United States Patent [19]

Cecere

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[54] **SEALING DEVICE FOR VACUUM EXTRACTOR**

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[52] **U.S. Cl.** **15/307,** 34/120, 34/242

[51] **Int. Cl.** **A47l 5/38**

[58] **Field of Search**.....34/13, 15, 92, 110–120, 34/240–242; 15/307

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[57] **ABSTRACT**

A sealing device for a vacuum extractor is provided for extracting moisture from a moving web passing adjacent the extractor. The vacuum extractor includes an elongated tube having a slot disposed therein for extracting the moisture therethrough, with the length of the tube being adjustable to accommodate different widths of a web to be treated by the adjustable longitudinal movement in the slot of an elongated, flexible, elastomeric rope-like substance which sealingly engages the edges of that portion of the slot not engaging a web to be treated.

9 Claims, 4 Drawing Figures

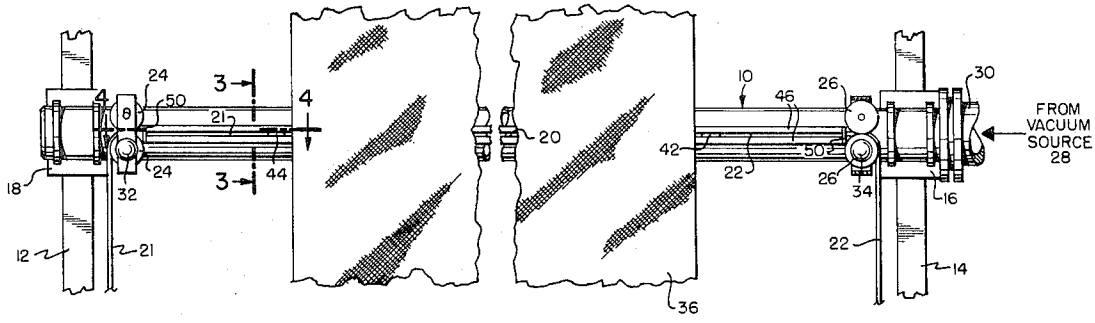


FIG. 1

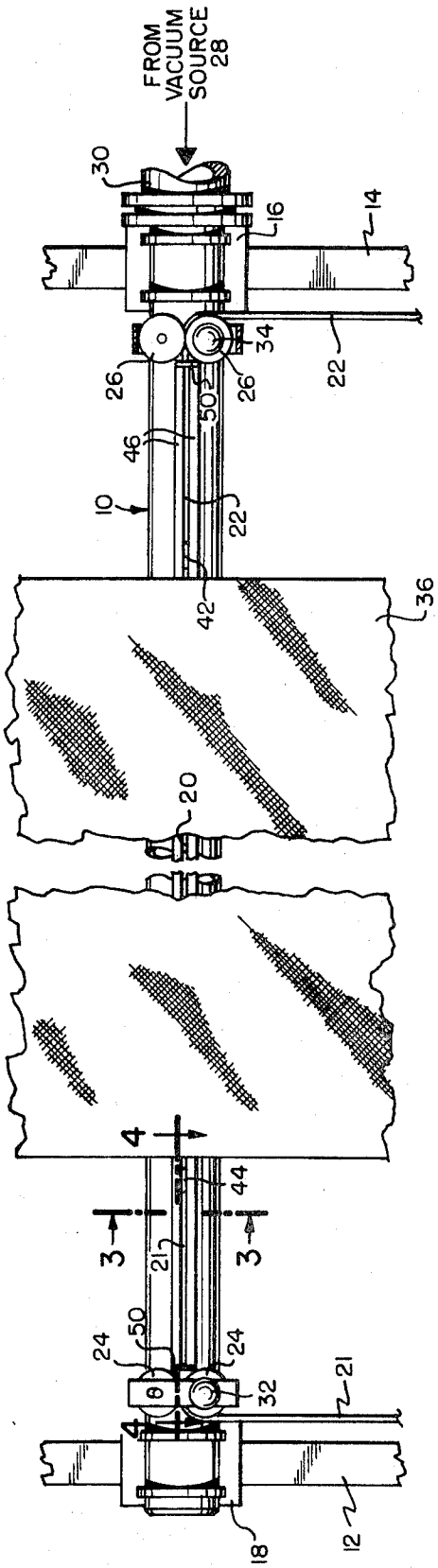

FROM VACUUM SOURCE 28
30
16
14
34
22
26
26
50
46
10
22
42
36
20
4
44
3
3
21
50
24
24
32
21
4
18
12

FIG. 2

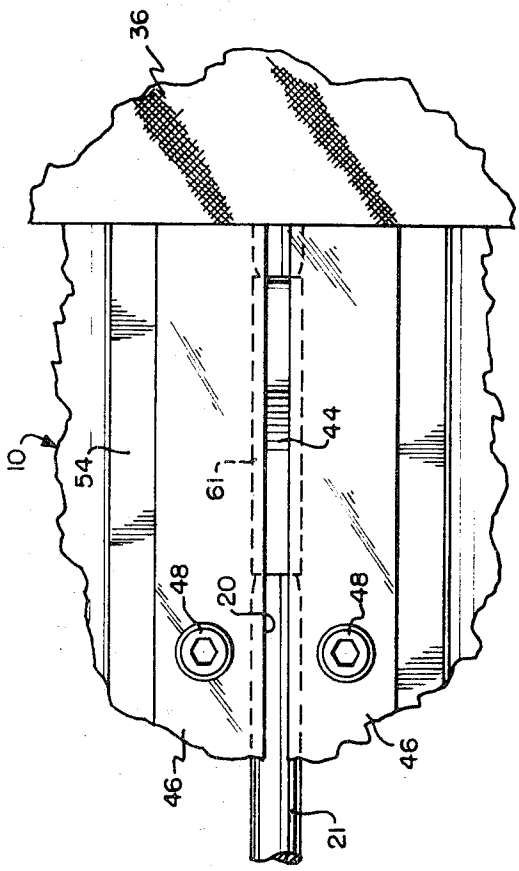

36
10
54
61
44
48
20
48
46
46
21

FIG. 4

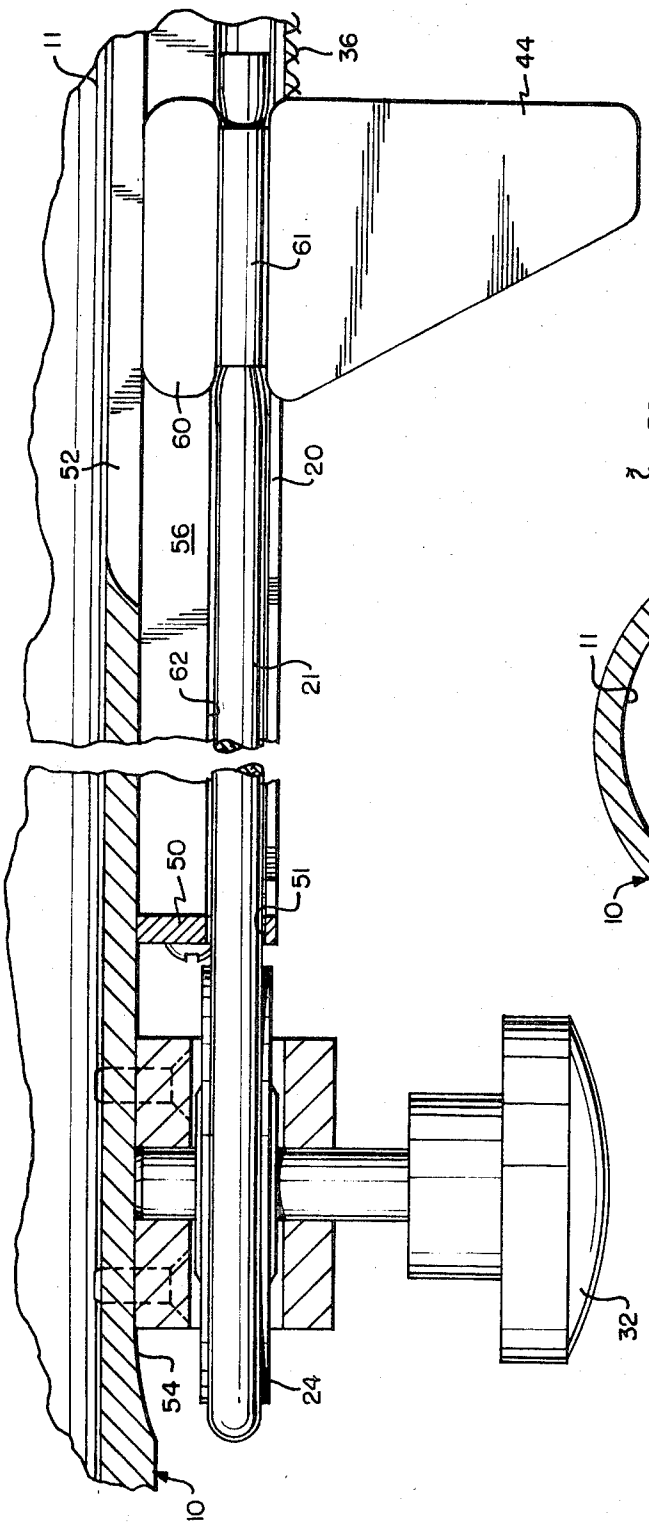
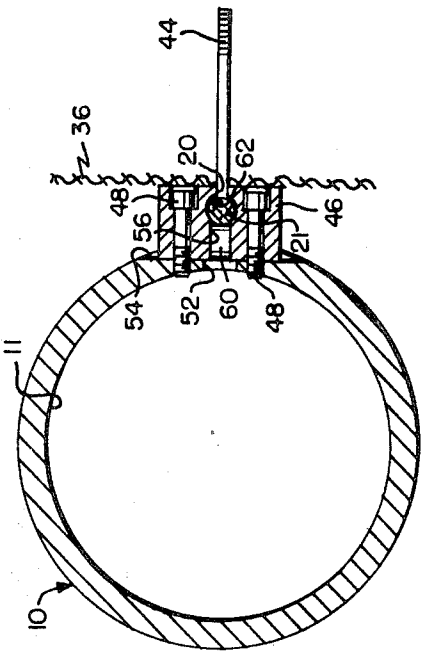

11
36
44
61
60
52
56
20
62
21
50
51
54
24
32
10

FIG. 3


44
36
20
62
48
46
56
21
54
52
60
48
11
10

SEALING DEVICE FOR VACUUM EXTRACTOR

Generally, this invention relates to apparatus for extracting moisture from a moving web. More particularly, this invention relates to a sealing device for such apparatus, which sealing device is adjustable for accommodating different widths of a web to be treated while simultaneously sealing that portion of the device not immediately adjacent a web to be treated.

As well known, in the treatment of webs of paper, fabric, and the like, it is necessary to treat the web with moisture containing substances for a variety of reasons and in a variety of sequences. Subsequent to such treatment, it becomes necessary to dry the web for further use and/or handling. However, in the usual moisture impregnation of such webs by such procedures as spraying or dipping in a continuous manner, an excess of moisture is usually imparted. Thus, in order to make subsequent drying procedures effective, particularly on a production line, it is necessary to remove the excess moisture prior to such drying procedures. This invention is specifically directed to apparatus for removing this excess moisture applied to such webs.

Generally, when extracting moisture from a continuously moving web, vacuum extraction is the most usually applied procedure. Thus, the moving web of moisture impregnated material is moved along immediately adjacent an opening to which a vacuum has been applied for the extraction of the moisture from the web by suction of the moisture through such an opening. However, in order to make the extraction effective, particularly with respect to a moving web continuously moving across such an opening, it is important that the opening be of a size to accommodate solely the exact width of the web moving across such an opening, because, otherwise, loss of suction power takes place. Thus, the opening must be adjustable in order to accommodate different widths of a moisture impregnated web because, as is obvious, different widths of the fabric or paper web might be utilized in such procedures.

Many devices have been developed in the past for accommodating this adjustment of the longitudinal opening through which the moisture is extracted. For example, complicated sensing apparatus has been utilized for sensing the width of the moving web and automatically moving an arrangement back and forth in order to accommodate different widths of the web. However, such devices have proved inappropriate in some instances simply because they have been difficult to service and are subject to failure particularly in the moisture environment involved herein. Furthermore, certain other devices have been proposed in the past which utilize metallic slides of different configurations for accommodating different widths of a moving web. Again, these devices are subject to failure because metallic slides of this nature are subject to oxidation in the moisture environment involved. Also, such devices are expensive to fabricate, unstable and in some instances require specialized knowledge to operate.

By Contrast, the applicant herein has discovered an extremely simple arrangement of sealing device for accommodating different widths of a web moving adjacent a vacuum extractor slot which simultaneously serves to move into a sealing engagement with that portion of the vacuum extractor slot not immediately adjacent a particular web being treated. Furthermore, the arrangement herein is extremely inexpensive to construct and is almost totally impervious to malfunction as a result of the oxidation and/or corrosive moisture environment involved in apparatus of the type discussed herein.

The applicant achieves this by the utilization of a pair of elongated, flexible, elastomeric rope-like materials which are inserted into each end of the longitudinally extending vacuum extractor slot. In addition, two pairs of pulleys are utilized with one of each at each end of the vacuum extractor which serve to accommodate each one of a pair of rope-like materials for moving them along the slot as desired for lengthening or shortening the effective width of the slot of the vacuum extractor. Connected to one of each pair of the pulleys is a knob which can be turned manually by the operator for moving the elastomeric substances back and forth in the slot for adjusting the effective opening thereof.

The flexible, elastomeric material has sufficient flexibility for, under the action of the vacuum in the extractor, moving against the edges of the slot passage for providing effective sealing engagement therewith so that only the open portion of the slot is effective for moisture extraction of the web being treated. With such an arrangement, therefore, no loss in the power of the vacuum takes place during subsequent treatment. Furthermore, the simplicity of the construction and operation of the device, in accordance herewith, makes the arrangements herein highly advantageous commercially.

Accordingly, it is one object of this invention to provide a device for a vacuum extractor which is adjustable longitudinally for accommodating different widths of a web to be treated, while simultaneously providing effective sealing engagement with that portion of a vacuum extractor not adjacent the web to be treated. In addition, it is a further object of this invention to provide a sealing device for a vacuum extractor which is simple and inexpensive in construction, is easily operated, and which is impervious to the corrosive action of the type of environment involved in a vacuum extractor.

Further, it is an object of this invention to provide a sealing device as described herein, which is devoid of complicated structure which may be subject to failure, thus substantially avoiding the possibility of damage to an entire production run because of such failures.

With the foregoing and additional objects in view, this invention will now be described in more detail and other objects and advantages thereof will be apparent from the following description, the accompanying drawings, and the appended claims.

Before describing this invention in more detail, it may be well to note that the flexible elastomeric rope-like material of this invention may be comprised of a variety of substances, such as polyurethane, for example, as well as polytetrafluoroethylene, acrylonitrile-butadiene-styrene terpolymer, nylon, rubber, and neoprene.

As purely illustrative of apparatus which may be used for carrying out this invention, one may note the attached drawings in which a longitudinally extending vacuum extractor tube is shown having an opening therein for accommodating the adjustable sealing slot arrangement of this invention, as well as means for making such adjustments.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a vacuum extractor, and embodying aspects for carrying out this invention;

FIG. 2 is an enlargement of a portion of FIG. 1, showing in detail the arrangement of an extractor tube in relation to a web being treated;

FIG. 3 is a sectional view along lines 3—3 of FIG. 1; and

FIG. 4 is a sectional view along lines 4—4 of FIG. 1.

Referring to the drawings, in which like reference characters refer to like parts throughout the several views thereof, a vacuum extractor tube **10** is shown supported on uprights **12** and **14** by brackets **18** and **16**, respectively. Extractor tube **10** is connected through connector **30** to a vacuum source **28**, which may be any well known source of vacuum, such as a vacuum pump, for example.

As further shown in FIG. 1, an extractor slot **20** is shown disposed in extractor tube **10** longitudinally thereof. Slot **20** is disposed in an extractor slot body **46** (FIGS. 1 and 3) which in turn is connected to extractor tube **10** by a plurality of bolts **48** (FIGS. 2 and 3). Longitudinally movable in slot **20** is a pair of rope-like flexible elastomeric sealing substances **21** and **22**. Disposed at each end of extractor tube **10** is a pair of pulleys **24, 26** through and over which adjustable sealing ropes **21, 22**, respectively, move. Connected to the internal end of flexible ropes **21** and **22** are markers **44** and **42**, respectively, for indicating the extent of movement of flexible ropes **21** and **22** toward each other for providing an effective extraction opening of slot **20** for accommodating different widths of a web **36** moving vertically adjacent the effective extraction opening of extraction slot **20**.

As can best be seen in FIG. 4, pulleys **24, 26** are movable by knobs **32, 34**, respectively, which serve to move flexible ropes **21, 22** and their associated markers **44, 42** back and forth to adjust the effective extraction opening of slot **20**. As can be seen further in FIG. 4, marker **44** (as well as marker **42**) has an extension **60** which is movable in longitudinal bore **56** (FIGS. 3 and 4) of slot body **46** with marker **44** also having a portion **61** of reduced cross section for accommodating and frictionally engaging flexible rope **21**. End wall **50** closes off the end of bore **62** and counter-bore **56** except for opening **51** for accommodating the passage of rope **21**. A mirror image arrangement for flexible rope **22** (not shown) is provided at the opposite end of tube **10**.

As shown in FIG. 3, extractor tube **10** has a cutaway portion **54** for accommodating extractor slot body **46**, with body **46** being connected to **10** through a plurality of bolts **48**.

Further, as can be seen in FIG. 3, the internal chamber **11** of extractor tube **10** has a longitudinal opening **52** for providing connection between chamber **11** of extractor tube **10** and longitudinal bore **56** in slot body **46**. Slot body **46**, in turn, is provided with longitudinally extended bore **62**, which accommodates flexible ropes **21, 22**. Bore **62**, in turn, communicates with the extractor slot **20** adjacent which web **36** is movably disposed.

In operation, the operator first determines the width of the web **36** to be treated. Thereafter, before application of vacuum in extractor tube **10**, the operator merely turns knobs **32** and **34** manually for moving the flexible ropes **21** and **22** toward each other until the distance between markers **42** and **44** is the same as the width of web to be treated. Thereafter vacuum pressure is applied and extractor tube **10** draws moisture through extractor slot **20** in that portion of the slot between the markers **42** and **44**. Under the action of the vacuum, the flexible longitudinally adjustable ropes **21** and **22** move into sealing engagement with longitudinal bore **62** in extractor slot body **46** for effective sealing engagement, thus preventing leakage through those areas not adjacent the web **36** moving against extractor slot **20**. When it becomes necessary to treat a different width of web **36**, the operator turns off the source of vacuum and again adjusts the length of flexible ropes **21** and **22** in extractor slot **20**, and again activates the source of vacuum.

Accordingly, as will be apparent from the foregoing, there is provided in accordance herewith, apparatus for extracting moisture from a moving web in a manner which accommodates readily different widths of web to be treated, while simultaneously providing effective sealing engagement in those areas of the extractor not immediately adjacent the web to be treated. Furthermore, the arrangements, in accordance herewith, are extremely simple and inexpensive to construct and to operate, requiring no complicated adjustments or equipment and being substantially impervious to the corrosive and/or oxidative environment involved, thus making the arrangements herein highly advantageous from a commercial standpoint.

While the apparatus herein disclosed forms preferred embodiments of this invention, this invention is not limited to this specific apparatus, and changes can be made therein without departing from the scope of this invention which is defined in the appended claims.

What is claimed is:

1. In apparatus for moisture extraction from a moving web and having an elongated extractor tube with a longitudinally extending extraction opening disposed therein, and a vacuum source connected to said tube, the combination which comprises a pair of flexible elongated elastomeric means movably disposed in said opening for defining the effective longitudinal extent of said opening, means for moving said pair of elastomeric means toward and away from each other to vary said effective opening in accordance with the width of web to be treated, said means for moving said pair of elastomeric means including two pairs of pulleys with one pair disposed at each end of said tube for frictionally engaging one of each pair of said elastomeric means therebetween, and a knob connected to one of said pulleys of each pair for manually operating said pulleys.

2. Apparatus as recited in claim **1**, in which said pair of flexible elongated, elastomeric means are in the form of a pair of ropes of a combined length longer than said extractor opening.

3. Apparatus as recited in claim **1**, which also includes an elongated extractor slot body connected to said tube adjacent said opening; said extractor slot body having a longitudinally extending bore disposed therein for movably accommodating said pair of elongated elastomeric means therealong, an elongated counter-bore disposed therein providing flow communication between said tube and said bore, and an elongated slot adjacent said bore on the side thereof opposite said counter-bore.

4. Apparatus as recited in claim 1, in which said elastomeric means is comprised of a member selected from the group consisting of flexible polyurethane, polytetrafluoroethylene, acrylonitrile-butadiene-styrene terpolymer, nylon, rubber, and neoprene.

5. Apparatus as recited in claim 2, in which a marker is disposed on each of the opposed ends of said pair of ropes for indicating the extent of said defined opening.

6. In apparatus for moisture extraction from a moving web and having an elongated extractor tube with a longitudinally extending extraction opening disposed therein, and a vacuum source; the combination which comprises an elongated extractor slot body connected to said tube adjacent said opening; said extractor slot body having a longitudinally extending bore disposed therein, an elongated counter-bore disposed therein providing flow communication between said tube and said bore, and elongated slot adjacent said bore on the side thereof opposite said counter-bore; a pair of flexible elongated elastomeric means movably disposed in said bore for defining the effective longitudinal extent of said slot; means for moving said pair of elastomeric

means toward and away from each other to vary said effective opening in accordance with the width of a web to be treated, said means for moving said pair of elastomeric means including two pairs of pulleys with one pair disposed at each end of said tube for frictionally engaging one of each pair of said elastomeric means therebetween; and a knob connected to one of said pulleys of each pair for manually operating said pulleys.

7. Apparatus as recited in claim 6, in which said pair of flexible elongated, elastomeric means are in the form of a pair of ropes of a combined length longer than said extractor opening.

8. Apparatus as recited in claim 6, in which said elastomeric means is comprised of a member selected from the group consisting of flexible polyurethane, polytetrafluoroethylene, acrylonitrile-butadiene-styrene terpolymer, nylon, rubber, and neoprene.

9. Apparatus as recited in claim 7, in which a marker is disposed on each of the opposed ends of said pair of ropes for indicating the extent of said defined opening.

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