adjacent guide throat.

Control means shown diagrammatically by control box 24 in the drawing are arranged to control the air flow from a pressurized supply to the air feed devices 12 and 13 and the air cylinders 22 and 23. Thus the control means comprises a valve arrangement made up of conventional valves and whose inter-relationship will be readily understood from the following description of the operation of the winding machine.

In the situation shown in the drawing the winding of a roll 41 in winding head 1 is just being completed, the severing blade 20 has just been operated to sever the web 40 to produce free leading web end 42 and to close the throat 17 so that leading web end 42 can not enter the throat 17. Also air is flowing over the surface of plate 11 so that the web 40 is drawn towards plate 11 and is thus directed through throat 19 to winding head 2. Once the leading web end 42 has been taken up by winding head 2 so that it is held thereby a control signal from winding head 2 via line 25 to control box 24 causes, after a predetermined time delay controlled by a timing device in box 24, the air supply to air cylinder...
Web feeding apparatus including a web diverting device which is controllable to cause a free leading end of a web to take a selected one of two alternative paths, the web diverting device comprising a pair of facing surfaces which diverge from each other in the web feeding direction whereby each defines a respective one of the two alternative paths, the facing surfaces of the diverting device extending substantially parallel to each other for a length before they commence to diverge, and means for directing a flow of air over either one of said surfaces as selected in the direction of web feed, whereby the free leading end of a web passing between the facing surfaces is drawn to the one of the surfaces over which the flow of air is directed, the means for directing the flow of air over the facing surfaces comprising air feed devices respectively disposed in each of said facing surfaces part way along their substantially parallel portions, and web severing means positioned to sever the web substantially at the commencement of the divergence of said facing surfaces.

2. Web feeding apparatus according to claim 1, wherein the web severing means comprise a pair of web severing blades, each arranged to be moved from an inoperative position behind a respective one of the facing surfaces to a position in which it projects through the facing surface to sever the web.

3. Web feeding apparatus according to claim 2, wherein the diverging portions of said facing surfaces each define together with a further surface a web guiding throat and each of said blades in its projecting position closes the adjacent throat.

4. Web feeding apparatus according to claim 2, wherein control means are provided for controlling the air feed devices and the web severing blades so that upon movement of one blade so that it projects through one of said facing surfaces to sever the web, the air feed device associated with the other surface is caused to supply a flow of air over said other surface.