

Jan. 5, 1960

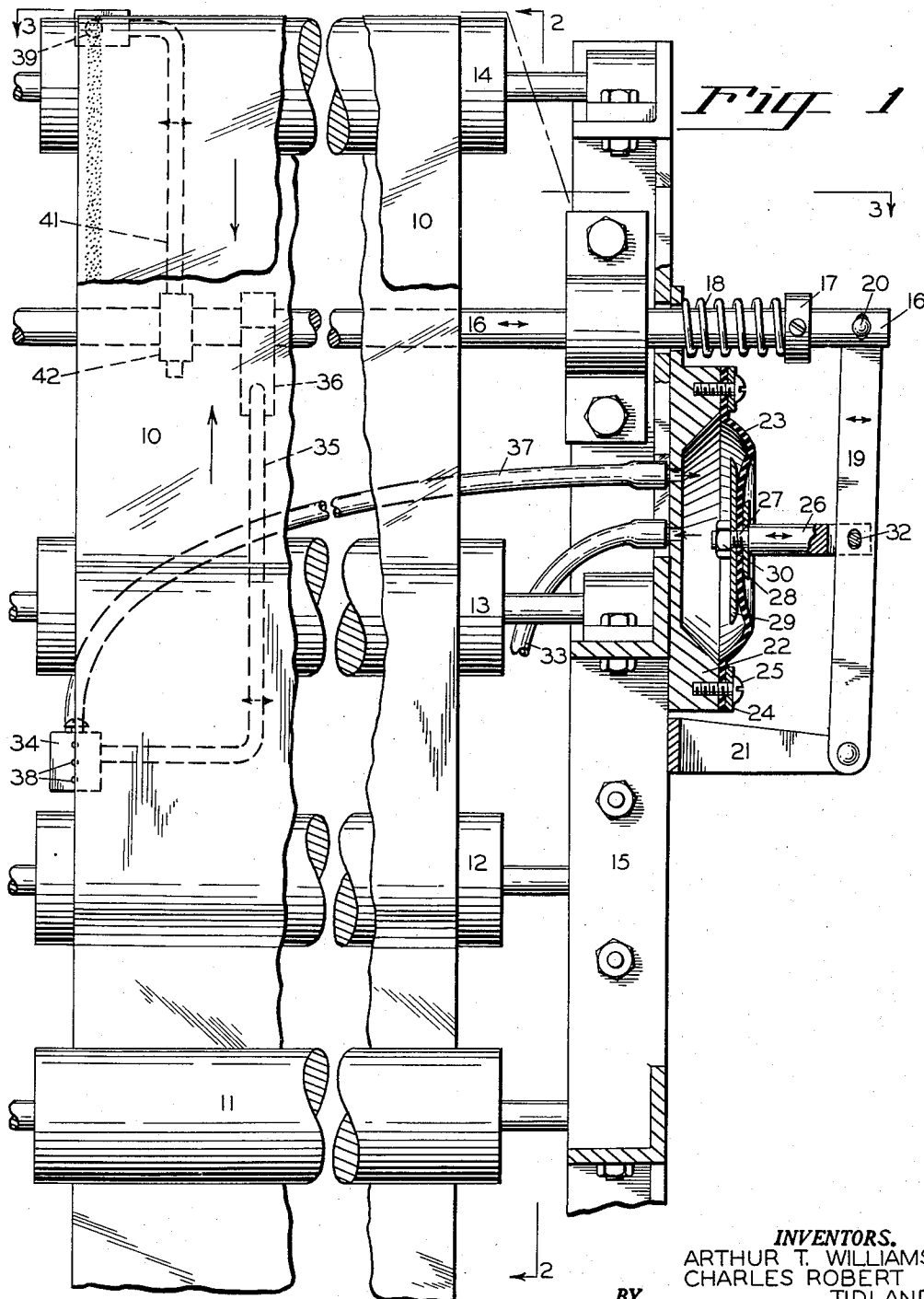
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2,919,673

POSITIONING CONTROL MEANS FOR WEB STRIPING DEVICE

Filed March 16, 1959

2 Sheets-Sheet 1



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POSITIONING CONTROL MEANS FOR WEB STRIPING DEVICE

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Application March 16, 1959, Serial No. 799,758

4 Claims. (Cl. 118—8)

This invention relates in general to the positioning of devices designed to operate on a traveling web where it is desired to maintain such a device operating constantly at an exact predetermined distance from one edge of the web.

In particular, the invention relates to the positioning of such a device as a glue applicator operating along the edge of a traveling web of paper, when, for example, the web of paper is being rapidly fed into a bag making machine. As is well known, in paper bag machines the paper web is first formed into a tube by applying a narrow line of adhesive along one edge of the web and then folding the edges towards each other until one edge overlies the other with a line of adhesive between them. The narrow line of adhesive is applied a very slight distance in from one edge of the paper web so that in the forming of the tube the adhesive will not be squeezed beyond the edge of the web to which it is applied, since this would cause some of the adhesive to spread beyond the bag seam and result in getting adhesive on the pressing rolls and also in causing the final bags to be stuck together. Similarly the other edge of the web extends slightly beyond the line of adhesive when the tube is formed so that the adhesive will not be squeezed beyond this other edge of the web. Furthermore, in order to avoid waste of material, it is desirable that the extent to which one edge of the web is made to overlie the other should be limited to a distance sufficient to cover the adhesive strip completely and safely but without too much excess. Since, in a rapidly traveling web of material, such as a web of paper being delivered from a supply roll to a high speed bag machine, there will invariably be some slight fluctuations in the position of the edges of the traveling web, it is necessary to have the device which applies the thin line of adhesive continuously to the web so arranged that it will follow any slight lateral movements in the web edge and thus constantly maintain its desired position relative to the web edge.

The object of the present invention is to provide practical control means by which a device operating on a traveling web, especially a device applying a strip of adhesive adjacent one edge of the web, will automatically be maintained in a predetermined position with respect to the web edge.

A related object of the invention is to provide such an automatic control which will be simple in construction, positive and direct in its operation, and which will present no particular problem of maintenance.

The manner in which these objects and other incidental advantages are obtained, and the construction and method of operation of this improved automatic positioning control, will be readily understood from the following brief description with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a foreshortened fragmentary sectional elevation of a portion of the web feeding assembly for a paper bag machine, the sectional elevation being taken

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transversely with respect to the assembly and travel of the web, showing the glue applicator for the web and the positioning control means for the applicator, this section being taken to the left of Fig. 2;

5 Fig. 2 is a fragmentary sectional side elevation taken on line 2—2 of Fig. 1, but drawn to a smaller scale; and

Fig. 3 is a fragmentary section taken on the line indicated at 3—3 in Fig. 1, but drawn to the same scale as Fig. 2.

10 In the figures, 10 indicates the web of paper which is traveling in the direction indicated by the arrows in Fig. 2 and which passes over the horizontal guide rollers 11, 12, 13 and 14 in succession immediately before being formed into a tube in the bag making machine (the tube forming portion and remainder of the bag machine not being shown in the drawings). The guide rollers are rotatably supported in a frame structure indicated in general at 15.

A horizontal shaft 16 is supported on the frame structure 15 and is mounted parallel to the axes of the guide rollers for the traveling web. This shaft 16 is located preferably, but not necessarily, below the topmost guide roller 14. This shaft 16 is mounted in suitable bearings so as to be slidable longitudinally or in an axial direction. A collar 17 (Figs. 1 and 3) is adjustably secured near one end of the shaft 16 beyond the side of the frame structure 15 on which the bearing for that end of the shaft is secured, and a coil spring 18 is held on the shaft 16 with its ends engaged by the side of the frame structure 15 and by the collar 17 respectively. The extreme end of the slidable shaft 16 is bifurcated to accommodate the end of a lever arm 19 which is pivotally connected to the shaft 16 by a pivot bolt 20. The lever arm 19 extends downwardly from the shaft 16 and the bottom end of this lever arm is pivotally mounted on a stationary bracket 21 (Fig. 1) secured to the frame structure. The aperture in the upper end of the lever arm 19 for the pivot bolt 20 is slightly elongated longitudinally with respect to the lever arm so as to allow for the slight arcuate travel of the upper end of the lever arm 19 with the sliding movement of the shaft 16 without imposing any bind on the shaft 16.

A dish-shaped casing 22 (Fig. 1), so arranged as to form a housing for a circular diaphragm chamber, is secured on the frame structure 15 between the shaft 16 and the bracket 21 for the lower end of the arm 19, and this housing is so positioned that the lever arm 19 will lie in a plane passing substantially through the axial center of the circular diaphragm chamber. A flexible diaphragm 23 is secured to the outer wall of the diaphragm chamber housing by means of a ring 24 and screws 25. A bar 26, has a reduced, round and threaded end portion 27 which extends through an aperture in the center of the diaphragm 23 and through a pair of clamping discs 28 and 29, which discs are located on the outside and on the inside of the diaphragm respectively, and a clamping nut 30 secures this end of the bar 26 together with the companion clamping discs tightly to the diaphragm 23. The other or outer end of the bar 26 is bifurcated and is pivotally connected to the lever arm 19 by means of the bolt 32, the aperture in the lever arm 19 for the bolt 32 being slightly elongated longitudinally the same as is the aperture for the bolt 20.

As will be apparent from Fig. 1, the arrangement is such that vacuum suction in the diaphragm chamber, acting on the diaphragm 23, will cause the bar 26, and with it the lever arm 19 and shaft 16, to move towards the left as viewed in Fig. 1, causing the shaft 16 to be moved in opposition to the force of the spring 18; while, upon reduction of the vacuum suction in the diaphragm chamber, the spring 18 will combine with the diaphragm in causing the shaft 16, the lever arm 19 and bar 26 to be

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moved in the opposite direction or towards the right. Thus the assembly is so arranged that fluctuation of the vacuum suction in the diaphragm chamber will produce longitudinal movement of the shaft 16. The diaphragm chamber is connected to a vacuum pump (not shown) or to other suitable constantly operating air exhaust means by the tube 33.

A box-like sensing head 34 is firmly but adjustably secured on the end of a rigid support arm 35 which in turn is rigidly held in a mounting collar 36. The collar 36 is firmly but adjustably secured on the shaft 16. Consequently this sensing head 34 will be moved laterally whenever the shaft 16 is moved longitudinally and will be moved exactly to the same extent as the shaft 16. The sensing head 34 has a hollow interior which is connected with the diaphragm chamber 22 by a flexible air hose 37.

This sensing head 34 is provided with one or more small orifices 38 through which air can be drawn into the interior of the head and thence drawn through the hose 37 into the diaphragm chamber. The sensing head is so arranged and positioned that the traveling web 10 will move over the face of the sensing head in which these orifices 38 are located. The orifices are arranged in alignment with the direction of travel of the web 10. In the preferred arrangement shown in Fig. 1, the sensing head is provided with three of these orifices all of which are in alignment with the direction of travel of the web over the sensing head, and the sensing head is so positioned that the edge of the web under proper operating conditions will be in registration with the center line of these three orifices. The reason for this will presently be apparent.

The adhesive or glue, which is deposited along near one edge of the web of paper preparatory to the forming of the paper web into a tube in a paper bag machine, is customarily delivered under pressure through a distributing nozzle. In Figs. 2 and 3 such glue-applying nozzle is indicated by the reference character 39. The adhesive or glue is delivered to the nozzle head under pressure through the flexible tube 40 from a suitable source (not shown). As is customary, the discharging end of this nozzle is positioned very close to the traveling web so that the glue can be delivered onto the web in a desired continuous narrow defined line, and the rate at which the glue is discharged from the nozzle is regulated in accordance with the speed of the traveling web so that a uniform glue line, with neither too much nor too little glue on any part of the line, will result.

In the carrying out of the present invention the nozzle head is supported on a rigid arm 41 which is firmly but adjustably secured in a collar 42, and this collar 42 in turn is firmly but adjustably secured on the shaft 16. Consequently any movement of the shaft 16, in an axial direction, will result in lateral movement of the glue-applying nozzle with respect to the direction of the travel of the web 10. Thus the nozzle 39, the sensing head 34 and the shaft 16 all move in unison, whenever any movement of these members with respect to the traveling web takes place.

In the operation of this positioning control assembly the withdrawal of air from the diaphragm chamber through the tube 33 by the vacuum pump is adjusted so as to equal the rate at which the air will be drawn into the diaphragm chamber through the orifices 38 in the sensing head 34 and through the connecting tube 37 when the edge of the paper web passes exactly over the center line of the orifices. In other words, when the orifices 38 are left half open by the paper web as it passes over the sensing head, the assembly will be in balance and the shaft 16, and with it the sensing head 34 and the glue-applying nozzle, will be stationary. Should the edge of the web shift slightly to the right (as viewed in Figs. 1 and 3), causing the orifices 38 to be entirely uncovered, then air will momentarily be drawn into the dia-

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phragm chamber more rapidly than it is exhausted by the vacuum pump. This reduction of the suction pressure on the diaphragm, together with the force of the spring 18 (which is at all times under some pressure) will cause the shaft 16 (and with it the sensing head and the glue-applying nozzle) to move to the right. However, should this movement to the right be sufficient to cause the edge of the paper web to cover the orifices 38 completely, thereby temporarily substantially shutting off any delivery of air into the diaphragm chamber, then the diaphragm 23 will be moved towards the left under the increased vacuum suction in the diaphragm chamber, and this will cause the bar 25, lever arm 19, and shaft 16 to be moved towards the left against the force of the spring 18, moving the sensing head and glue nozzle towards the left until the orifices are at least partly uncovered. In this way, any slight shifting of the position of the edge of the traveling web causes the sensing head and the glue-applying nozzle to shift their position correspondingly. In actual practice the lateral shifting of the web ordinarily is very slight, never exceeding a fraction of an inch, and consequently the resulting movements of the sensing head, shaft and glue-applying nozzle are very slight. However, with a rapidly traveling web these adjustments of position may occur in rapid succession, and this positioning control means, when properly set up and balanced, is very sensitive and will respond to slight changes in the position of the edge of the web with utmost speed.

As previously indicated, this positioning control means can be used for other operations on a traveling web which may require accurate maintenance of a constant lateral spacing with respect to the edge line of the web. However its most important and extensive use is believed to be in the application of the narrow line of adhesive for the formation of the bag tubing in a bag making machine, as herein described.

We claim:

1. In an automatic positioning control for a device operating on a traveling web passing over guide rollers, a shaft extending parallel to the guide rollers for said web, support means for said shaft, said shaft mounted for axial movement in said support means, said device operating on the web supported on said shaft, a lever arm connected to said shaft, a diaphragm and a housing forming an airtight diaphragm chamber with said diaphragm, a link connecting said diaphragm with said lever arm to cause axial movement of said shaft with movement of said diaphragm, a sensing head supported on said shaft, said sensing head positioned against said web and provided with an orifice arranged so as to be normally covered in part by an edge portion of said web, an air hose connecting said sensing head with said diaphragm chamber, said diaphragm chamber connected with air exhaust means, and spring means exerting a force to move said shaft in opposition to the force of said diaphragm under vacuum pressure.

2. In an automatic positioning control for a device operating on a traveling web passing over guide rollers, a shaft extending parallel to the guide rollers for said web, support means for said shaft, said shaft mounted for axial movement in said support means, said device operating on the web supported on said shaft and laterally adjustable thereon, a lever arm connected to said shaft, a diaphragm and a housing forming an airtight diaphragm chamber with said diaphragm, a link connecting said diaphragm with said lever arm to cause axial movement of said shaft with movement of said diaphragm, a sensing head supported on said shaft and laterally adjustable thereon, said sensing head positioned against said web and provided with an orifice arranged so as to be normally covered in part by an edge portion of said web, an air hose connecting said sensing head with said diaphragm chamber, said diaphragm chamber connected with air exhaust means exhausting the air from said chamber at the same rate at which air can be drawn

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into said chamber from said sensing head when said orifice is partly covered by said web, and spring means exerting a force to move said shaft in opposition to the force of said diaphragm under vacuum pressure, whereby lateral movement of said web with respect to said sensing head orifice will immediately result in corresponding movement of said shaft and therewith of said sensing head and said web operating device, and thereby maintain said web operating device in desired predetermined position with respect to said edge portion of said web.

3. In an automatic positioning control for an applicator applying a strip of adhesive on a traveling web passing over guide rollers, a shaft extending parallel to the guide rollers for said web, support means for said shaft, said shaft mounted for axial movement in said support means, said adhesive applicator supported on said shaft, a lever arm connected to said shaft, a diaphragm and a housing forming an airtight diaphragm chamber with said diaphragm, a link connecting said diaphragm with said lever arm to cause axial movement of said shaft with movement of said diaphragm, a sensing head supported on said shaft, said sensing head positioned against said web and provided with an orifice arranged so as to be normally covered in part by an edge portion of said web, an air hose connecting said sensing head with said diaphragm chamber, said diaphragm chamber connected with air exhaust means, exhausting air from said chamber at the same rate at which air can be drawn into said chamber from said sensing head when said orifice is partly covered by said web, a collar mounted on said shaft, and a coil spring on said shaft held under compression between said collar and a bearing for said shaft and exerting a force to move said shaft in opposition to the force of said diaphragm under vacuum pressure, whereby lateral movement of said web with respect to said sensing head orifice will immediately result in corresponding movement of said shaft and therewith of said sensing head and said adhesive applicator, and thereby maintain said adhesive applicator in desired predetermined position with respect to said edge portion of said web.

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4. An automatic positioning control for an applicator applying a strip of adhesive on a traveling web of paper passing over guide rollers to a paper bag machine, said positioning control including a shaft extending parallel to the guide rollers for said web, support means for said shaft, said shaft mounted for axial movement in said support means, said adhesive applicator supported on said shaft and laterally adjustable thereon, a lever arm connected to an end of said shaft, a diaphragm and a housing forming an airtight diaphragm chamber with said diaphragm, a link connecting said diaphragm with said lever arm to cause axial movement of said shaft with movement of said diaphragm, a sensing head supported on said shaft and laterally adjustable thereon, said sensing head positioned against said web and provided with a plurality of orifices in alignment with the direction of travel of said web arranged so as to be normally covered in part by an edge portion of said web, an air hose connecting said sensing head with said diaphragm chamber, said diaphragm chamber connected with air exhaust means exhausting air from said chamber at the same rate at which air can be drawn into said chamber from said sensing head when said orifices are partly covered by said web, a collar adjustably mounted on said shaft and a coil spring on said shaft held under compression between said collar and a bearing for said shaft and exerting a force to move said shaft in opposition to the force of said diaphragm under vacuum pressure, whereby lateral movement of said web with respect to said sensing head orifices will immediately result in corresponding movement of said shaft and therewith of said sensing head and said adhesive applicator, and thereby maintain said adhesive applicator in desired predetermined position with respect to said edge portion of said web.

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