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S. COHN ET AL

2,653,812

APPARATUS FOR FOLDING FABRICS

Filed Sept. 16, 1949

4 Sheets-Sheet 2

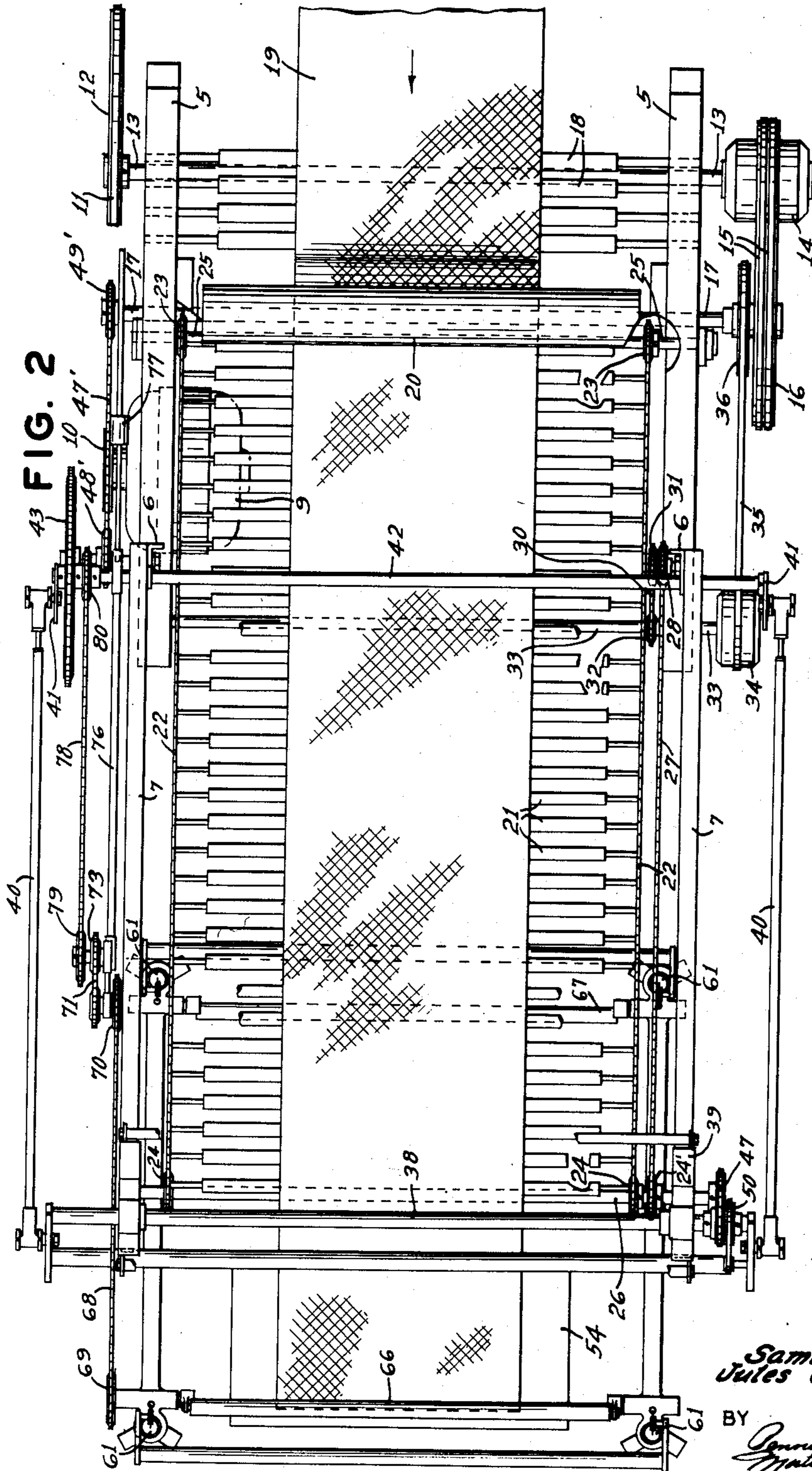


FIG. 2

INVENTORS
Samuel Cohn
Jules G. Walter

BY
Dennis Edmunds,
Myron and Charles
ATTORNEYS

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FIG. 3

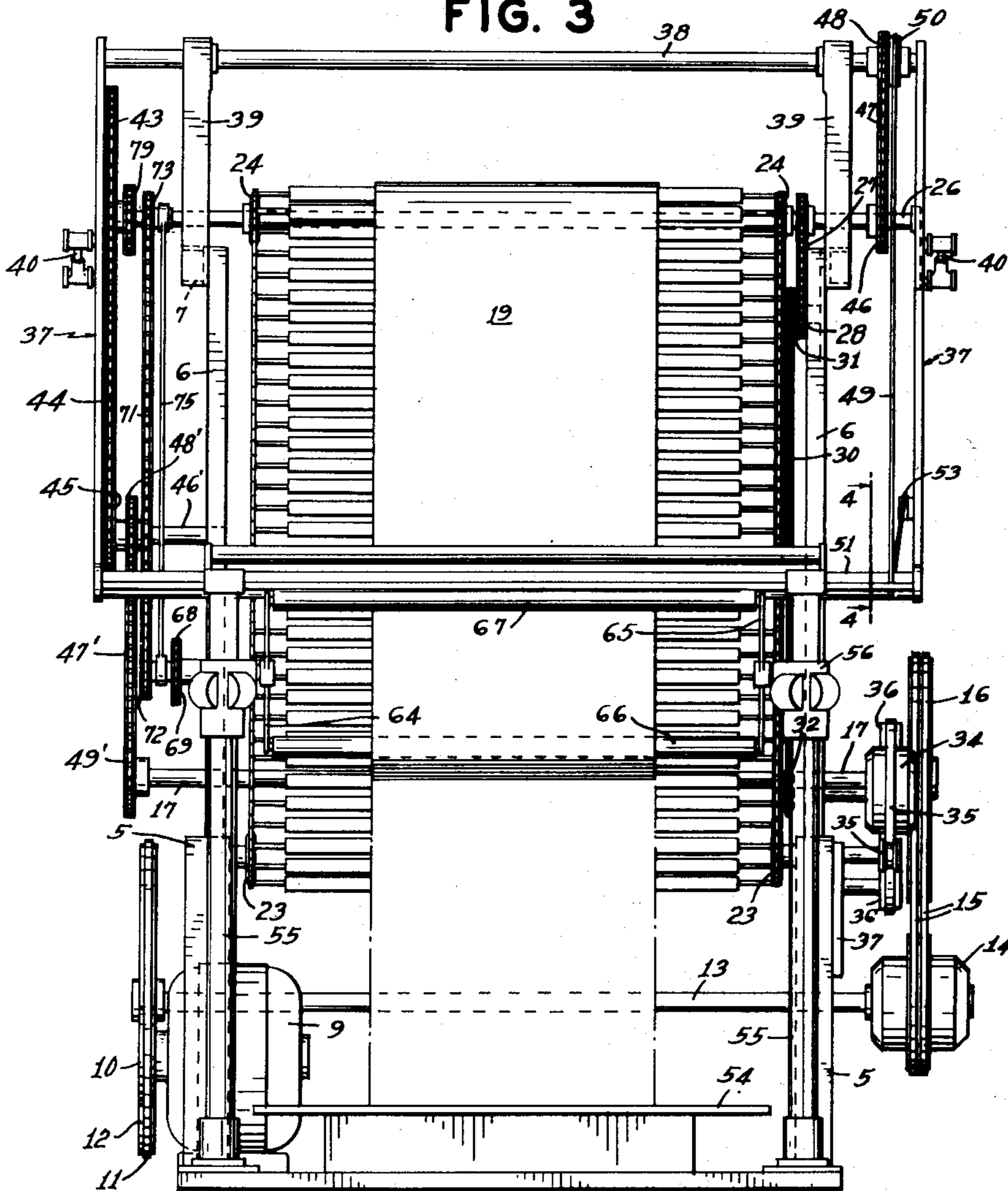
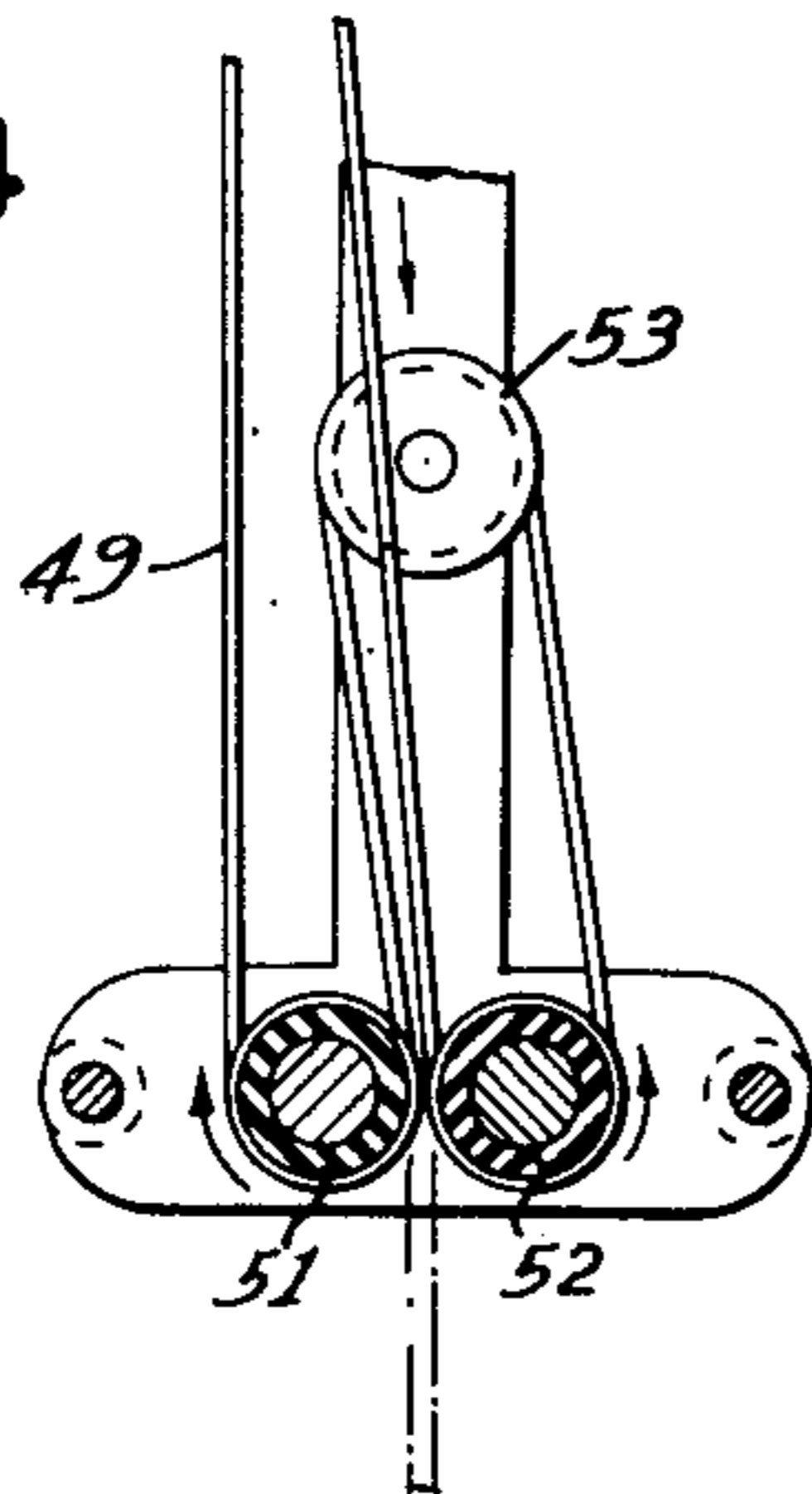


FIG. 4



INVENTORS
Samuel Cohn
Jules G. Walter

BY

Conrad Edmunds Norton and Barrows
ATTORNEYS

Sept. 29, 1953

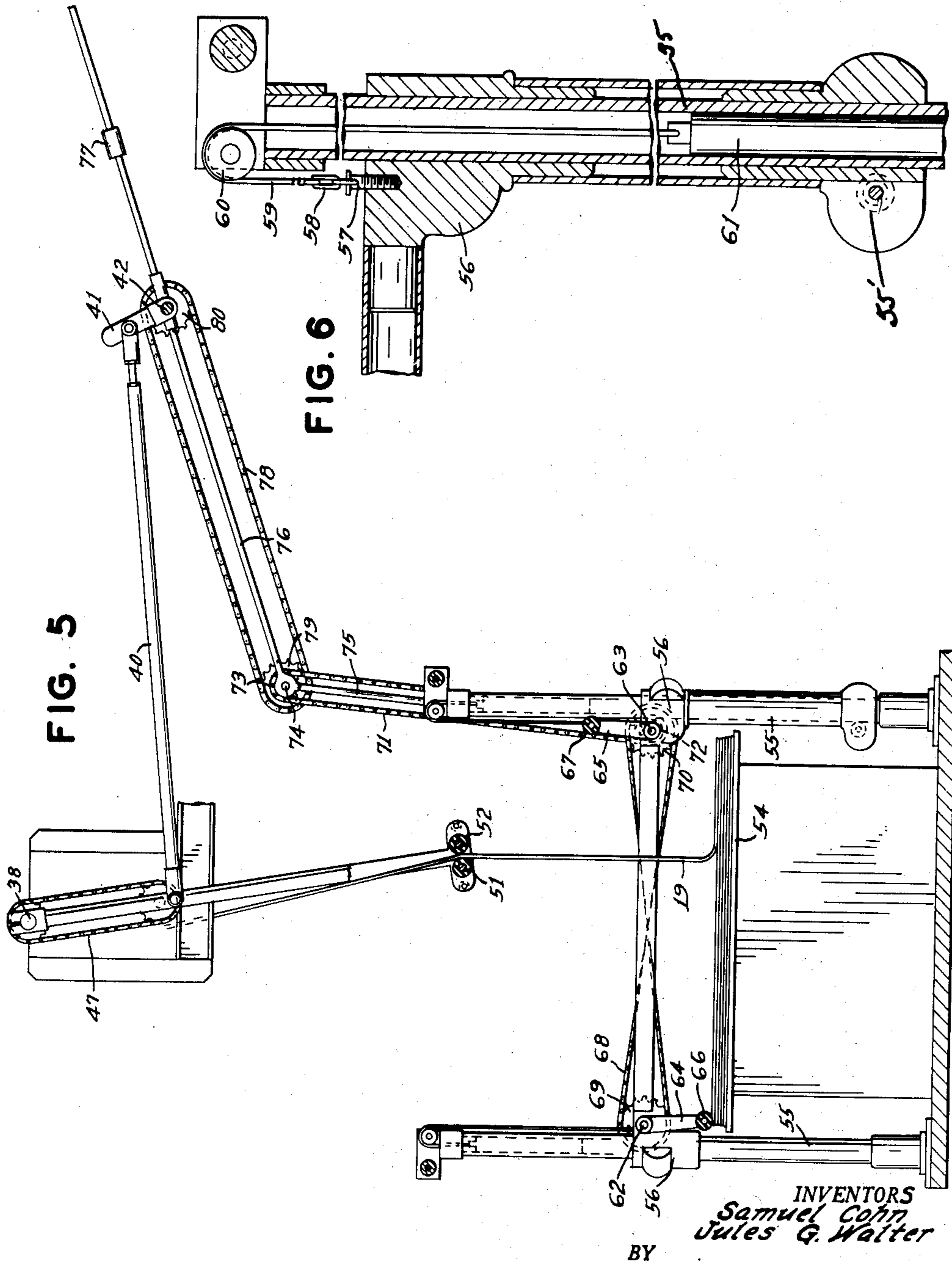
S. COHN ET AL

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INVENTORS
Samuel Cohn
Jules G. Walter

BY

Perris, Edwards, Norton and Barrows
ATTORNEYS

UNITED STATES PATENT OFFICE

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APPARATUS FOR FOLDING FABRICS

Samuel Cohn and Jules G. Walter, New York, N. Y., assignors to Samco Holding Corporation, Woodside, L. I., N. Y., a corporation of New York

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14 Claims. (Cl. 270—79)

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This invention relates to textile machinery and particularly to an apparatus for folding fabrics.

In the handling of textile fabrics, they are subjected to various finishing operations such, for example, as steaming and calendering or ironing. Often the fabric is then rolled on a mandrel. However, to facilitate subsequent handling, it is often desirable to fold rather than to roll the fabric. Folding apparatus has been devised heretofore, but it is not entirely satisfactory, since it does not produce a pile of uniform layers of the fabric.

It is the object of the present invention to provide a mechanism which folds the web of fabric uniformly at each end of its stroke, affording a zigzag pile of fabric with the folded edges smoothed and laid accurately one upon the other.

Another object of the invention is the provision of a mechanism which continues to perform its function accurately as the pile of fabric increases in thickness, without manual adjustment.

A further object of the invention is the provision of means for smoothing the edges of the fabric as it is folded, which is self-adjusting so that the mechanism applies equal pressure to the successive folded edges as the pile of folded layers increases in thickness.

Another object of the invention is the provision of means affording a uniform drive for the folding mechanism during adjustment thereof to the increasing pile of fabric;

Other objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and accompanying drawing, in which

Fig. 1 is a side elevation of the machine;

Fig. 2 is a plan view thereof;

Fig. 3 is an end elevation of the machine;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a side elevation of a portion of the machine; and

Fig. 6 is a detail in section showing a portion of the structure of Fig. 5.

In carrying out the present invention, the fabric may be delivered from any machine in which it has been treated, such as a steam applicator and calender rolls, as shown, for example, in the Cohn and Walter Patent No. 2,187,644. This, however, is not a part of the present invention, which is adapted to handle material which has been previously treated in any desired manner.

From the treating mechanism the material is delivered by any suitable conveyor to a distributor which swings through a predetermined arc.

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The distributor delivers the web of fabric to a table suitably disposed beneath it. As the distributor swings back and forth and the fabric is fed in predetermined timed relation, the distributor folds the fabric upon itself at the end of each stroke, laying down successive layers of the fabric, which is folded at a line parallel to the distributor at the end of its stroke. Thereupon a roller which is rotated on arms in a complete arc of 360° engages the fabric near the fold and rolls along the fabric toward the line of the fold, smoothing the fabric and creasing the edge of the fold in a straight line. Two such rollers are provided at opposite ends of the folding mechanism, and the rollers are timed to engage the fabric after each fold is made, so that the successive layers of the fabric are laid down, smoothed and creased at each end of the pile.

In order that the smoothing and creasing mechanism may be self-adjusting to exert the same pressure as the pile increases in thickness, the rotating arms and smoothing rollers are mounted on a floating frame which is supported and counterbalanced so that if adjusted by the operator too closely to the top of the pile, the floating frame is simply lifted when one of the smoothing rollers engages the fabric. Thereafter, as each layer of fabric is superposed on preceding layers, the floating frame is lifted slightly to accommodate the added thickness of the pile, and each succeeding layer is subjected to rolling pressure precisely of the same magnitude. Such operation continues to the limit of the capacity of the apparatus, which is designed to accommodate a pile of fabric of certain depth or thickness.

Referring to the drawing, 5 indicates a frame of suitable structural metal to support the parts of the machine. Upright members 6 at one end of the frame 5 support horizontal beams 7, and braces 8 are provided to sustain the weight of the mechanism on the beams 7.

Suitable driving means, such as a motor 9, is mounted on the frame 5, and a pulley 10 thereon is connected by a belt 11 to a pulley 12 on a shaft 13 extending transversely of the frame 5. On the other end of the shaft 13, a variable speed pulley 14 is mounted and is connected by a V-belt 15 to a pulley 16 on a shaft 17 extending transversely of the frame 5. A plurality of steam pipes 18 are disposed transversely of the frame 5 and are adapted to direct steam upon the web 19 of fabric. The fabric then passes between the calender rolls 20, one of which is mounted on the shaft 17 and the other directly above it,

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and is thus smoothed and finished. As already indicated, this particular part of the mechanism is merely illustrative, and other types of treating devices may be substituted therefor.

The web 19 is delivered to a conveyor which, as shown, comprises a plurality of slats 21 mounted on endless chains 22 which pass about sprockets 23 and 24 on shafts 25 and 26, suitably supported in the frame 5 and on the beams 7. As the web is delivered to the slats of the conveyor, it forms loops between the slats, avoiding any tension on the web. The conveyor is driven to travel, in the directions indicated by the arrows on Fig. 1, by a chain 27 engaging the sprocket 24' and a sprocket 28 supported on a shaft 29. The shaft 29 is driven by a chain 30 engaging a sprocket 31 on the shaft 29 and a sprocket 32 on a shaft 33 carrying a variable speed pulley 34. A V-belt 35 connects the variable speed pulley 34 with a pulley 36 on the shaft 17. The belt 35 passes over idler rollers 35' and 36' on a bracket 37' which may be adjusted to vary the speed of the pulley 34.

The web is delivered from the conveyor to a distributor 37 which comprises arms pivotally mounted for swinging movement on a shaft 38 which is mounted on brackets 39 at the ends of the beams 7. The distributor 37 is connected by links 40 to arms 41 secured to a shaft 42 extending across the beams 7. The shaft 42 is driven through a sprocket 43 which is connected by a chain 44 to a sprocket 45 on the shaft 46'. The latter is driven by a chain 47' engaging sprockets 48' and 49' on the shafts 46' and 17. As the shaft 42 rotates, the arms 41 swing in circles, thereby actuating the links 40 to swing the distributor 37 about its pivotal shaft 38.

A sprocket 46 on the shaft 26 is connected by a chain 47 to a sprocket 48 on the shaft 38. An endless belt (Fig. 4) 49 connects a pulley 50 on the shaft 38 with rollers 51 and 52 and an idler 53 on the distributor 37. Thus the rollers 51 and 52 are driven in unison with the conveyor which carries the web to the distributor. The web passes between the rollers 51 and 52 and, as the distributor swings from side to side, the web is laid upon a table 54 which is supported in a frame comprising posts 55 at the corners of the table.

Referring particularly to Figs. 5 and 6 of the drawing, a floating frame 56 is supported at its corners in sliding engagement with the posts 55 and is adapted to move up and down thereon, guided by the rollers 55' (Fig. 6) and therefore substantially without friction. At the corners, screws 57 engage the floating frame 56 and are connected by links 58 to flexible members 59 which pass over pulleys 60 mounted at the upper ends of the posts 55. Weights 61 are secured to the flexible members 59 within the posts 55 and serve to counterbalance the weight of the floating frame 56 so that it may move freely in either direction upon the application of slight force.

Transverse shafts 62 and 63 are mounted at the ends of the floating frame 56 and carry arms 64 and 65 with rollers 66 and 67 mounted thereon. The arms 64 and 65 are arranged to travel so that the arms 64 move in a clockwise direction while the arms 65 travel in a counterclockwise direction to bring the rollers 66 and 67 successively into contact with the web as it is folded onto the table 54. Rotation is effected by a chain 68 engaging sprockets 69 and 70 on the shafts 62 and 63. As will be noted, the chain is crossed to effect the opposite rotation of the two shafts.

The shaft 63 is driven by a chain 71 which engages a sprocket 72 thereon and a sprocket 73 on

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a shaft 74 supported at one end of an arm 75 which is connected at its opposite end to the floating frame 56. An arm 76 is pivotally connected to the arm 75 and is pivotally mounted on the shaft 42. A counterweight 77 is mounted on the free end of the arm 76 to permit adjustment and balancing of the mechanism. A chain 78 connects a sprocket 79 on the shaft 73 with a sprocket 80 on the shaft 42 which is driven, as hereinbefore described, by the sprocket 43. By means of the elbow construction last described, the driving connection is maintained to the arms 64 and 65 regardless of the position of the floating frame 56. Thus, as the floating frame 56 rises, when the pile of fabric accumulates, the elbow drive shifts its position, but the driving connection and the synchronism of the mechanism are maintained.

As will be readily understood from the foregoing description and particularly with reference to Figs. 1 and 5 of the drawing, the web of fabric delivered to the distributor 37 passes between the rollers 51 and 52 and, as the distributor swings from one edge of the table to the other, the advancing fabric is laid down and folded at the ends on lines parallel to the axes of the rollers 51 and 52. As each fold is made, the roller 66 or 67, as the case may be, is brought downwardly into contact with the folded fabric, moves toward the folded edge, smoothes the fabric, and creases the fabric at the edge. The rollers 66 and 67 always move toward the folded edge and thus ensure smooth folding of the fabric at the edges and the production of a pile of folds with the edges substantially uniform.

In initiating the operation of the machine, the operator simply pushes the floating frame 56 downwardly to the limit of its travel. As soon as a fold of fabric is laid down and the roller 66 or 67 comes into contact therewith, the floating frame is lifted until a uniform pressure is exerted by the roller upon the fabric. As each fold is successively laid, the roller 66 or 67 engages the fabric with the same uniform pressure, the floating frame rising gradually with each successive operation only to the extent equal to the thickness of each layer of fabric laid down with each successive operation. No adjustment is necessary because of varying thickness of the fabric treated. The mechanism compensates automatically for varying thickness of the fabric treated.

The apparatus as described affords a means for accurately folding a web of textile fabric into a pile of superposed layers, with the folded edges uniform and laid upon each other. When the floating frame 56 reaches the upper limit of its travel, the fabric must be removed from the table 54 and a new pile of fabric may then be laid thereon.

Various changes may be made in the details of construction and arrangement without departing from the invention or sacrificing the advantages thereof.

We claim:

1. In a folding machine for textile material, an immovable table, a distributor, means for swinging the distributor above the table to lay the textile material in successive folds on the table, a frame above said table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to lend support to the frame throughout its range of vertical movement, and rotating means on the frame operating in timed relation with the distributor to engage and

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smooth each layer of textile material adjacent the edges of the folds.

2. In a folding machine for textile material, an immovable table, a distributor, means for swinging the distributor above the table to lay the textile material in successive folds on the table, a frame above said table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to lend support to the frame throughout its range of vertical movement, rotating means on the frame operating in timed relation with the distributor to engage and smooth each layer of textile material adjacent the edges of the folds, the frame being adapted to automatically adjust the position of the smoothing means as each additional fold is laid and to maintain uniform pressure on the successive folds.

3. In a folding machine for textile material, an immovable table, a distributor swinging in an arc above the table to lay the textile material in successive folds on the table, a frame above said table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, and means operating in timed relation with the distributor to press the edge of each fold after it is laid.

4. In a folding machine for textile material, an immovable table, a distributor, means for swinging the distributor through a predetermined arc to lay the textile material in successive folds on the table, a vertically movable frame supported above the table, balancing means connected to the frame to sustain a portion of the weight thereof throughout the range of vertical movement of the frame, rotatable arms on the frame and rollers carried by the arms and adapted to engage the fabric adjacent the edge of each fold and to smooth and crease the fabric at the edge of the fold.

5. In a folding machine for textile material, an immovable table, a distributor, means for swinging the distributor through a predetermined arc to lay the textile material in successive folds on the table, a frame supported above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, rotatable arms on the frame and rollers carried by the arms, and means for rotating the arms in timed relation to the distributor causing the rollers to engage the fabric adjacent the edge of each fold and to smooth and crease the fabric at the edge of the fold.

6. In a folding machine for textile material, an immovable table, a distributor, means for swinging the distributor through a predetermined arc to lay the textile material in successive folds on the table, a frame supported above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, rotatable arms on the frame, rollers carried by the arms and adapted to engage the fabric adjacent the edge of each fold and to smooth and crease the fabric at the edge of the fold, and means for feeding the textile material to the distributor.

7. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, driven rolls on the

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distributor between which the textile material is fed, means for swinging the distributor in a predetermined arc whereby the textile material is laid upon the table in successive folds, a frame above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, means on the frame to engage and smooth the textile material after each fold is laid, and driving connections having an elbow joint to actuate the smoothing means.

8. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, driven rolls on the distributor between which the textile material is fed, means for swinging the distributor in a predetermined arc whereby the textile material is laid upon the table in successive folds, a vertically movable frame above the table, counterweights connected to and partially supporting the frame to sustain a portion of the weight thereof throughout the range of vertical movement of the frame, and means on the frame to engage and smooth the textile material after each fold is laid.

9. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, driven rolls on the distributor between which the textile material is fed, means for swinging the distributor in a predetermined arc whereby the textile material is laid upon the table in successive folds, a frame above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, and means on the frame to engage and smooth the textile material after each fold is laid, consisting of rotatable arms and rollers supported by the arms.

10. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, driven rolls on the distributor, means for swinging the distributor in a predetermined arc, means for feeding the textile material to the distributor, a frame above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, two pairs of rotating arms on the frame, rollers supported between each pair of arms, and driving connections having an elbow joint for rotating the arms respectively in clockwise and counterclockwise directions at opposite sides of the frame whereby the rollers engage and smooth the successive layers of textile material as it is laid on the table.

11. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, driven rolls on the distributor, means for swinging the distributor in a predetermined arc, means for feeding the textile material to the distributor, a vertically movable frame above the table, counterweights connected to and partially supporting the frame to sustain a portion of the weight thereof throughout the range of vertical movement of the frame, two pairs of rotating arms on the frame, rollers supported between each pair of arms, and means for rotating the arms respectively in clockwise and counterclockwise directions at opposite sides of the frame whereby the rollers engage and smooth the successive layers

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of textile material as it is laid on the table.

12. In a folding machine for textile material, an immovable table, a distributor swinging in an arc above the table, a frame supported above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, and rotating means supported on the frame and operating in timed relation to the distributor to engage and smooth the edges of the folds of each layer of the material as it is delivered.

13. In a folding machine for textile material, an immovable table, a distributor mounted for swinging movement above the table, means for swinging the distributor, an upwardly movable frame supported above the table and vertically movable within a predetermined range of movement, counterbalance means secured to said frame and effective to support the frame throughout its range of vertical movement, driven means thereon to engage and smooth the fabric as it is laid on the table, and a driving connection for the driven means including an elbow joint

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whereby the driving connection is maintained as the frame moves upwardly.

14. In a folding machine for textile material as set forth in claim 13, the driving connection for the driven means including in addition to the elbow joint a counterweight secured to one member of said elbow joint to support a portion of the weight of said joint whereby said table is free from such portion of the weight of the elbow joint.

SAMUEL COHN.
JULES G. WALTER.

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