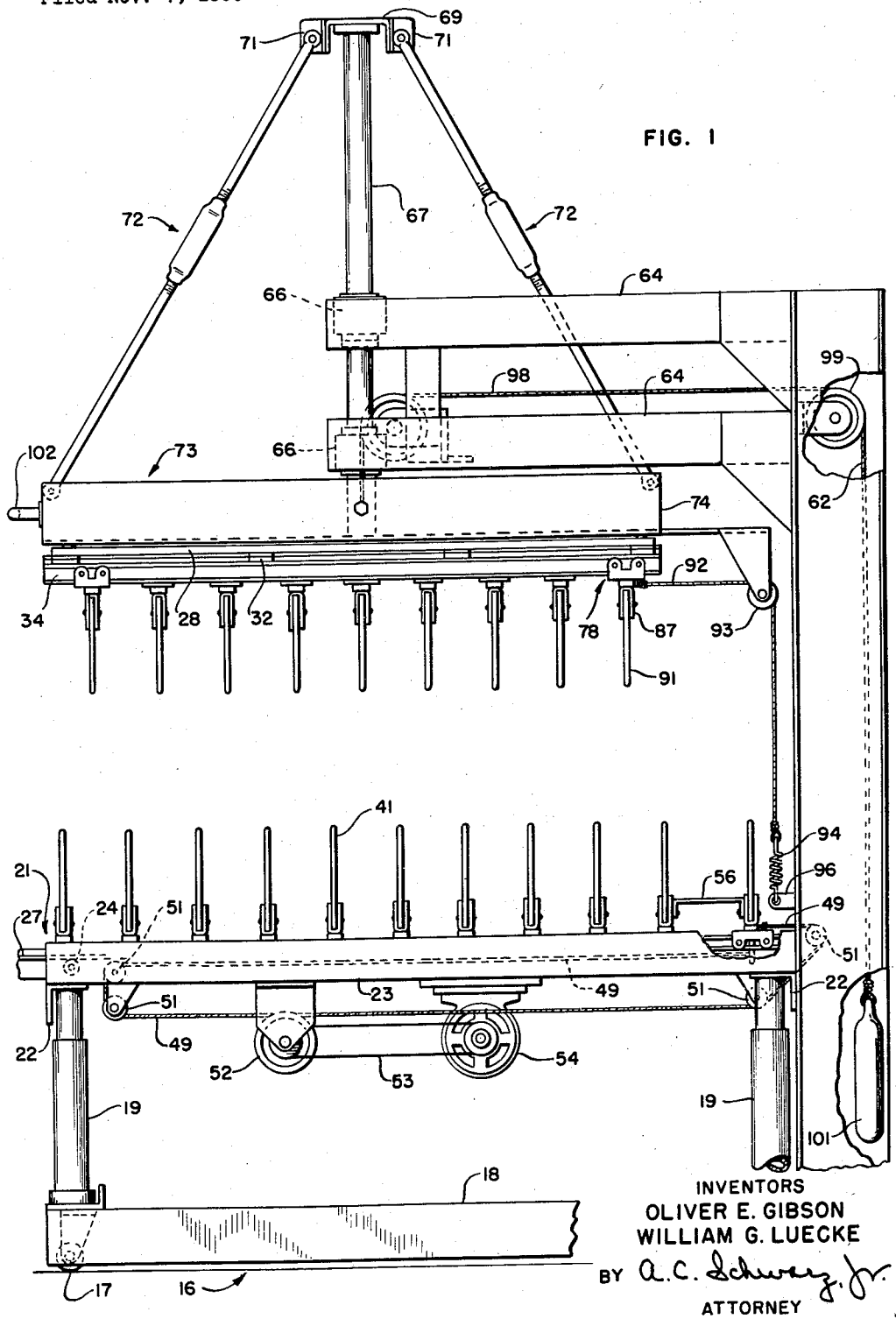
June 3, 1958 O. E. GIBSON ET AL 2,837,257

METHOD OF AND APPARATUS FOR FORMING PLEATS

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FIG. 1



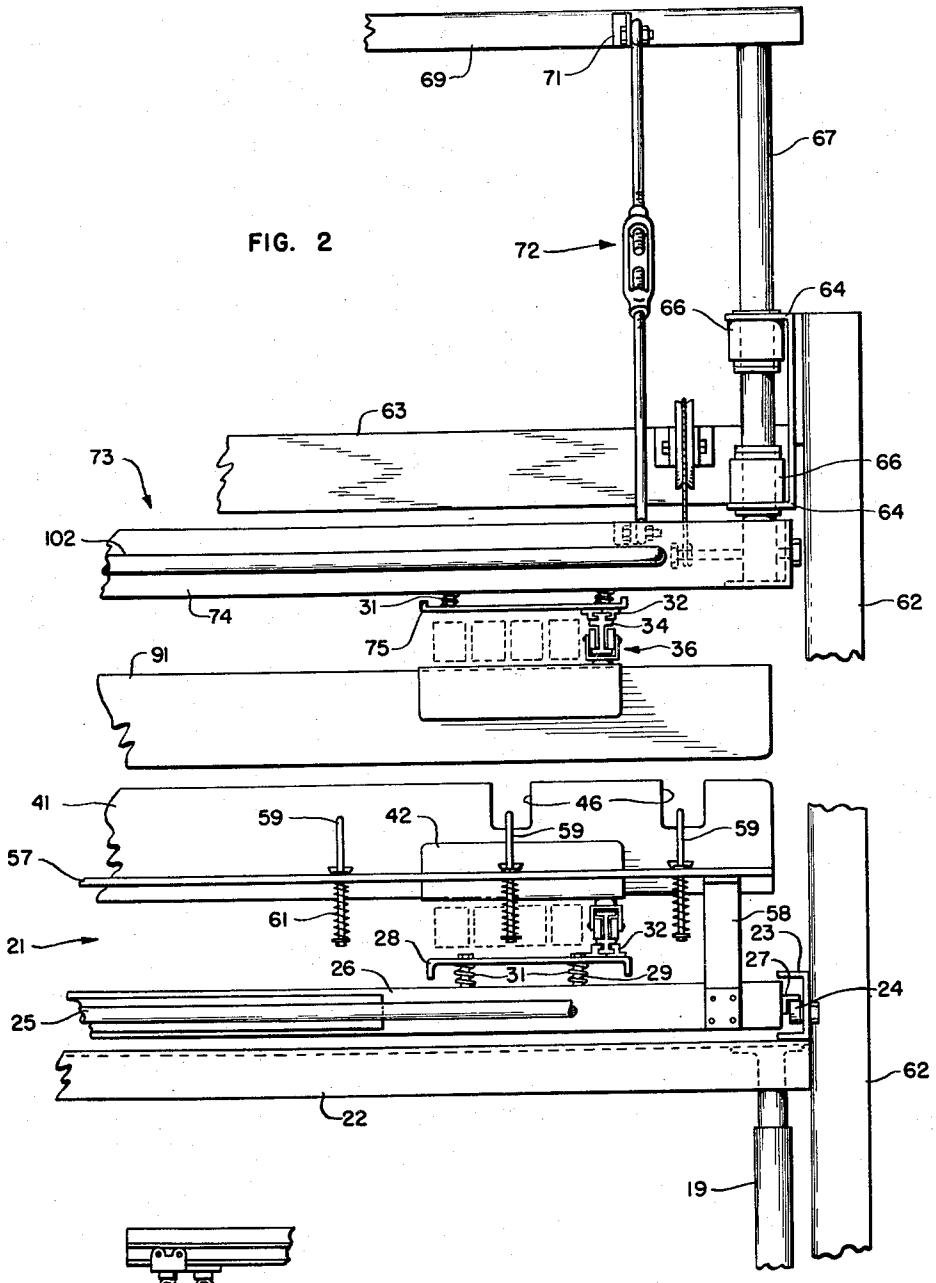
INVENTORS
OLIVER E. GIBSON
WILLIAM G. LUECKE
BY A. C. Schwarz, Jr.
ATTORNEY

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METHOD OF AND APPARATUS FOR FORMING PLEATS

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FIG. 2



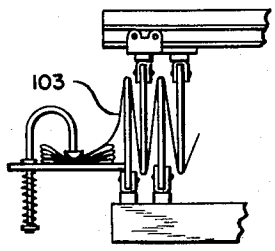


FIG. 13

INVENTORS
OLIVER E. GIBSON
WILLIAM G. LUECKE
BY A. C. Schwarz, Jr.
ATTORNEY

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FIG. 3

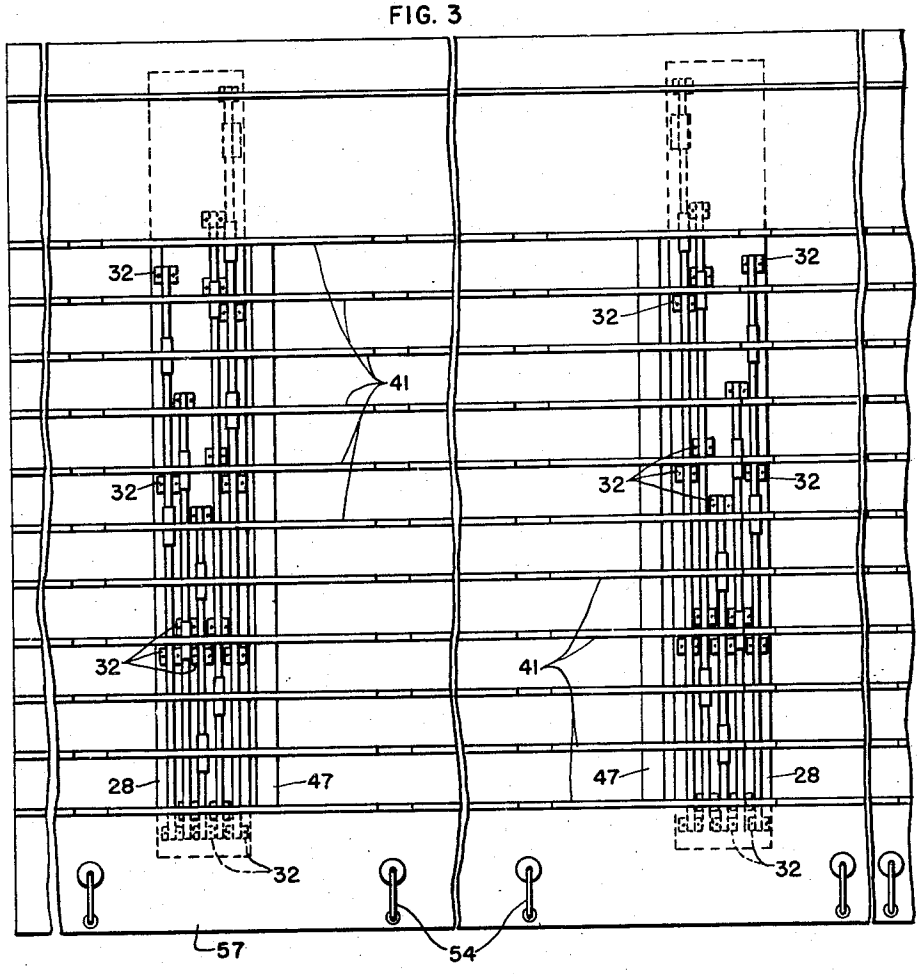


FIG. 4

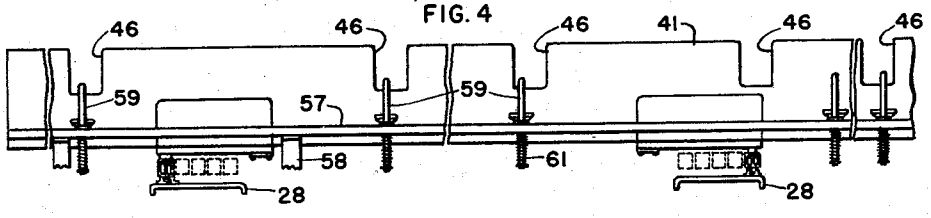
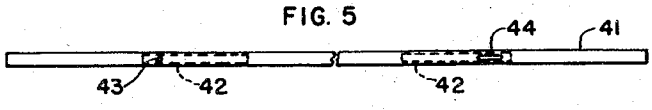


FIG. 5



INVENTORS
OLIVER E. GIBSON
WILLIAM G. LUECKE
BY A. C. Schwarz, Jr.
ATTORNEY

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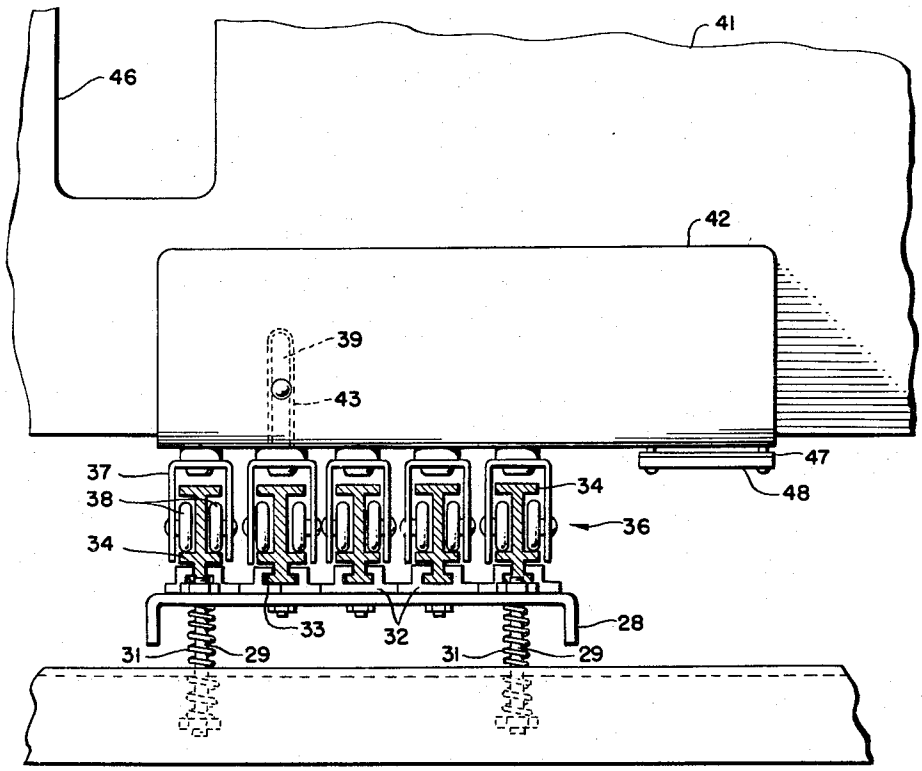


FIG. 6

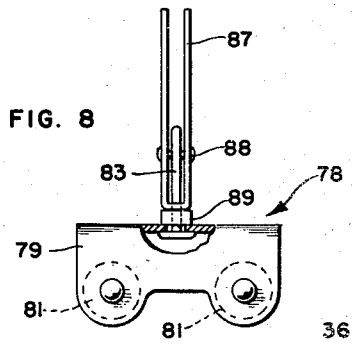


FIG. 8

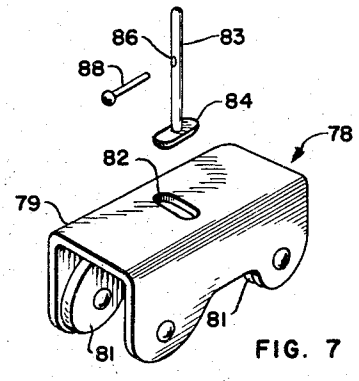


FIG. 7

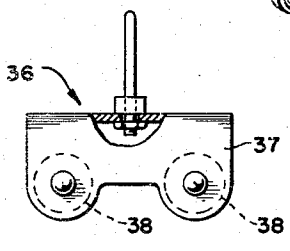


FIG. 9

INVENTOR
OLIVER E. GIBSON
WILLIAM G. LUECKE
BY A. C. Schwarz, Jr.
ATTORNEY

June 3, 1958 O. E. GIBSON ET AL 2,837,257

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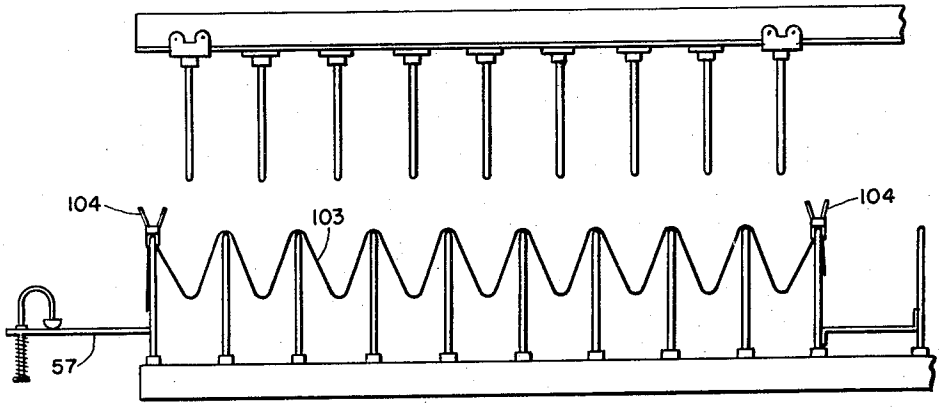


FIG. 10

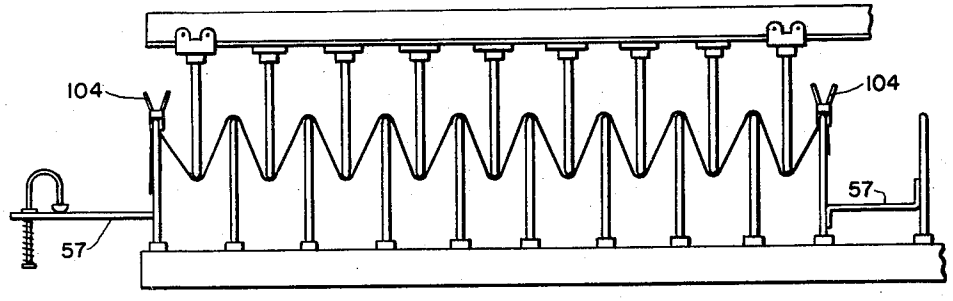


FIG. 11

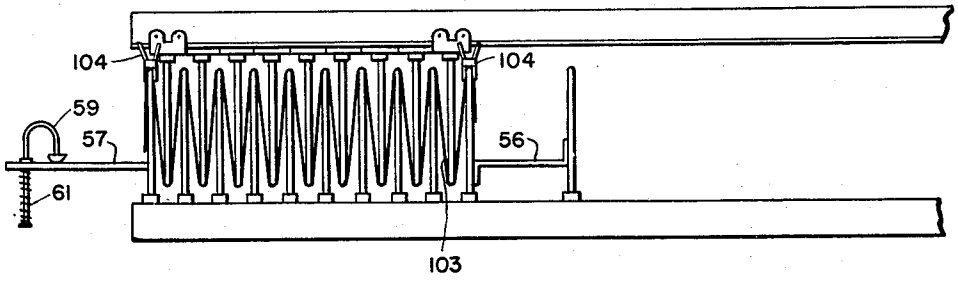


FIG. 12

INVENTORS
OLIVER E. GIBSON
WILLIAM G. LUECKE
BY A. C. Schwarz Jr.
ATTORNEY

United States Patent Office

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METHOD OF AND APPARATUS FOR FORMING PLEATS

Oliver E. Gibson, Skokie, and William G. Luecke, Chicago, Ill.

Application November 7, 1956, Serial No. 620,961

7 Claims. (Cl. 223—30)

The present invention relates to methods of and apparatus for forming pleats or folds in material, and more particularly to methods of and apparatus for forming pleats or folds in draperies.

It has been particularly difficult to form pleats or folds in draperies after dry cleaning, in that it has been the practice to either leave the drapery unfolded or to complete the operation by hand; either by hanging them from the ceiling on traverse rods, or laying in the folds on a long table. This latter operation is usually done with one operator at each end of the drape laying one fold upon another, which is a costly operation and seldom gives satisfactory results.

In copending application Serial No. 620,960, filed on November 7, 1956, in the name of W. G. Luecke, there is disclosed apparatus for manual operation for forming pleats. While such apparatus would give some degree of satisfactory results, it is slow to operate and requires manual operations to form the pleats in folds.

Accordingly, an object of the present invention is to provide semiautomatic apparatus for forming pleats or folds in material.

A further object of the present invention is to provide a method of and apparatus for forming pleats in draperies in a simple, rapid and efficient manner.

A still further object of the invention is to provide apparatus for forming pleats or folds in draperies which are accurate and neat irrespective of the size of the drapery being processed.

An embodiment of an apparatus embodying the present invention may include a plurality of upstanding members to receive material to be pleated thereover, means to move the upstanding members toward and away from each other, a plurality of downwardly extending members extending in spaced opposed relation to the upstanding members, means to move the downwardly extending members with respect to each other, and means to move one of the plurality of members with respect to the other plurality of members to form pleats therebetween in the material.

Generally, the apparatus comprises a lower section to which is upstandingly positioned a series of longitudinally extending slats which are movable laterally with respect to each other, and which are further movable as a unit in an outwardly direction to facilitate loading. Secured above the slats and lower section are a plurality of cooperating slats in an upper section which are movable laterally with respect to each other and which move downwardly as a unit to perform the pleating. After a drapery is positioned above the lower slats, the entire upper section is lowered to cooperate with the lower slats, and the lower slats are urged together forming pleats, in cooperation with the upper slats, in the drapery. The lower section may be moved to a forward position with respect to the upper section to facilitate loading and removal of the drapery.

A method embodying the present invention may include the steps of placing material to be pleated over a plurality of upstanding spaced members, applying force to the material to push it down between the upstanding members to form pleats therein, removing the source of force from the material while maintaining the members in operated position close to each other, and removing the pleated material from the members.

A more complete understanding of the invention may be obtained by reference to the attached drawings, wherein similar numerals are utilized to identify similar parts throughout the several views, and wherein:

Fig. 1 illustrates a side elevation view, partly broken away, of the apparatus in its unoperated position;

Fig. 2 illustrates a front elevation view of a portion of the apparatus shown in Fig. 1;

Fig. 3 illustrates a top view of a portion of the lower section of the apparatus shown in Fig. 1;

Fig. 4 illustrates a partial front elevation view of the lower section shown in Fig. 3;

Fig. 5 illustrates a bottom view of a slat of the lower section of the apparatus;

Fig. 6 illustrates an enlarged view of a portion of the lower section of the apparatus;

Fig. 7 illustrates an exploded enlarged view of a carriage used in the upper section of the apparatus;

Fig. 8 illustrates an assembled view of the carriage of Fig. 7 with a reinforcing member added;

Fig. 9 illustrates an enlarged view of a carriage used in the lower section of the apparatus;

Fig. 10 illustrates portions of the upper and lower sections of the apparatus in an unoperated position;

Fig. 11 illustrates the portions of the apparatus shown in Fig. 10 in a partially operated position;

Fig. 12 illustrates the portions of the apparatus shown in Fig. 10 in an operated position, and

Fig. 13 illustrates a portion only of the apparatus shown in Fig. 12 in a subsequently operated position.

Referring now to the drawings, and particularly to Figs. 1 and 2 thereof, a base indicated generally by the numeral **16** is provided which has rollers or casters **17** near the four corners thereof to provide mobility of the apparatus. Obviously, the base could be secured to the floor or a bench if desired. The base further consists of connecting members **18** to provide rigidity and upwardly extending posts **19** to support the lower operating section of the apparatus, designated generally by the numeral **21**. The posts **19** are of the type which are individually adjustable to permit leveling of the operating portions of the apparatus. Angle members **22** extend across the front and back of the apparatus above the posts **19**, and support channel members **23** which extend along the sides of the apparatus. The channel members **23** are each provided with rollers **24** rotatably secured therein.

The lower section **21** is provided with channel members **26** which extend across the front and back of the apparatus, and which are connected at the two sides by angle members **27**. The members **27** ride on the rollers **24** to permit the lower section **21** to be moved outwardly with respect to the base **16** by means of a hand rail **25** to facilitate loading and unloading of a drapery in the apparatus. The rollers **24** and angles **27** form a slideway which is well known, such as is used for drawers in metal furniture.

Secured near opposite sides of the channels **26**, at both back and front, is a member **28**. The members **28** are secured by bolts **29** and are permitted to float by means of springs **31**. The members **28** each have a plurality of members **32** secured thereto which are provided with inverted T-shaped slots **33** therein (Fig. 6). The T-shaped slots **33** receive a T-section which extends downwardly from I-beam members **34**. As illustrated herein, there are five members **34** secured to each of the members **28**, which extend in parallel spaced relationship from the front of the apparatus toward the rear. All of

the members 34 do not extend the same distance rearwardly, for a reason which will be mentioned hereinafter.

The I-beam members 34 are utilized to receive carriages, which are indicated generally by the numeral 36. As shown more in detail in Figs. 6 and 9, the carriages 36 are formed of inverted U-shaped bodies 37, which have two spaced wheels 38 secured to each side of the U. A pin 39 extends upwardly from the carriage 36 and is secured rigidly thereto. Thus, through the interoperation of the I-beam members 34 and the wheels 38, the carriages 36 may move toward the front and rear of the apparatus.

Extending laterally and parallelly across the lower section 21 are a plurality of slats 41. Each slat 41 is provided with reinforcing members 42 which are U-shaped and are secured to both sides of the slat. There are two members 42 to a slat, near opposite extremities thereof. As shown in Fig. 6, near one extremity of the slat 41 there is provided an aperture 43 which extends upwardly from the bottom of the slat at the point of one of the reinforcing members 42. The aperture 43 is provided to receive one of the pins 39 of one of the carriages 36. Near the opposite extremity of each slat 41, a second aperture 44 is provided, see Fig. 5, but in this instance the aperture 44 is rectangular in shape; it also is positioned at the point of a reinforcing member 42, and also is designed to receive the pin 39 of a second carriage 36. From the above it may be understood that as each slat 41 is supported near opposite extremities by a carriage 36 that it may be moved in parallel planes toward the front and rear of the apparatus on spaced I-beam members 34. The rectangular aperture 44 is provided to prevent any binding as a slat 41 is moved.

In the instant disclosure, there are eleven slats 41. As there are five I-beam members 34 on each side of the apparatus, each unit of five of which must provide eleven carriages 36 for movement of the slats, it has been determined that all members 34 need not extend completely to the rear of the apparatus, thus reducing the cost of construction of the apparatus. It should be understood, however, that a greater or lesser number of slats 41 may be utilized, depending on the size of apparatus desired and the number of pleats to be made. Each of the slats 41 is provided with a plurality of apertures or slots 46 in the upper surface thereof, Figs. 2 and 6.

The spacing between adjacent of the slats 41 is predetermined and is controlled by a pair of tapes 47 which are secured at opposite sides of each slat by securing members 48 at the bottom of the reinforcing members 42, Fig. 6. Each tape 47 is connected to all of the slats 41 at predetermined intervals of the tape.

In order that the slats 41 may be moved with respect to each other, a chain or rope 49 is provided which has one end secured to the rearmost slat 41 (Fig. 1). The rope extends around a pair of idler pulleys 51, around a drive pulley 52, around a second pair of idler pulleys 51 near the front of the apparatus, and then has its opposite extremity secured also to the rearmost slat 41, but on the opposite side to the first connection. The drive pulley 52 is rotated by a belt 53 secured to the drive of a reversible electric motor 54 secured to the lower section 21. It should be noted that the two most rearward slats 41 are separated by a plate or table 56.

Extending across the front of the lower section 21 of the apparatus is a plate or table 57 which is secured to the front channel member 26 by means of brackets 58, Figs. 2 and 4. The plate 57 has secured therethrough a plurality of hook-shaped pins 59, which have a spring 61 surrounding the portion thereof below the plate 57 to perimt the pins 59 to be raised.

Referring again to Figs. 1 and 2, it may be seen that at the rear of the apparttus there is provided upwardly extending columns 62 at each side thereof. The columns 62 are secured to the members 22 and 23 to provide rigidity. Secured rigidly at the upper portion of the columns 62 is a conecting plate 63 which extends across the back of the apparatus. At each side of the apparatus, a pair of angle members 64 are rigidly secured to the columns 62, each of which is provided with a bearing surface 66 to receive a post 67.

The posts 67 are interconnected at the top by a channel member 69 which has flanges 71 near opposite extremities thereof extending on both sides to receive the one extremity of a turn buckle assembly, indicated generally by the numeral 72. The opposite extremities of the assemblies 72 are secured to the four corners of a box-like structure, formed by four angle members 74, forming a portion of an upper section, indicated generally by the numeral 73.

The section 73 is provided with a pair of members 75, Fig. 2, similar in purpose and operation to the members 28, described previously. Each member 75 is connected to a member 74 and is provided with elements 76, similar to members 32, for supporting a plurality of I-beam members 77, similar to members 34. In this instance, however, the members 77 will depend from the member 75, rather than be supported above as was the structure of the member 28.

The I-beam members 77 are provided to serve as a track for a plurality of carriages, indicated generally by the numeral 78, Figs. 7 and 8. The carriages 78 are similar to the carriages 36 in that they consist of a U-shaped body 79 provided with four wheels 81. However, instead of a pin 39 secured thereto as for carriages 36, the carriages 78 are provided with an oval aperture 82 which receives a pin 83. The pin 83 is provided at one extremity with an oval head 84, which will enter the aperture 82 but, when rotated 90 degrees, will not be able to pass through the aperture. This is necessary, for in this instance the carriages 78 are inverted in positon, and the pin 83 depends therefrom. Each pin 83 is provided near the extremity opposite from the head 84 with an aperture 86 extending completely therethrough and extending parallel to the length of the head 84.

In assembling the carriages 78, the pin 83 is inserted in the aperture 82 and then turned 90 degrees, in which position the head 84 cannot pass through the aperture. A U-shaped reinforcing member 87 is then placed down over the pin 83 by means of an aperture therein and a locking pin 88 is then passed through apertures in the sides of the U and through the aperture 86 in the pin 83. A shim or washer 89 is placed, prior to member 87 being placed on the pin 83, between the member 87 and the body 79 and permits the entire assembly to hold together.

After the assembly described above is completed, a slat 91 is secured between the open sides of the member 87 by any suitable means, such as welding or riveting. The slats 91 are generally similar to the slats 41, but they do not have the apertures 43, 44 or 46. Any binding is overcome in movement of the slats 91 by virtue of the oval-shaped apertures 82 in the carriages 78, which permit play during movement. The slats 91 are positioned in such a manner that in their unoperated position they are spaced at about the midpoint of adjacent slats 41 in the lower section 21, Fig. 10, and extend across the apparatus in parallel relationship.

The slats 91 are spaced by tapes, not shown, similar to the tapes 47, and a rope or chain 92 is secured to the rearmost slat 91. The rope 92 passes over an idler pulley 93, secured to one of the channel members 74, and terminates in a spring 94 which is secured to a bracket 96 extending from the column 62. Because of the resiliency of the spring 94, the slats 91 will be held in their spaced position in an unoperated position of the apparatus, Figs. 1 and 10.

A spring loaded pulley 97 is secured to one of the angle members 64 and has a rope or chain 98 secured

thereto. The rope **98** passes over an idler pulley **99** secured to a column member **62** and terminates in a counterweight **101**. Thus, under nonoperating conditions of the apparatus, the weight **101** causes the entire upper section **73** of the apparatus, described above, to be in its raised position away from the lower section **21** (Fig. 1).

A hand bar **102** is provided to permit manual operation of the upper section of the apparatus, as will now be described.

In the operation of the apparatus let it be assumed that it is in an unoperated position, as shown in Fig. 1. An operator may grasp the hand rail **25** and cause the lower section **21** to be moved forward on the rollers **24** from under the upper section **73**. A drapery **103** may then be loaded on the tops of the lower slats **41**, Fig. 10, with approximately the same amount of material between adjacent slats. The drapery **103** will be placed on the apparatus with the stitched, buckrum-backed top at one side of the machine. The operator may then place compression clips **104** at intervals to secure the material to the front and rearward slats **41**, Fig. 10. In the event that the drapery **103** is wider than the apparatus, the one edge of the drapery would be secured to the front slat **41** and the additional material would be laid or stored temporarily on the rear plate **56**.

After loading, the lower section **21** may be pushed to the rear on the rollers **24**, to assume the position shown in Fig. 10. It might be noted that a latch, of conventional type, may be employed to prevent the lower section **21** from being pulled off of the rollers **24** and out of the apparatus. With the lower section **21** in rearward position, the operator may grasp the hand rail **102** and urge the upper section downwardly, the pressure exerted overcoming the force of the counterweight **101** and permitting the posts **67** to move in the bearing surfaces **66**. At a predetermined position in the downward travel of the upper section, a limit switch (not shown) will be actuated automatically to start the drive motor **54**. In the alternative, a manual motor switch (not shown) may be utilized to start the motor. During the initial downward movement, the upper slats **91** will exert pressure on the drapery **103** to partly form the pleats, as shown in Fig. 11.

As the motor **54** operates, it will drive belt **53** and in turn rotate pulley **52**, in a manner such as to cause the rope **49** to exert pressure on the back slat **41** to cause it to move forwardly. Simultaneously, the operator continues to exert downward pressure on the upper section, and the slats **91** will move further downwardly with respect to the slats **41**. As the upper section is lowered, the tension of the spring **94** will be decreased, the rope **92** will slacken in tension, and the slats **91** will be urged toward each other and toward the front of the apparatus through the motor drive on the slats **41**. The movement of the slats **41** is accomplished by the carriages **36** riding on the I-beam members **34**, and the movement of the slats **91** by the carriages **78** on the I-beam members **77**.

At such time as the slats **41** are driven to a position as close as possible, approximately as shown in Fig. 12, the upper slats **91** should be positioned in their lowermost position, thus completing the pleating operation. If desired, a second limit switch (not shown) may be provided so that the motor **54** will be shut off automatically when the slats **91** are in their lowermost position, or a stop switch (not shown) may be operated manually.

After the pleating is completed, the hand rail **102** may be released, which will permit the counterweight **101** to return the upper section to its unoperated position. As such occurs, the tension of the spring **94** will cause tension on the rope **92** and return the slats **91** to their unoperated position (Fig. 1).

The hand rail **25** may now be grasped and the lower section **21** slid forwardly on the rollers **24** to its foremost position. However, as the motor **54** is in stopped condition, the slats **41** will still remain closely together. The operator may now remove the clips **104** and grasp the drapery **103** at the points where the apertures **46** are in the slats **41** to raise it and remove it from the apparatus.

A switch (not shown) may now be operated to reverse the motor **54** and cause the drive of the drive pulley **52** and the rope **49** to be reversed to move the slats **41** to their position for the unoperated apparatus, such as shown in Fig. 1.

In the event that the drapery **103** is wider than the apparatus, the pleated portion would be placed on the table **57**, under the pins **59**, as shown in Fig. 13, and the remainder of the drapery **103** from the plate **56** would be placed over the slats **41**, and the pleating operation repeated. This, of course, may be done several times, if necessary.

It should also be noted that, if desired, a vibrator may be supplied to the members **28**, which may be placed in operation during the pleating to assure proper allocation of the material between adjacent slats **41** and to enhance the pleating operation.

It should be understood that the apparatus might be designed so that the upper section is stationary and the lower section moves upwardly. The motive power for upward movement might be by hydraulic pressure, by motor, or any suitable means.

While a specific embodiment of the invention has been disclosed and described, it is understood that the invention is not limited thereto, but that other embodiments may be utilized, all within the scope and spirit of the present invention.

What is claimed is:

1. Apparatus for forming pleats in material, comprising a base, a plurality of upstanding parallelly extending members secured to said base, means to move each of said upstanding members with respect to said base, means secured to said base and extending above and over said upstanding members, a plurality of downwardly parallelly extending members secured to said means, means to move each of said downwardly extending members with respect to said securing means, means to move said securing means toward said base, whereby said upstanding members and downwardly extending members cooperate with each other to form pleats in material placed therebetween, and means connected to said securing means for moving said securing means away from said base, whereby the pleated material may be removed from said upstanding parallelly extending members.

2. Apparatus for forming pleats in material, comprising a lower section, a plurality of upstanding members secured to said lower section, an upper section, a plurality of downwardly extending members secured to said upper section and positioned in spaced opposed relation to said upstanding members, means to move said upper and lower sections toward and away from each other, whereby said upstanding members and said downwardly extending members will cooperate to form pleats in material placed therebetween, and means to move said lower section laterally with respect to said upper section, whereby to facilitate placing or removing material therebetween.

3. Apparatus for forming pleats in material, comprising a plurality of upstanding members, means to move said upstanding members toward and away from each other, a plurality of downwardly extending members extending in spaced opposed relation to said upstanding members, means to move said downwardly extending members with respect to each other, and means to move one of said plurality of members with respect to said other plurality of members, said means to move said upstanding members and said means to move said downwardly extending members cooperating to form pleats

in material placed between said pair of plurality of members, said upstanding members having apertures at the tops thereof to permit the pleated material to be removed readily from the closely spaced upstanding members.

4. Apparatus for forming pleats in material, comprising a lower section, a plurality of tracks on said lower section, a plurality of carriages for movement on said tracks, a plurality of upstanding members each secured to a pair of said carriages for movement in substantially parallel relationship to each other, means for moving said upstanding members, a plurality of downwardly extending members in spaced opposed relationship to said upstanding members, means to move said downwardly extending members with respect to each other, and means to move one of said plurality of members with respect to said other plurality of members, whereby said upstanding members and said downwardly extending members will cooperate to form pleats in material placed therebetween.

5. The apparatus as claimed in claim 4, wherein the means for moving said downwardly extending members comprises a plurality of tracks and a plurality of carriages, said members being secured to said carriages.

6. The apparatus as claimed in claim 4, wherein said

means for moving said upstanding members comprises means connected to each of said members, a motor, a drive pulley driven by said motor, and a drive belt secured at opposite ends to each side of one of said upstanding members and driven by said drive pulley.

7. The method of forming pleats in material, which comprises the steps of placing material over a plurality of upstanding spaced members, applying force to the material to push it down between adjacent of said upstanding members, moving said upstanding members toward each other during the application of force to the material, removing the source of force from the material while continuing to maintain said upstanding members in their operated position close to each other, and removing the pleated material from said upstanding members.

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