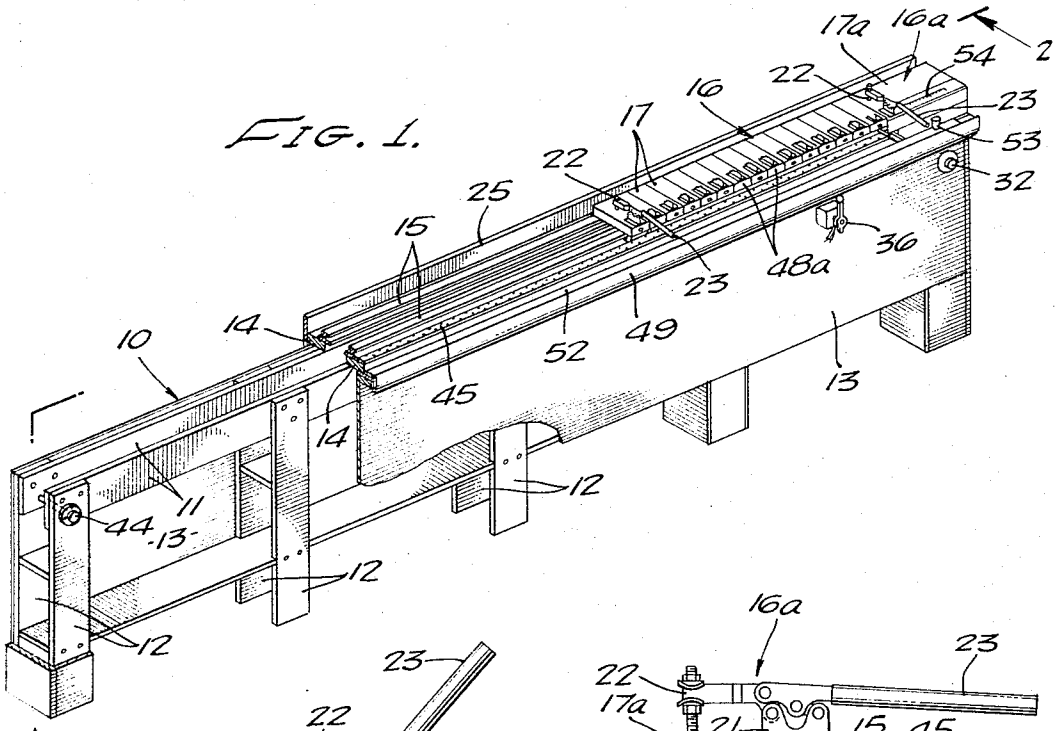
Jan. 10, 1967 E. SOTO 3,297,215

PLEATING APPARATUS AND METHOD

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FIG. 1.



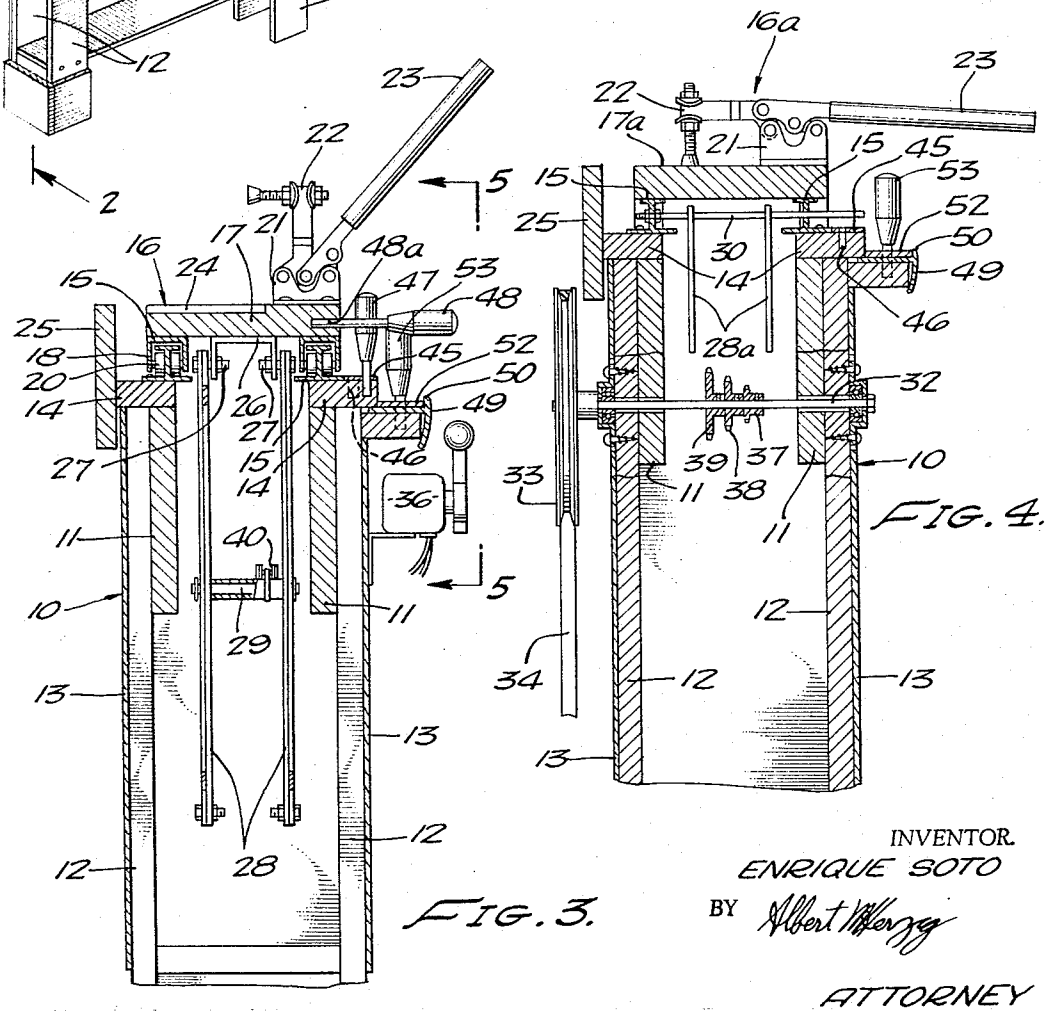


FIG. 3.

FIG. 4.

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PLEATING APPARATUS AND METHOD

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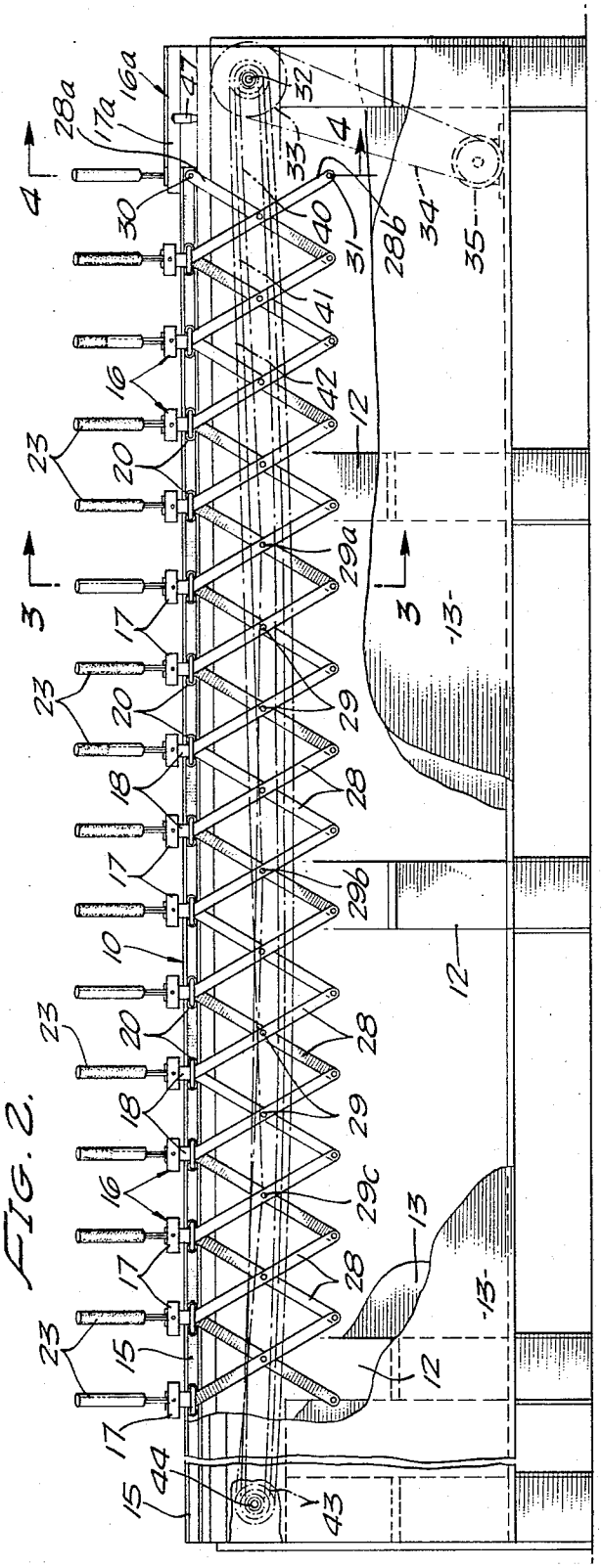


FIG. 2.

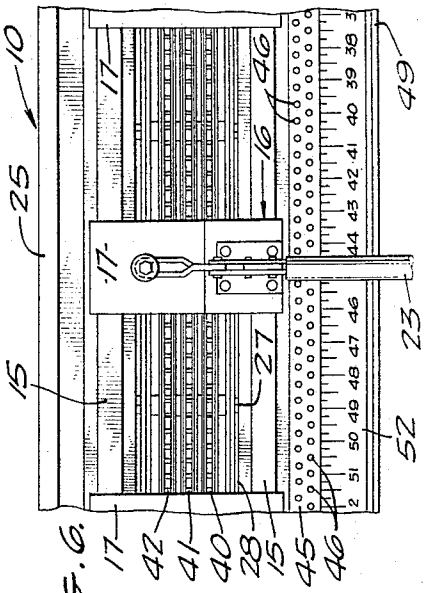


FIG. 6.

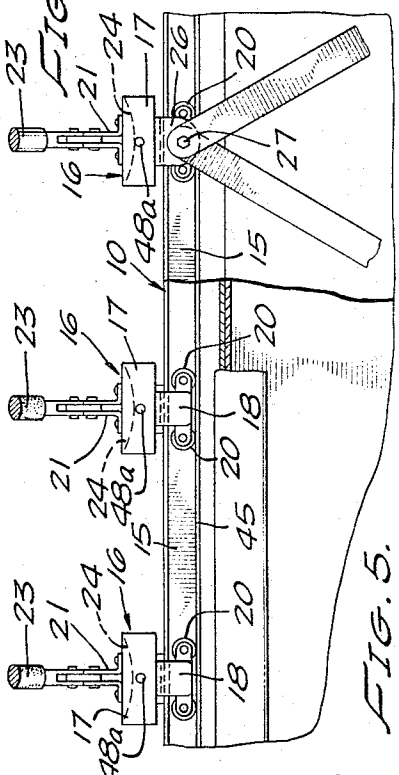


FIG. 5.

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PLEATING APPARATUS AND METHOD

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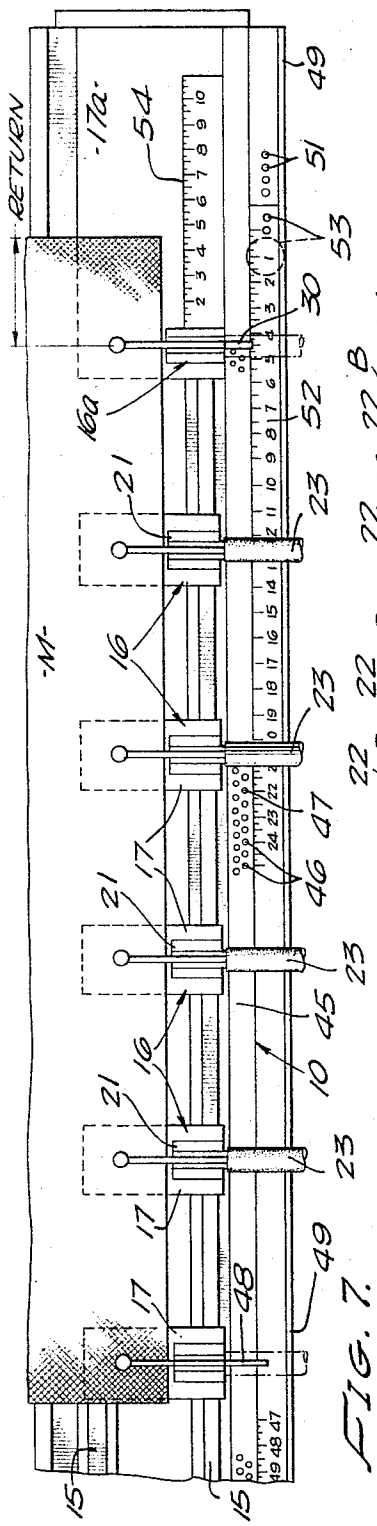


FIG. 7.

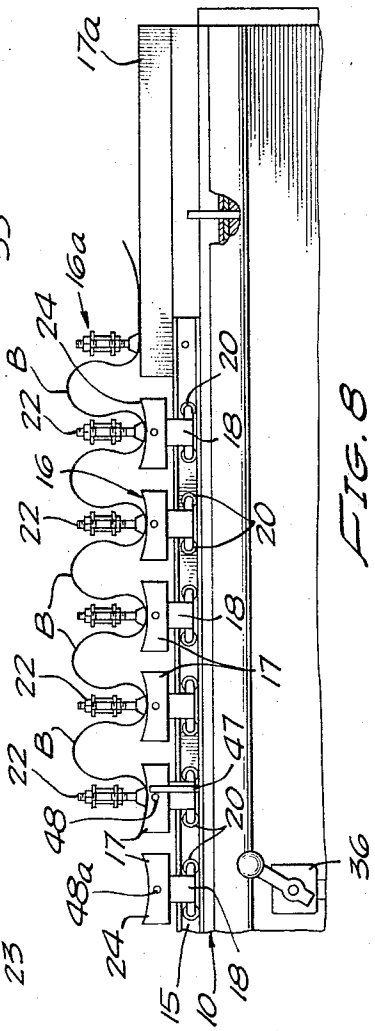


FIG. 8

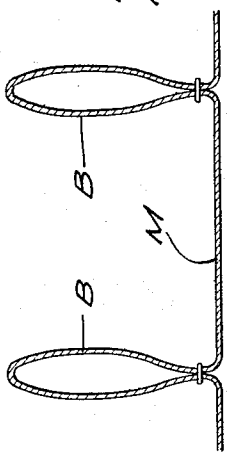


FIG. 10.

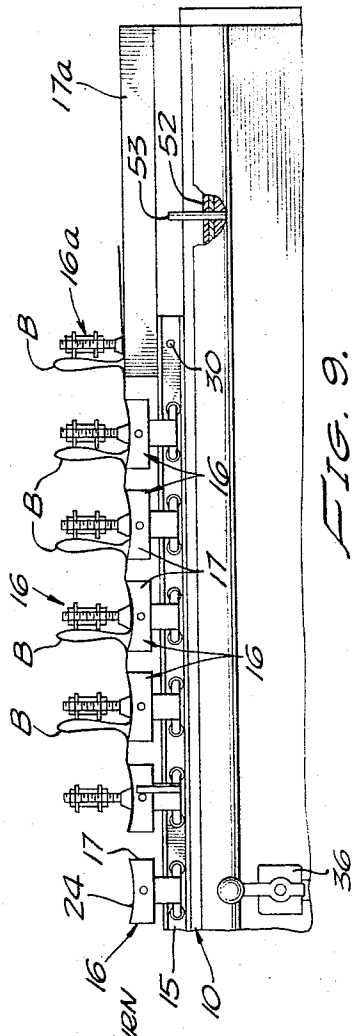


FIG. 9.

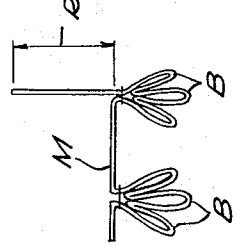


FIG. 11.

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United States Patent Office 3,297,215 Patented Jan. 10, 1967

3,297,215

PLEATING APPARATUS AND METHOD

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Filed Jan. 23, 1962, Ser. No. 168,213
11 Claims. (Cl. 223—28)

This invention relates to pleating apparatus and manufacture and more especially to a machine for pleating draperies and other fabric articles.

The manufacture of pleated draperies and other fabric articles heretofore has been attended with considerable difficulty. In such manufacture the pleats have often been uneven and irregular in form and spacing and such irregularities have been readily noticeable, the resultant product having an appearance of poor workmanship. The present invention has been developed to overcome these difficulties and shortcomings of the prior art apparatus and methods of pleating draperies and has its fruition in a machine or apparatus for making perfect pleats in fabric materials.

It is, therefore, the primary purpose and objective of this invention to provide novel pleating apparatus for pleating draperies and other fabric materials.

Another objective of the invention is to provide a novel pleating apparatus for draperies and the like wherein the size of the pleats can be readily varied.

Another object of the invention is to provide an improved pleating machine or apparatus wherein the spacing of the pleats can be varied.

An additional object of the invention is to provide a novel pleating apparatus wherein the size of the pleated article is substantially unlimited.

Other objects and advantages of the invention will appear and be brought out more fully in the following specification, reference being had to the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view partially in section showing the structure of the crank case or frame of the pleating machine of this invention.

FIGURE 2 is a sectional view enlarged taken along the line 2—2 of FIGURE 1 showing the parts in partially operated condition.

FIGURE 3 is a sectional view enlarged taken along the line 3—3 of FIGURE 2.

FIGURE 4 is a view similar to FIGURE 3 taken along the line 4—4 of FIGURE 2.

FIGURE 5 is a partial elevation view taken along the line 5—5 of FIGURE 3 showing the displacements of the carts.

FIGURE 6 is a partial plan view showing one of the carts and related parts.

FIGURE 7 is a partial plan view showing a step in the operation of the apparatus and with a portion of the material to be pleated in position.

FIGURE 8 is a partial elevation front view showing a second step in the operation of the apparatus.

FIGURE 9 is a view similar to FIGURE 8 showing the next succeeding step in the operation of the apparatus.

FIGURE 10 is a sectional view of two bows of material held together by stapling.

FIGURE 11 is a diagrammatic plan view of a pleated bow showing the necessary "return" portion of the material.

The pleating apparatus of this invention comprises an elongated table-like frame along which extends a track on which a plurality of carts or roller clamp devices may roll, these devices being connected by a plurality of cross bar links of the lazy-tong type and by which the spacing of the carts or clamp devices are always maintained at equal though varied spacing. An end cart or clamp device is secured to one end of the structure and determines the starting point for the several panels of the pleated unit. The pleat material is initially secured to the several clamp devices in separated or extended condition and, upon the carts or clamp devices being moved to near contracted condition, the several bows are formed, the sides of which are temporarily stapled and thereafter sewed together to form the several pleats. A scale is positioned along the trackway by which the size of the pleats and the panels may be determined in order that accuracy of these dimensions may be maintained. The apparatus is designed for manual or motor operation, as may be desired.

Referring in more detail to the drawings, the pleating apparatus of this invention comprises an elongated frame or crank case **10** consisting of a pair of spaced apart beams **11** secured to a plurality of legs **12** to which a pair of side panels **13** are secured. A top plate **14** is mounted on each beam **11** and an I-beam rail **15** is secured on each of the top plates **14**.

A plurality of roller clamp devices or carts **16** are movable along the I-beam rails **15** and each of the carts comprises a block **17** to the underside of which are secured a pair of U-shaped brackets **18**, each of which provides bearing mounting for two pairs of rollers **20** adapted to run on rails **15** on opposite sides of the web thereof. A bracket **21** is secured on each of the carts **16** and mounts a clamp **22** that is actuated by a toggle link handle **23** from the open position shown in FIGURE 3 to the clamped position indicated in FIGURE 4. A fixed clamp device **16***a* is mounted on a block **17***a* secured on frame **10** at one end thereof at the end of rails **15**. The block **17** in each of the carts **16** is formed slightly concave or dished as indicated at **24** and as may be clearly seen in FIGURES 8 and 9. A guide rail **25** is secured to the rear top plate **14**, the top edge of the guide rail being substantially level with the top of blocks **17** and **17***a*.

To the underside of each cart block **17** is secured a U-shaped bracket **26** which mounts bearing pins or bolts **27**, each of which pivotally secures the upper ends of a pair of links **28** which are arranged in a cross bar or lazy-tong arrangement. Each link **28** is pivotally connected at its mid-point to the mid-point of a link carried by an adjacent cart **17** and the lower end of each link **28** is similarly secured to the lower end of a link connected to the second removed cart, the mid-pivot connection being indicated at **29**. A pin **30** extends through apertures in the webs of rails **15** and provides pivot mounting for an end pair of links **28***a*, the alternate pair of links **28***b* being similarly connected to pins **31** suitably secured to panels **13** or a fixed part of frame **10**.

A transverse shaft **32** is suitably bearing mounted at one end of frame **10** and has secured thereon a pulley **33** driven by a belt **34** from a motor **35** suitably mounted to frame **10**. A switch **36** is secured on one of the panels **13** near the right end thereof, as may be seen in FIGURES 1 and 3, for controlling the operation of the motor **35** for forward and reverse movement. The shaft **32** has secured thereon, and for drive by it, three chain sprockets **37**, **38** and **39**, respectively, for driving three chains **40**, **41** and **42**, respectively, which chains are carried over three idler pulleys **43** running on a transverse shaft **44** positioned at the opposite end of frame **10**. Chain sprockets **37**, **38** and **39** are dimensioned in the ratio of 1–2–3. Chain **40** has one link thereof secured to cross bar link pin **29***a*, chain **41** having a link thereof connected to pin **29***b* and a chain **42** having a link thereof connected to pin **29***c*.

Because of the proportioned sizes of the sprockets **37**, **38** and **39**, driving chains **40**, **41** and **42**, drive the cross-bar links **29***a*, **29***b*, and **29***c*, at proportionately different rates whereby clamps that are farther from the fixed end of the lazy tongs assembly are moved at a proportionately

greater rate (and distance) whereby the result is realized of uniform spacing between the clamps.

The pleating machine exemplified herein is designed for the making of three panels, each having five pleats, and there are therefore provided **15** carts or roller clamp devices **17**. Pin **29***a* is that which interconnects links **28** respectively connected to the fourth and fifth carts, pin **29***b* being similarly connected to the links secured to the eighth and ninth carts and pin **29***c* connected to the links secured to the twelfth and thirteenth carts respectively. Thus, upon rotation of drive shaft **32** by a motor **35** (or manually if the apparatus does not have a motor) the lazy-tong linkage will be extended and retracted so as to maintain the carts **17** uniformly and equally distantly spaced, this spacing being also maintained between the first cart and the fixed clamp device **16***a* at the end of the structure.

Extending along the front of the apparatus is a metal strip **45** running the full length of the frame which strip is formed with a plurality of apertures **46** spaced at one-quarter inch intervals. These apertures are staggered so as not to weaken the strip, the starting point of this array of apertures being opposite clamp device **16***a*. A shaft or retractable pin **47** is provided for positioning in any of apertures **46** during the operation of the apparatus. A staff or stop pin **48** is provided and is insertable in an aperture **48***a* which is formed in the front side of each clamp block **17** staff **48** being adapted to stop against staff **47** during the operation of the apparatus.

Extending parallel with strip **45** is a case **49** having an upstanding flange **50**, the case being formed with a plurality of apertures **51** at the extreme right end thereof and spaced one-quarter inch apart starting from a starting point opposite fixed clamp device **16***a*. A metal ruler **52**, measuring 96 inches in length, is slidable along case **49** and, at one inch in from the end thereof at the zero mark of the ruler, a shaft **53** extends which is insertable in one or another of apertures **51** in the case **49**. A scale **54** may, if desired, be provided on block **17***a* running to the right of the starting point of the fixed clamping device **16***a*. Pin **30** which supports links **28***a* extends forwardly and serves as an abutment for stop pin or staff **47**.

This pleating apparatus is designed to make five pleats each and three panels, however, additional pleated panels may be made in the same piece of material by merely pleating the additional panels following the manner of making the first three panels. In conducting the pleating operations, it is first necessary to determine the amount of width to be pleated and to what size. With the aid of a chart accompanying the machine, equal spaces and hidden seams will result. After the number of widths to be pleated and the total size have been determined, the chart will indicate what the first three widths and the remaining widths should be pleated to.

FIGURES 7 to 11 show the manner of pleating with the machine of this invention and illustrate a pleated panel of 22 inches having a return size of 4½ inches. The amount of material for this panel will be 45 inches. Starting with the machine closed, as shown in FIGURE , that is, with all of the carts **16** bunched at the right nd, the material "M" is placed so that the end thereof is n the "return" platform **17***a* with the end or "return" f the material placed at 4½ inches as indicated by the ıler **54** and the material clamped down by the clamp 6*a*, the handle **23** thereof being preferably marked white." The ruler **52** is then shifted on case **49** so that e 4½ inch mark coincides with pin **30** which indicates e start of the pleating panel the "return" of the material the end part to the right of the fixed clamp **16***a* and nstitutes a border part between the edge of the material id the first pleat.

The next step is to place shaft **47** in the aperture **46** rresponding to the 22-inch mark on strip **45**. The left d of the material "M" is then clamped to the fifteenth ımp device **16**, the handle of which is also "white."

The next step is to open the machine, by operation of motor **35**, or manually, until the material is taut between the two "white" handles. The intermediate clamping devices are then actuated to clamp the material thereto. The machine is then closed until the stop pin or staff **48** strikes the stop pin or staff **47** in the aperture in strip **45**. This will form the five bows "B" as shown in FIGURE 8. Thereupon the material is folded by hand adjacent the clamp to the right thereof and stapled or pinned, as shown in FIGURE 10, in readiness for sewing. These bows will thus be the pleats when folded to the position shown in FIGURE 11. The material is then removed from the machine or shifted, if additional panel widths are to be pleated. The same process is repeated for additional panels, with the exception of resetting the ruler **52** at the zero mark or point of no "return."

As should be clear from the foregoing description, the disclosed pleating machine is capable of making five pleats per panel, making three panels at a time, the size of the panels and the pleats being whatever desired, within the limits of the machine. As stated above, clamp handles **5**, **10** and **15** are white, however, if half panels are desired, they may be made using handles No. **2**, **7** and **12** which are half "white" and half "black." The remaining clamp handles are "black."

It will be understood that the foregoing description is illustrative rather than restrictive of the invention and that changes and modifications may be made without departing from the spirit and scope of the subjoined claims.

What is claimed is:

1. A pleating machine comprising a frame having an elongated guide track, means comprising a plurality of material clamping devices movable along the track, means interconnecting the clamping devices whereby they may be moved in one direction while maintaining equal spacing between adjacent clamping devices, variably settable stop means positioned along the guide track whereby to stop movement of the clamping devices at a desired predetermined point whereby material to be pleated can be clamped to individual clamping devices and then the clamping devices moved in closing direction until interrupted by the stop means, the said clamping devices being arranged to form folds between adjacent clamping devices, extending upwardly from the material.

2. A machine as in claim **1** wherein said interconnecting means comprises lazy tongs.

3. A pleating machine comprising a frame having an elongated guide track, means comprising a plurality of material clamping devices movable along the track, means interconnecting the clamping devices whereby they may be moved in one direction while maintaining equal spacing between adjacent clamping devices, variably settable stop means positioned along the guide track whereby to stop movement of the clamping devices at a desired predetermined point whereby material to be pleated can be clamped to individual clamping devices and then the clamping devices moved in closing direction until interrupted by the stop means to form folds between adjacent clamping devices, means for holding said interconnecting means at one end, and drive means for opening said clamping devices from said one end and closing them toward said one end.

4. A combination as in claim **3** including a material end clamp on one end of the said frame.

5. A pleating machine comprising a frame having an elongated guide track, means comprising a plurality of material clamping devices movable along said guide track, interconnecting means between the clamping devices and fixed at one end whereby the clamping devices may be opened away from said fixed end while maintaining uniform spacing between adjacent clamping devices, means providing an adjustable stop along said guide track, a plurality of said movable clamping devices having adjustable means for cooperating with said stop means, means for clamping the material to be pleated at said

fixed end and for opening said clamping devices with material clamped to one device until the material is taut, means for closing said clamping devices with material clamped therein until a stop member carried on a movable clamping device engages the said fixed stop member, the said movable clamping devices having relationship to the guide trackway whereby the material to be pleated folds upwardly when the movable clamping devices are closed.

6. A machine as in claim 5 wherein said interconnecting means comprises a lazy-tongs assembly having linkages connected to individual clamping devices, said assembly being positioned beneath the movable clamping devices.

7. A machine as in claim 6 including drive means for the lazy-tongs assembly including endless drive members and drive means including means for driving portions of the lazy-tongs assembly farther from the said fixed end at a greater rate to compensate for the greater distance from the fixed end.

8. A pleating machine comprising a relatively narrow upright frame having a pair of spaced guide rails at the upper part providing an elongated trackway, means comprising a plurality of material clamping devices having rollers and mounted to the movable along the track, means interconnecting the clamping devices comprising a lazy-tongs assembly having links connected to individual clamping devices whereby they may be moved in one direction while maintaining equal spacing between adjacent clamping devices, the lazy-tongs assembly being in a position below the clamping devices and being fixed at one end to the frame so as to be expandable in a direction away from the fixed end, a platform along the top of the frame having openings in it and variably settable stop members formed to be received in the openings, the said clamping devices having opening, and a removable stop member adapted to be received in the openings and cooperable with the variably settable stop means whereby to stop movement of the clamping devices at a desired predetermined point whereby material to be pleated can be clamped to individual clamping devices and then the clamping devices moved in closing direction until interrupted by the stop means whereby to form upward folds of material between adjacent clamping devices.

9. A method for forming uniformly spaced uniform drapery pleats comprising extending unpleated drapery material to a full width condition, simultaneously engaging two side edges and a number of uniformly spaced intermediate portions of the drapery material along one margin equal to the number of pleats desired plus one, simultaneously progressively and uniformly reducing the spacing between said engaged portions and causing the unengaged portions to form accessible pleats of progressively increasing uniform dimension until a predetermined width is reached between the side edges, maintaining said engaged portions equally spaced apart, and directly applying predetermined amounts of movement to spaced ones of said engaged portions of the material, in the same direction and in proportion to their distances from a side edge of the material.

10. An apparatus for forming uniformly spaced uniform pleats in drapery material comprising a fixed base, a plurality of relatively movable uniformly spaced material engaging means mounted on said base, actuating means connected to said respective engaging means for uniformly decreasing their spacing in a linear direction, means mounted on said apparatus extending at a fixed level between said spaced material engaging means for supporting drapery fabric therebetween and causing the pleats to automatically form upwardly when the material engaging means are brought toward each other, said actuating means including expandable means connected at spaced intervals to each of said respective engaging means, plural drive means connected to said expandable means at spaced points therealong, and proportional drive means for said plural drive means for imparting proportionately different movement in the same direction to said expandable means at the points of connection of said drive means whereby to insure uniform spacing between the said clamping devices.

11. An apparatus for forming uniformly spaced uniform pleats in drapery material comprising a fixed base, a plurality of relatively movable uniformly spaced material engaging means mounted on said base, actuating means connected to said respective engaging means for uniformly decreasing their spacing in a linear direction, means mounted on said apparatus extending at a fixed level between said spaced material engaging means for supporting drapery fabric therebetween and causing the pleats to automatically form upwardly when the material engaging means are brought toward each other, said actuating means including expandable means connected at equally spaced intervals to each of said respective engaging means, a plural flexible line and pulley drive mechanism with the flexible lines thereof drivingly connected to different parts of said expandable means for driving said different parts in the same direction but at different rates whereby to insure uniform spacing between said engaging means.

References Cited by the Examiner

UNITED STATES PATENTS

1,733,353	10/1929	Maulsby et al.	223—28
2,124,650	7/1938	Chessler	223—33 X
2,520,787	8/1950	Sherman	223—30
2,589,379	3/1952	Herzog.	
2,672,929	3/1954	Eggert.	
2,777,617	1/1957	Matt	223—34
3,058,634	10/1962	Wieneke	223—28

FOREIGN PATENTS

15,180	8/1893	Great Britain.

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