April 15, 1969 A. F. SHIELDS 3,438,559

WEB TENSION MEANS

Filed Jan. 11, 1967 Sheet 1 of 2

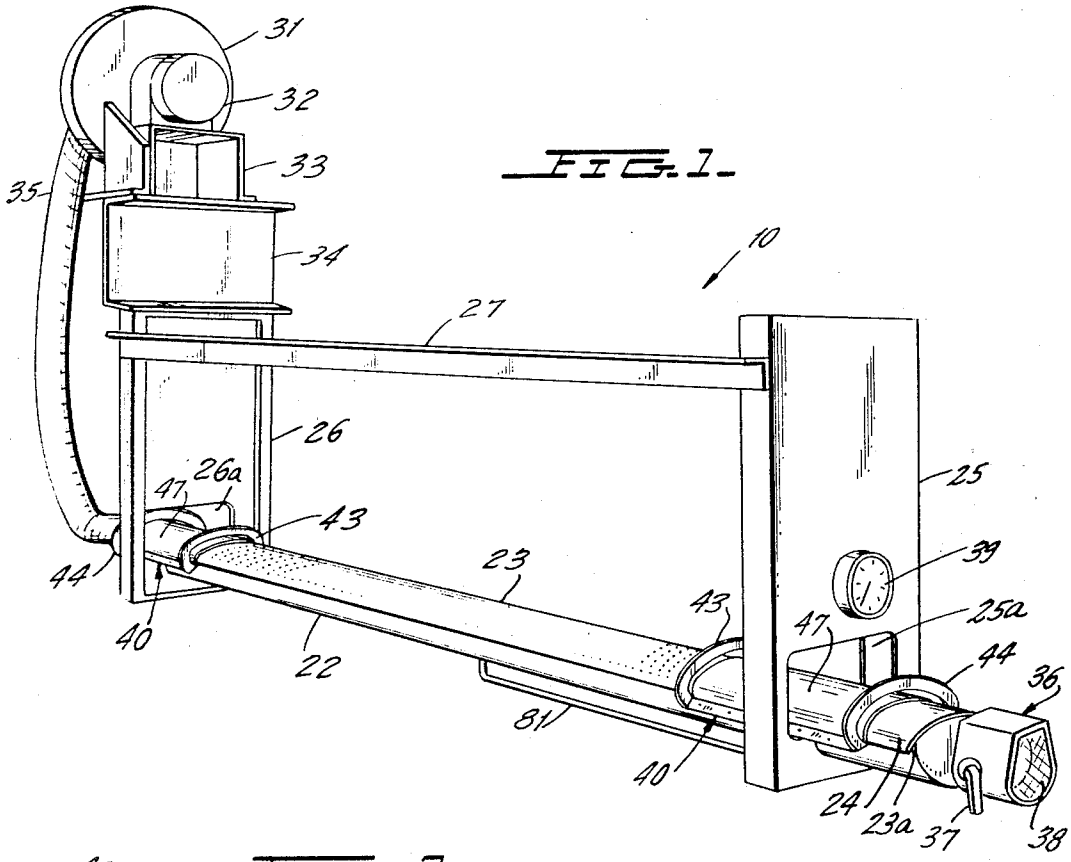


FIG. 1.

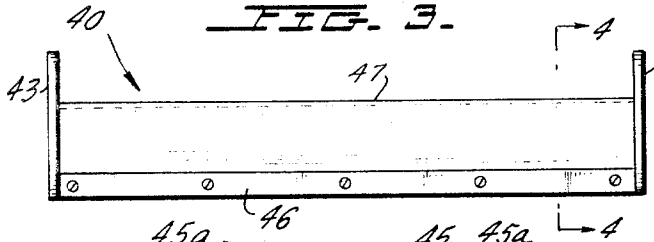


FIG. 3.

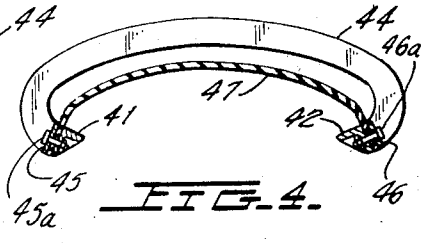


FIG. 4.

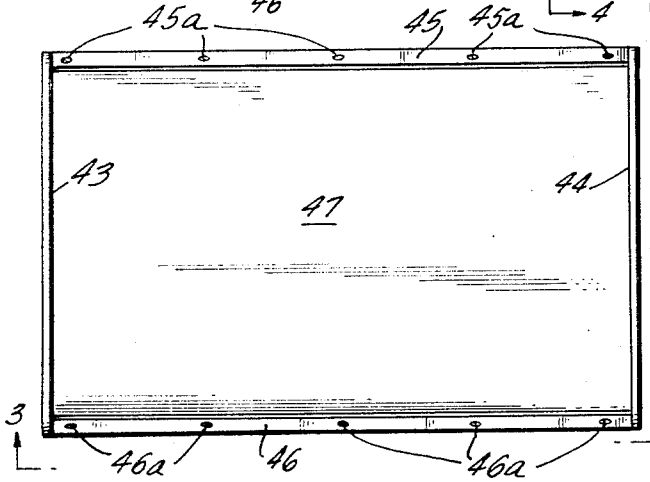


FIG. 2.

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Filed Jan. 11, 1967 Sheet 2 of 2

FIG. 6.

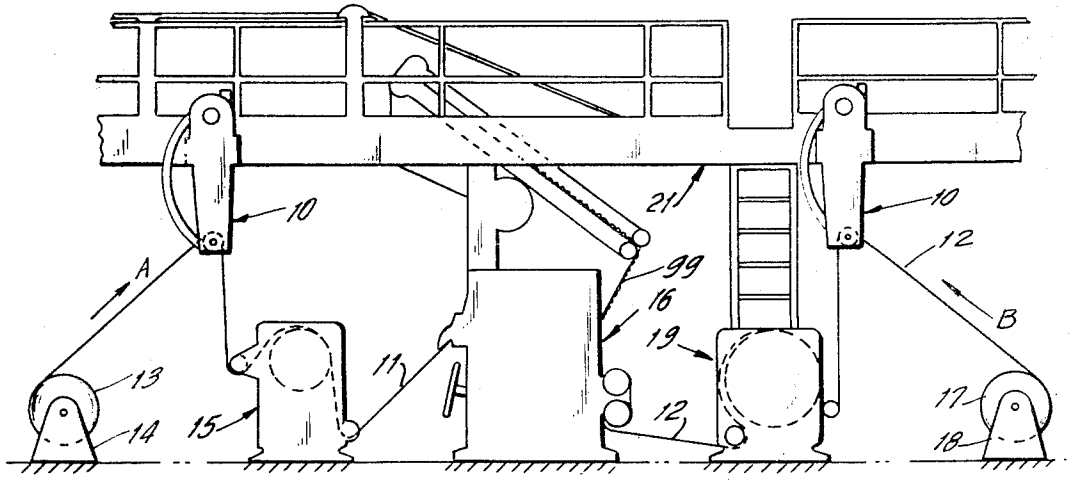
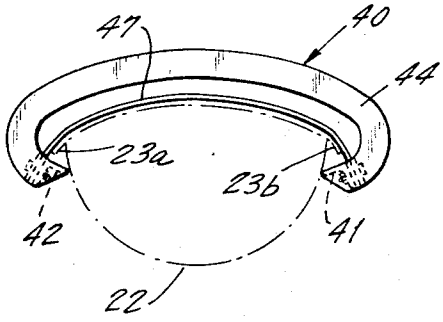


FIG. 5.



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WEB TENSION MEANS

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U.S. Cl. 226—195 3 Claims

ABSTRACT OF THE DISCLOSURE

Constant tension is applied to a web moving across a porous portion of a suction chamber support surface. Adjustable slideable cover-guide devices are mounted at opposite ends of the suction chamber to guide the web and cover those sections of the support surface porous portions outboard of the side edges of the web.

This invention relates to suction type tensioning means for moving web material and more particularly relates to suction means of this type having novel adjustable cover-guide devices which prevent unwanted loss of suction and reduce noise.

For many industrial processes, such as the production of corrugated board, it is necessary to move elongated web material at high speed from a supply means usually in the form of a large roll of the material in question mounted on a mill roll stand. In order to provide effective control of the web entering the processing apparatus, it is necessary to provide a tensioning force.

The prior art has utilized magnetic brakes for obtaining such a tensioning force but this has proven to be unsatisfactory in many respects. In particular, the magnetic braking force is applied to the rotational support for the mill roll rather than directly to the web so that the braking force must be varied in accordance with roll diameter. When the mill roll is not perfectly round, the diameter sensing means is unable to transmit a signal with sufficient rapidity to vary the magnetic braking force in a manner which will maintain constant web tension.

The prior art has attempted to overcome the difficulties noted above by utilizing a suction device for application of a tensioning force. However, prior art constructions of so-called suction brakes have been such that when narrow webs are handled, a good deal of the porous suction support surface is exposed causing a large loss of suction coupled with an increase in audible noise to an objectionable level.

The device of the instant invention overcomes the disadvantages of prior art suction web tensioning apparatus by including adjustable devices at each edge of the web. Each of these devices includes a guide portion and a flexible non-porous covering portion. In operation, the device is moved to a position wherein the guide portion lies adjacent to an edge of the web to guide the latter over the tensioning apparatus while the flexible cover is positioned over the porous portion of the suction chamber lying outboard of the web edge. Thus, the porous portions of the support surface that are not covered by the web are covered by the flexible cover portions of the adjustable devices so that there is no unwanted loss of suction and operating noise is materially reduced.

Accordingly, a primary object of the instant invention is to provide a novel construction for a so-called suction brake which provides tension acting on a moving web.

Another object is to provide a suction brake of this type which will provide constant tension of the web regardless of the shape of the roll from which the web

is being supplied. That is, whether the roll may be egg-shaped, loosely wound, or be a butt, web tension will remain substantially constant thereby preventing fracturing of the web by eliminating inertial shock.

Still another object is to provide a tensioning means of this type which maintains relatively constant tension without the necessity of sensing supply roll diameter.

A further object is to provide a suction tensioning means which is adjustable to accommodate different web widths.

A still further object is to provide a web tensioning means of this type which reduces shock loads and fluttering of the web.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIGURE 1 is a perspective of a suction tensioning means constructed in accordance with the teachings of the instant invention.

FIGURE 2 is a plan view of one of the cover-guide devices of FIGURE 1.

FIGURE 3 is a side elevation of the cover-guide device of FIGURE 2 looking in the direction of arrows 3—3.

FIGURE 4 is a cross section taken through line 4—4 of FIGURE 3 looking in the direction of arrows 4—4.

FIGURE 5 is an end view of the cover-guide device of FIGURE 2.

FIGURE 6 is a schematic showing two tensioning means units of the type shown in FIGURE 1 supporting webs of paper feeding into a single facer.

Now referring to the figures. Suction web tensioning unit **10** of FIGURE 1 appears twice in the schematic of FIGURE 6 which shows apparatus for producing single face corrugated board from webs of kraft paper **11, 12.**

More particularly, web **11** is stored in roll **13** mounted to mill roll stand **14** and is drawn from roll **13** in the direction indicated by arrow A passing through tensioning means **10** at the left of FIGURE 6, through preconditioner **15** where moisture and heat are added thereto, and then passing into the corrugating rolls (not shown) of single facer **16.** Web **11,** after being corrugated by single facer **16,** is combined with the liner provided by web **12.** Web **12** is drawn in the direction indicated by arrow B from roll **17** mounted to mill roll stand **18.** Web **12** after leaving roll **17,** passes through suction tensioning means **10** at the right of FIGURE 6 and then through preheater **19** where web **12** is heated. From preheater **19** web **12** passes into single facer **16** where, in a manner well known to the art, web **12** is bonded to the tips of the corrugations formed in web **11** to produce single face board **99.**

In order to achieve high quality production at fast speeds, it is necessary to apply a substantially constant force tensioning webs **11** and **12** prior to their entry into single facer **16.** As will hereinafter be seen, the required constant tensioning forces are supplied by suction tensioning devices **10, 10** both depending from bridge structure **21** extending over single facer **16.**

As best seen in FIGURE 1, suction tensioning device **10** includes elongated suction chamber **22** extending at right angles to the direction of paper travel and having a porous arcuate upper support surface **23** with non-porous sections **24** at each end thereof extending outboard of horizontally spaced vertical frame members **25, 26.** Chamber **22** extends through apertures **25***a*, **26***a*, in members **25, 26,** respectively, at the lower ends thereof and is fixedly secured to members **25, 26** by welds (not shown). Transverse frame member **27** has its opposite ends fixedly secured to members **25, 26,** at the upper ends

thereof. Centrifugal air pump **31** is driven by motor **32** mounted to stand **33** secured to one leg of channel **34** mounted above member **26** with the other leg of channel **34** fixedly secured to member **26**. Flexible conduit **35** is connected at one end thereof to the intake of pump **31** while the other end is connected to the left end of chamber **22**.

Damper assembly **36**, mounted to the right end of chamber **22**, is provided with handle **37** for manually adjusting the flow controlling vane (not shown) of damper **36**. Screen **38** at the end of damper **36** prevents relatively large objects from being drawn through chamber **22** by pump **31**. Meter **39** is connected to one end of tube **81** having its other end connected to chamber **27** at the lower center portion thereof. Meter **39** is mounted to the outboard surface of member **25** and provides an easily readable indication of the suction pressure within chamber **22** while damper **36** is being adjusted.

Identical cover-guide devices **40** are mounted at opposite ends of support surface **23**, and are slidable along surface **23**. Now referring more particularly to FIGURES 2 through 5 for detailed illustrations of the construction of one of the cover-guide devices **40** consisting of longitudinally extending angles **41**, **42**, C-shaped handles **43**, **44**, clamps **45**, **46** and flexible cover **47** constructed of a rubber-like plastic which may be fabric reinforced. The free ends of handle **43** are welded to one end of each of the brackets **41**, **42**, while the free ends of handle **44** are welded to the other ends of brackets **41**, **42**. One of the long edges of cover **47** is interposed between clamp **45** and bracket **41**, being held in place by a plurality of screws **45***a* passing through clearance apertures in clamp **45** and cover **47** into threaded apertures of bracket **41**. In a similar manner, the other long edge of cover **47** is interposed between clamp **46** and bracket **42** being secured by a plurality of screws **46***a* passing through clearance apertures in clamp **46** and cover **47** being received by threaded apertures in bracket **42**.

As best seen in FIGURE 5, brackets **41**, **42** are so positioned that they cooperate with the protruding longitudinal edges **23***a*, **23***b* of support surface **23** to prevent cover-guide device **40** from being lifted off of chamber **22** or being dragged in the direction of sheet travel. Instead, movement of device **40** is confined along the axis of chamber **22** with cover **47** resting on surface **23**.

In operation, it is intended that devices **40**, **40** be moved to positions along surface **23** wherein handles **43**, **43** lie adjacent to opposite edges of the moving web supported by surface **23**. There is generally a small clearance gap (¼ in. to ½ in.) set between each edge of the moving web and the guide portion of the adjacent handle **43** to permit limited weave of the web.

Adjustment of devices **40**, **40** so that their covers **47**, **47** close the porous portion of surface **23** outboard of the web edges reduces noise and maintain the suction force drawing the web against surface **23** with this force acting to tension the web as it is being drawn into the processing apparatus consisting of single facer **16**.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. Apparatus for tensioning web material moving parallel to its longitudinal axis along a predetermined path; said apparatus including a support surface extending across said path and having a porous section, a suction chamber partially defined by said support surface, suction pump means connected to said chamber, first and second devices disposed outside of said chamber at opposite sides of said path; means adjustably mounting said devices to said chamber for movement to positions wherein each of said devices has a relatively non-porous flexible portion covering that portion of the porous section outboard of an edge of web material supported by said surface, each of said devices also including a guide portion positioned adjacent to an edge of web material supported by said surface, means for guiding movement of said devices generally horizontally and at right angles to direction of movement of web material supported by said surface, an adjustable damper means, said chamber being elongated with said damper means connected to said chamber at one end thereof and said pump means connected to said chamber at the other end thereof.

2. Apparatus as set forth in claim **1** in which the support surface includes non-porous sections outboard of said porous section.

3. Apparatus as set forth in claim **1** in which each of said flexible portions is constructed of synthetic sheet material.

References Cited

UNITED STATES PATENTS

1,949,237	2/1934	Bradner	226—195 X
3,259,288	7/1966	Wasserman	226—195 X
3,281,957	11/1966	Ranney	226—199 X

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U.S. Cl. X.R.

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