Oct. 28, 1969 G. E. MOORE, SR 3,474,553

FABRIC SPREADING AND FEEDING MACHINE

Filed Jan. 6, 1967 2 Sheets-Sheet 1

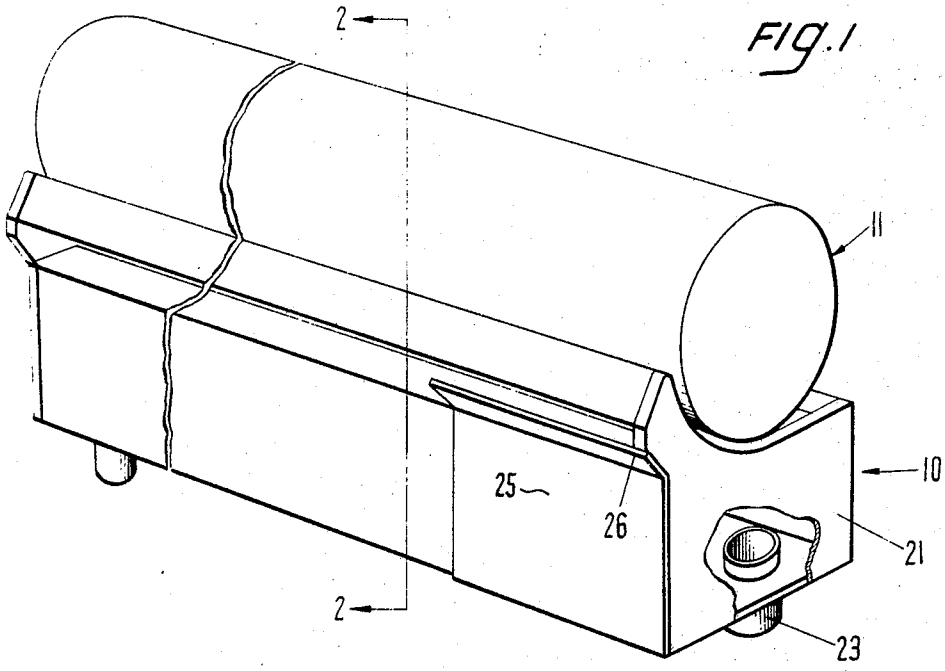

FIG. 1

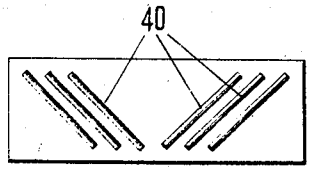

FIG. 2a

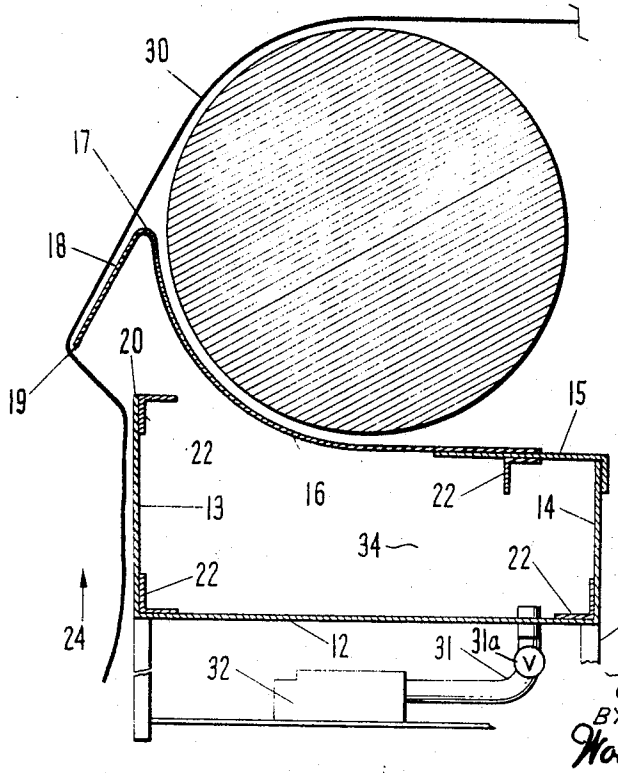

FIG. 2

INVENTOR
George E. Moore, Sr.
BY
Wolf, Greenfield & Hesson
ATTORNEY(S)

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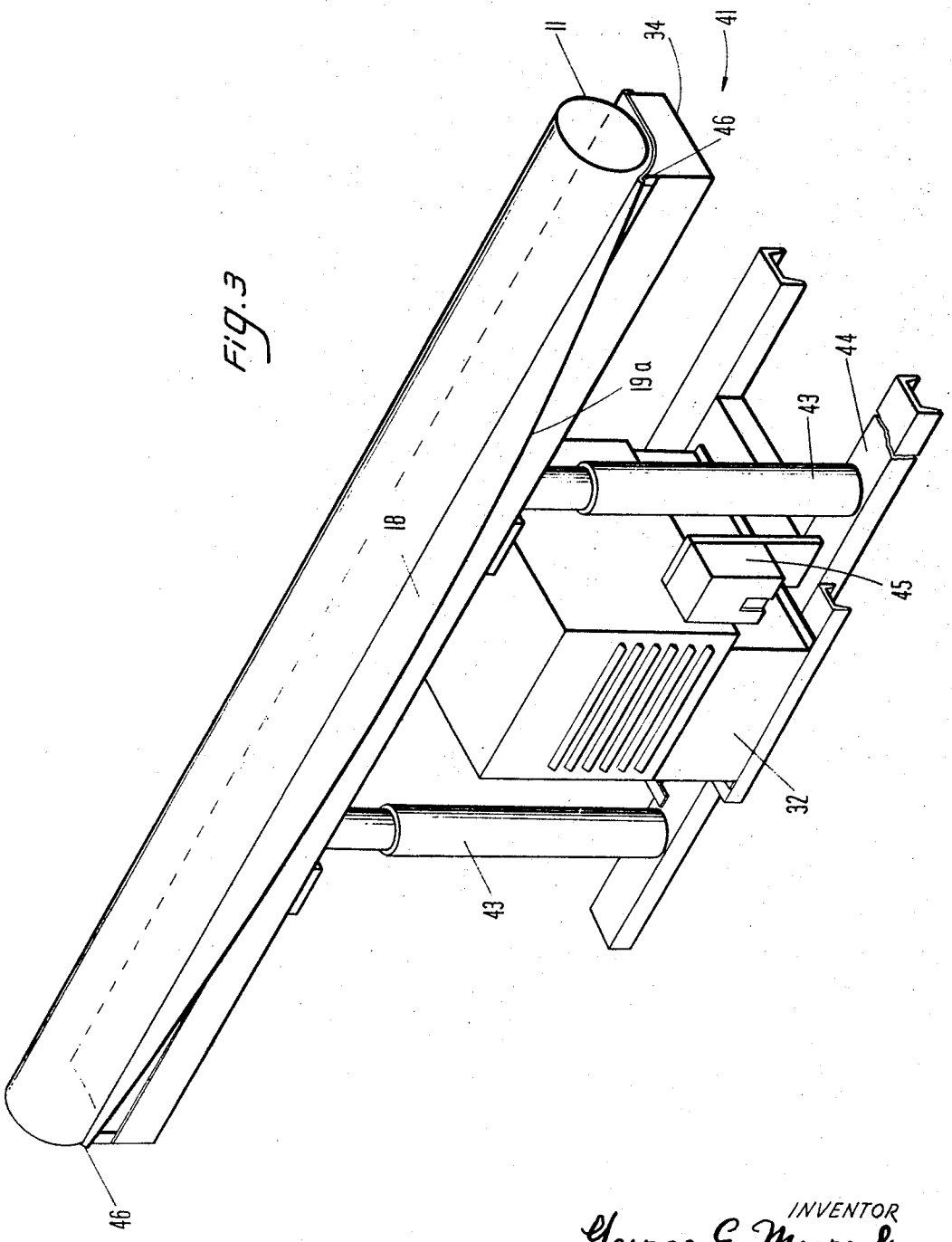
Fig. 3



INVENTOR
George E. Moore Sr.
BY
Wolf, Greenfield & Hicken

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3,474,553

FABRIC SPREADING AND FEEDING MACHINE

George E. Moore, Sr., Stone Mountain, Ga., assignor to Sheetmaster Corporation, Boca Raton, Fla.

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U.S. Cl. 38—143 4 Claims

ABSTRACT OF THE DISCLOSURE

A sheet feeding apparatus for feeding non-self-supporting sheet materials in spread condition to a subsequent processing apparatus and more particularly a novel and improved vacuum operated sheet feeding apparatus useful for straightening and spreading to remove wrinkles from fabric in connection with fabric handling apparatus is provided. The feeding apparatus defines a forward, elongated, uninterrupted vacuum orifice. In the preferred embodiment, a curved overhanging lip is provided which significantly aids the straightening process.

BACKGROUND OF THE INVENTION

The feeding of fabric materials into processing apparatus such as ironers is a time consuming process. In conventional practice, when feeding a ten foot long ironer roll with bed sheets, two girls are ordinarily employed. The workers bend at each side of a sheet and bring the leading edge of the sheet into the ironer rolls. They must then hold and spread the side edges as the sheet is drawn along its path between the ironer rolls. Holding the side edges has been found necessary when manual feeding is employed in order to keep sheets spread and prevent unwanted wrinkles occurring between side edges.

At least one vacuum feed device has been designed to speed up the feeding of ironers and other sheet processing equipment. In one prior art device, an upwardly facing vacuum orifice is provided in front of an ironer roll. Sheet feeding can be speeded up by feeding the sheets to the roll and permitting the upwardly facing vacuum orifice to provide a drag on the sheet tending to straighten it. However, the upwardly facing orifice does not eliminate all spreading and straightening problems and in fact it is often necessary to employ workers at each side of the sheet as previously done to assure spreading of the sheet during feeding.

An important object of this invention is to provide a sheet feeding apparatus for rapid and efficient feeding of fabric processing apparatus.

Another object of this invention is to provide a sheet feeding apparatus in accordance with the preceding object which can be formed using substantially conventional vacuum means in an inexpensive construction.

Still another object of this invention is to provide a sheet feeding apparatus in accordance with the preceding objects which eliminates the necessity for side seams to be stretched apart during feeding of sheet materials to fabric handling apparatus.

SUMMARY OF THE INVENTION

According to the invention, a sheet feeding apparatus for feeding non-self-supporting sheet material to a subsequent processing apparatus such as an ironer is associated with a means, preferably in the processing apparatus, for pulling the sheet material in a first direction along a path. The feeding apparatus has an elongated vacuum chamber extending transversely of the path of travel of the sheet material. The chamber defines an elongated orifice extending transversely of the path and has a first orifice edge and a second orifice edge. The second orifice edge is spaced forwardly of the first orifice edge with the

first orifice edge being positioned to receive a portion of the sheet material before that portion of sheet material moves along the path to the second orifice edge. Means are provided for creating a partial vacuum at the orifice to cause a predetermined drag on the sheet material tending to spread the sheet material and remove wrinkles as it moves along the path whereby the material is evenly fed in smooth condition to the processing apparatus.

Preferably the orifice opens downwardly and the second orifice edge is defined by an upper wall which has a vertical component while the first orifice edge is defined by a second wall having a vertical component. The second orifice edge is preferably curved to aid in straightening and stretching sheets during feeding. The vacuum means is preferably attached to the vacuum chamber substantially at the sides of the chamber. A sheet processed in the sheet feeding apparatus passes from the second wall across a downwardly opened vacuum orifice and upwardly over the upper wall to the processing apparatus. As the processing apparatus pulls the sheet along the path, the vacuum creates a suction force at the orifice preferably of sufficient magnitude to straighten and smooth the sheet material without drawing the sheet material within the orifice to the adjacent vacuum chamber.

It is a feature of this invention that operators can merely start the front two corners of a sheet into the feeding apparatus and then let go. The apparatus automatically correctly feeds the sheet while the operators are free to grasp the next sheet to be fed.

The above and other objects, features and advantages of the present invention will be better understood from the following specification when read in conjunction with the accompanying drawing, in which:

FIG. 1 is a perspective view of a sheet feeding apparatus in accordance with the present invention;

FIG. 2 is a cross-sectional view thereof taken along line 2—2 of FIG. 1;

FIG. 2*a* is a front view of a modified element thereof; and,

FIG. 3 is a perspective view of a preferred embodiment of the invention.

Turning now to the drawings, and more particularly FIG. 1 thereof, a sheet feeding apparatus **10** is shown in combination with an ironer roll **11** of a conventional sheet ironing machine. The apparatus **10** defines a vacuum chamber **34** preferably formed by a flat bottom **12** having upwardly extending side walls **13** and **14**. The upper wall of the chamber **34** is formed by an overturned plate **15** and a curved plate **16** extending upwardly to a point **17** forming a downturned wall **18** having a vertical component and an upper orifice edge **19**. A lower orifice edge **20** is formed opposite the edge **19** with both edges extending from side to side, transversely of the apparatus **10**. The vacuum orifice defined by edges **19** and **20** leads directly to the chamber **34** without interruption providing an open elongated passageway in cross section. The chamber **34** is closed at both sides by an end plate as best shown in FIG. 1 at **21**. Reinforcing angle irons **22** extend transversely of the apparatus particularly at the corners to reinforce in accordance with known practice. The curved plate permits compact placement of the roll **11** close to the vacuum orifice and enhances the design of the vacuum chamber **34**.

Vacuum ports as shown at **23** are preferably positioned on either end of the transversely extending vacuum chamber **34** and are connected by hoses such as **31** to a suitable vacuum source such as a two horsepower motor **32** and conventional blower means, such as one capable of moving 1200 cu. ft./min., to create a substantially uniform vacuum with the chamber **34** during operation of the sheet feeding apparatus. A butterfly valve, is indicated diagrammatically at **31***a*, is preferably positioned in each

of the hoses **31** so as to vary the vacuum in the chamber as desired with different weight and size sheet materials processed. It is believed that the positioning of the vacuum ports at sides of the chamber aids in spreading sheets from side to side as they are fed.

The transversely extending vacuum orifice defined by parallel edges **19** and **20** preferably faces generally downwardly so that a sheet **30** fed into the feeding apparatus passes adjacent the flat vertical wall **13** past edge **20**, edge **19**, upper wall **18** and into the associated apparatus in the direction of the path shown by arrow **24**.

Suitable legs shown semidiagrammatically in FIG. 2 form a frame **33** supporting the motor assembly and vacuum chamber. The legs are preferably adjustable to raise the feeding apparatus to the working level of an operator preferably with the vacuum orifice about three to four feet above the ground.

The roll **11** of the ironer with which the spreader is used is designed to pull sheets along the path **24** toward the rear end of the ironer as shown to the right of FIG. 2. The ironer may be a conventional piece of equipment having a roll **11** of the type shown and in some cases an upper roll to flatten and iron a sheet drawn therebetween.

In the embodiment of FIG. 1, the orifice defined by edges **19** and **20** is generally in the form of a rectangular slot extending transversely of the path **24** from end plate to end plate of the apparatus and having a downwardly facing opening to draw a sheet into the position shown in FIG. 2 and provide back pressure on the sheet tending to remove wrinkles from the sheet material as it travels along the path. Where the sheet material fed into the machine has a width less than the width of the vacuum orifice, cover plates of the type shown at **25** are affixed to the front wall **13** by conventional screws (not shown). One or more cover plates such as **25** can be used to reduce the orifice transverse extent from, for example, ten feet to eight feet by providing two one-foot cover plates at either end of the chamber as shown in FIG. 1. The cover plates **25** preferably have an upwardly extending lip **26** adapted to substantially close the slot formed by edges **19** and **20** preventing unwanted escape and lowering of the vacuum when narrow sheet material is employed. Thus, the specific width of any sheet material fed into the apparatus **10** will determine the size or number of plates **25** attached to the apparatus in use. These plates are preferably removable so as to provide for interchangeability or complete removal and high versatility. The plates **25** can be used to modify the apparatus for feeding of two or more sheets at a time. Thus, if three spaced plates **25** are used with two plates located at the sides, two separate sheets can be simultaneously fed by the apparatus **10**.

In use of the sheet feeding apparatus, a non-self-supporting sheet material such as a bed sheet made of cotton fabric is fed to a processing apparatus such as ironer **11** which has means including the roll shown in FIG. 1 for pulling the sheet material along a path. The path followed by the sheet is shown in FIG. 2 with the leading sheet edge moving in the direction of arrow **24** and the rear edge hanging down. Preferably two workers grasp side corners of the leading edge of a sheet and place the corner of the sheet into feeding engagement with the ironer roll **11**. Thus the leading edge goes over the ironer roll with the remaining portion of the sheet draped downwardly as shown. The vacuum in chamber **34** pulls the sheet toward the slot formed by the edges **19** and **20** while the weight of the sheet and the pull on the leading edge prevents the sheet from being pulled within the vacuum chamber. The sheet moves upwardly with sufficient back drag to stretch the sheet and allow the operators to release the side edges once the leading edge has been positioned. The use of the vacuum means **23** at either end of the chamber **34** also aids in stretching the sheet in a side to side direction and smoothing out wrinkles in the normally wet sheets fed to an ironer.

In a specific embodiment of this invention, the vacuum chamber is approximately 10 feet wide, 7 inches from wall **13** to wall **14** and about 3⅜ inches from the top of wall **13** to the bottom thereof. The straight line distance from edge **19** to edge **20** is approximately 1¼ inches and a two horsepower motor (Dayton Motor, 3515 r.p.m. 3-phase) is used to create suction with a partial vacuum in 4-inch tubing connected to ports **23**. Conventional single or double bed sheets can be fed at a high rate with minimum effort by feeding operators.

A modification of the invention is shown in FIG. 2A wherein the front plate **13** has a plurality of angularly arranged raised ridges **40**. Preferably two groups of ridges **40** are used on either side of the center line of the front plate **13**. The ridges extend at angles and are inclined upwardly and outwardly of the sheet material positioned in the feeding apparatus. This feature aids in straightening of the sheet in side to side directions.

Turning now to the preferred embodiment of the invention shown in FIG. 3, the sheet feeding apparatus **41** is shown which is identical to apparatus **10** except for the differences described below.

A conventional welded channel frame **44** supports the motor and blower as indicated at **32**. An on-off electric switch **45** is provided preferably at the forward portion of the apparatus. Adjustable legs **43** support the vacuum chamber **34** and are preferably formed of telescopic tubes. The vacuum ports **23** and hoses **31** (not shown in FIG. 3) are the same as used in the embodiment of FIG. 1.

The significant difference in the embodiment of FIG. 3 lies in the use of the curved edge **19***a* of the down-turned wall or lip **18**. The edge is convex or curved gently from side to side of the apparatus to form the widest portion of wall **18** at the center with rearwardly tapering arcuately curved portions extending on either side thereof to the sides of the machine. In the preferred embodiment, the transverse extent of the curve is 10 feet which is the width of the vacuum chamber **34** and the center lip is 2 inches long at its widest point and substantially uniformly curved to a length of ¾ inch at edges **46**. The generally arcuate curvature greatly aids in stretching sheets fed in the apparatus and acts to eliminate unwanted wrinkles and creases in textile sheets such as bed sheets when fed into the ironer.

While specific embodiments of the present invention have been shown and described, many modifications thereof are possible. For example, the feeding apparatus of this invention is useful in connection with large sheets such as bed sheets and in addition small sheet materials such as tablecloths and napkins. The sheet materials can be of any known fabric including cotton, muslin, wool and the like. The ironer is one processing apparatus with which the feeder is useful although it may also be used with such textile handling apparatus as folders, packers and the like. The conventional sheet moving means of such apparatus is sufficient to provide motion to sheets over the feeding apparatus. The dimensions of the chamber and specific shape can vary. The degree of vacuum in the chamber **34** can be varied to impart desired drag to the specific sheets processed with regard to their weight and dimensions. Preferably as described and claimed the vacuum orifice, including the path from the orifice to the chamber **34**, is uninterrupted; however, it should be understood that in some cases reinforcing or other members can be used across the orifice or path so long as the orifice and path are substantially uninterrupted with regard to the vacuum and such structure is the full equivalent of the claimed invention.

What is claimed is:

1. Apparatus for spreading non-self-supporting sheet material to a subsequent processing device having means for pulling said sheet material along a path, said apparatus comprising an elongated vacuum chamber adapted to be positioned transversely of said path of travel of said

sheet material as it is pulled by said device, means defining an elongated orifice in said chamber extending lengthwise thereof and having a first transverse orifice edge and a second transverse orifice edge, said first orifice edge being spaced inwardly of and below said second orifice edge, a wall extending downwardly from said first orifice edge and adapted to engage sheet material as said material is pulled along said path to said second orifice edge, said second orifice edge generally arcuately curved from side to side of said chamber whereby said sheet material is straightened at least partially as it moves over said second orifice edge, and means for creating a partial vacuum in said chamber to cause a predetermined drag at said elongated orifice on said sheet material as it moves along said path whereby said material is evenly fed in smooth condition to said process means.

2. A fabric-spreading device for use in connection with fabric-handling apparatus comprising, an elongated chamber having means forming an elongated slot in said chamber extending longitudinally thereof and defined in part by elongated first and second wall members with said first wall member defining an upper edge with said second wall member at least in part displaced along its lower edge outwardly with respect to the upper edge of said first wall member of said chamber said lower edge generally arcuately curved from side to side of said chamber, and suction means connected to said chamber for drawing air through said slot into said chamber whereby fabric drawn over said wall members is sucked towards said slot.

3. A fabric-spreading device for use in connection with fabric-handling apparatus comprising, an elongated chamber having means forming an elongated slot in said chamber extending longitudinally thereof and defined in part by elongated first and second wall members with said first wall member defining an upper edge with said second wall member at least in part displaced along its lower edge outwardly with respect to the upper edge of said first wall member of said chamber, said lower edge generally arcuately curved from side to side of said chamber,

means forming a plurality of vacuum ports spaced longitudinally in said chamber, said second wall member extending angularly with respect to said first wall member and with said slot extending below said second wall member, and suction means connected to said chamber for drawing air through said slot into said chamber whereby fabric drawn over said wall member is sucked towards said slot.

4. A fabric-spreading device for use in connection with fabric-handling apparatus comprising, an elongated chamber having means forming an elongated slot in said chamber extending longitudinally thereof and defined in part by elongated first and second wall members with said first wall member defining an upper edge with said second wall member at least in part displaced along its lower edge outwardly with respect to the upper edge of said first wall member of said chamber, said lower edge generally arcuately curved from side to side of said chamber, and said first wall member carries a plurality of ridge means projecting therefrom, and suction means connected to said chamber for drawing air through said slot into said chamber whereby fabric drawn over said wall members is sucked towards said slot.

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MERVIN STEIN, Primary Examiner

G. V. LARKIN, Assistant Examiner