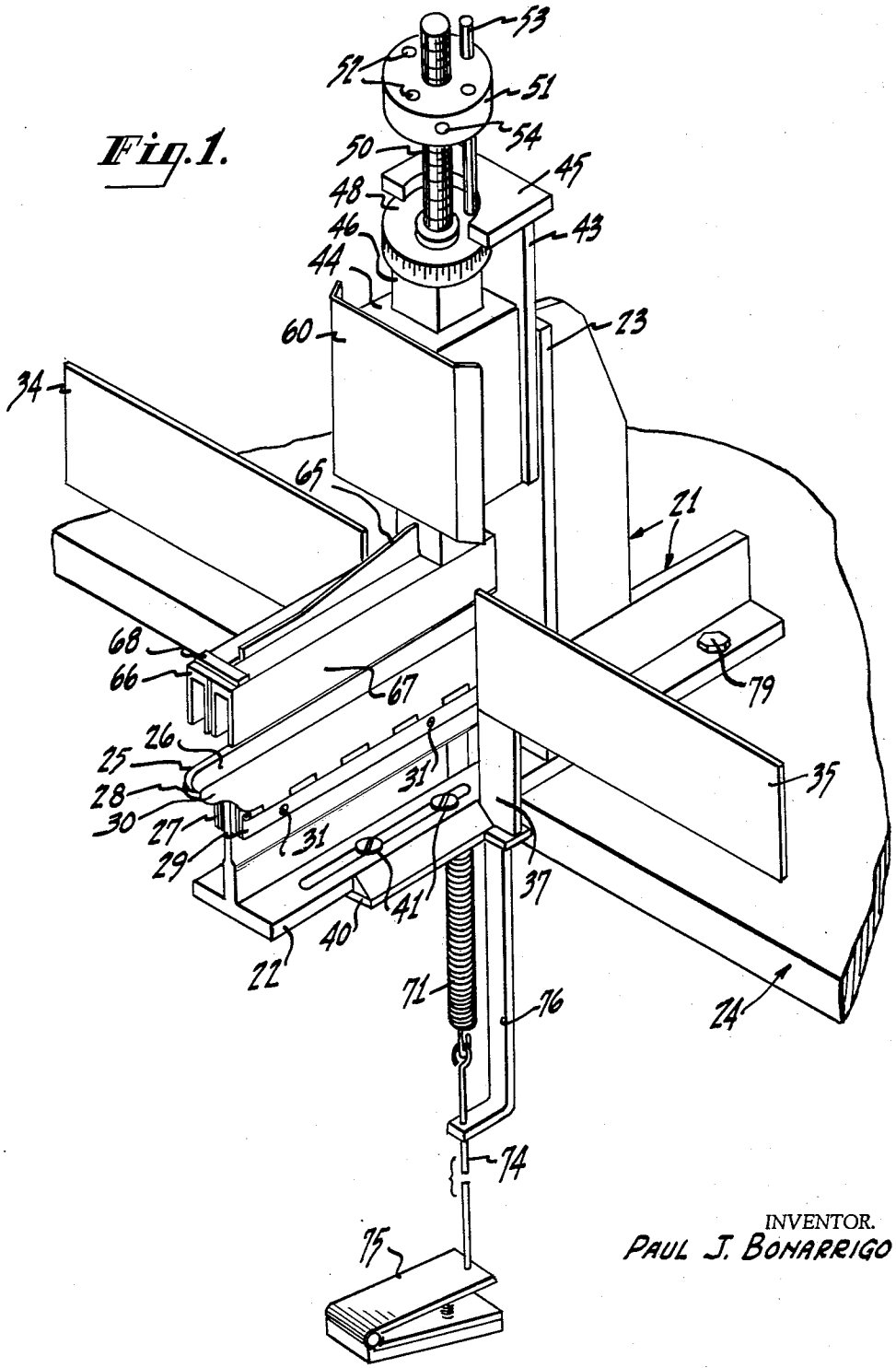
Nov. 28, 1961 P. J. BONARRIGO 3,010,621

PLEAT-FORMING DEVICES

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Fig. 1.



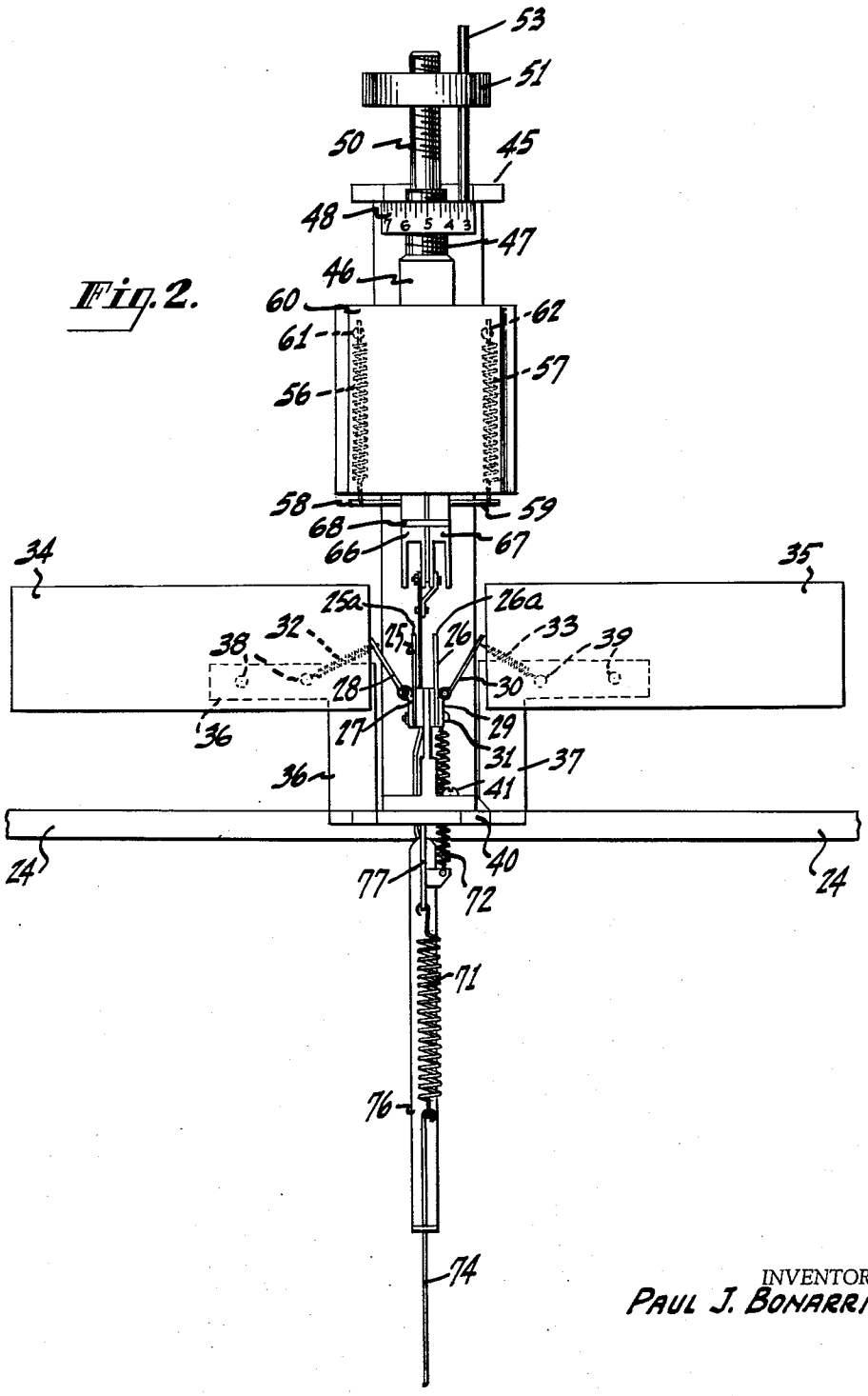
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Nov. 28, 1961 P. J. BONARRIGO 3,010,621

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Fig. 2.



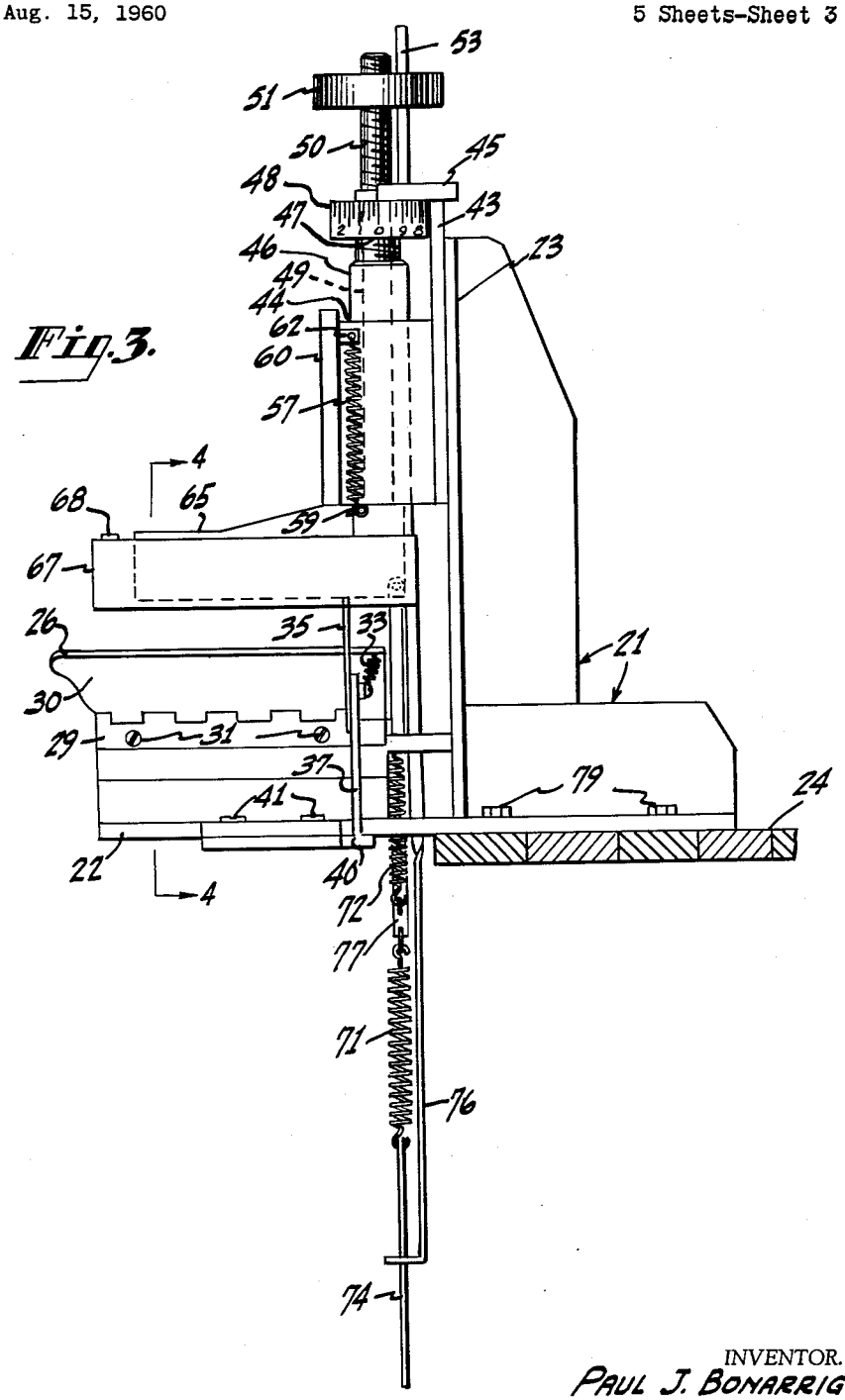
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Fig. 3.



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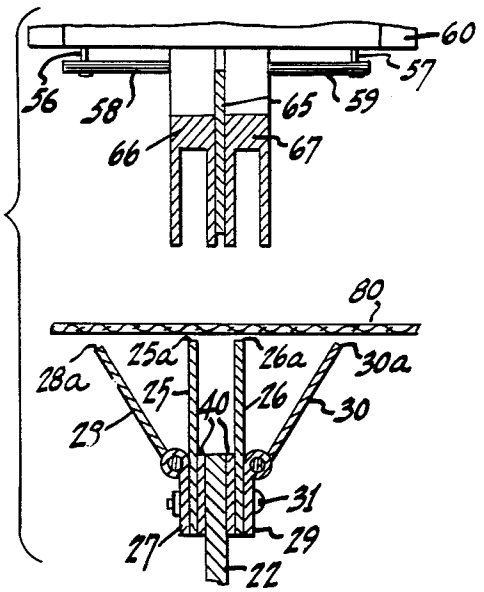


Fig. 4

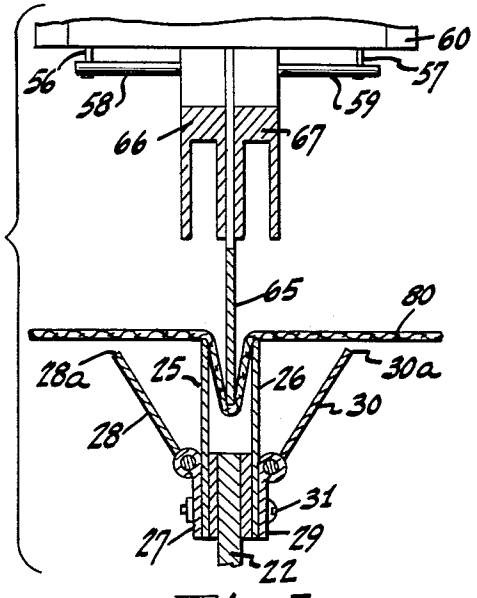


Fig. 5.

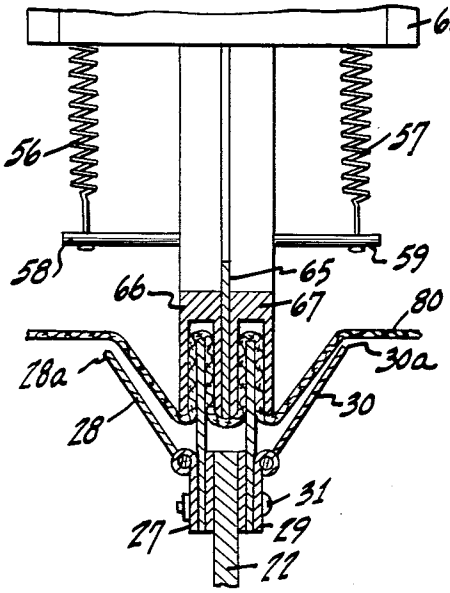


Fig. 6.

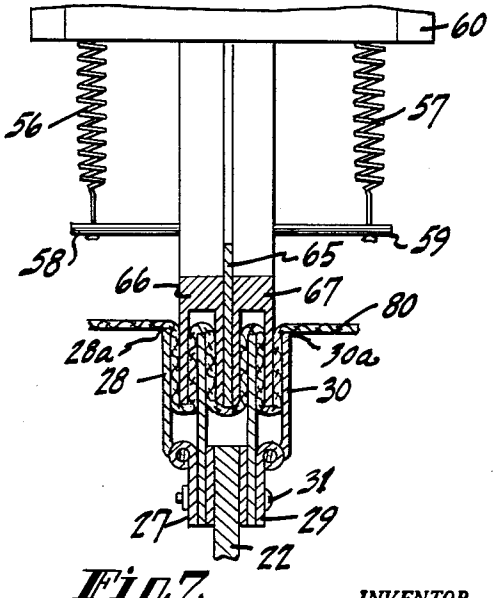


Fig. 7.

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Fig. 9.

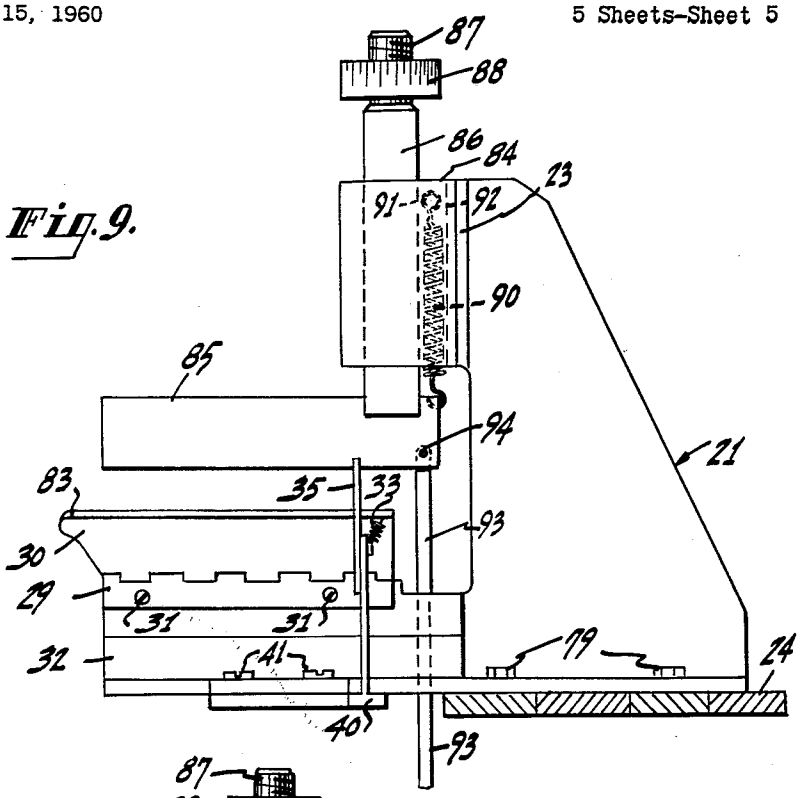
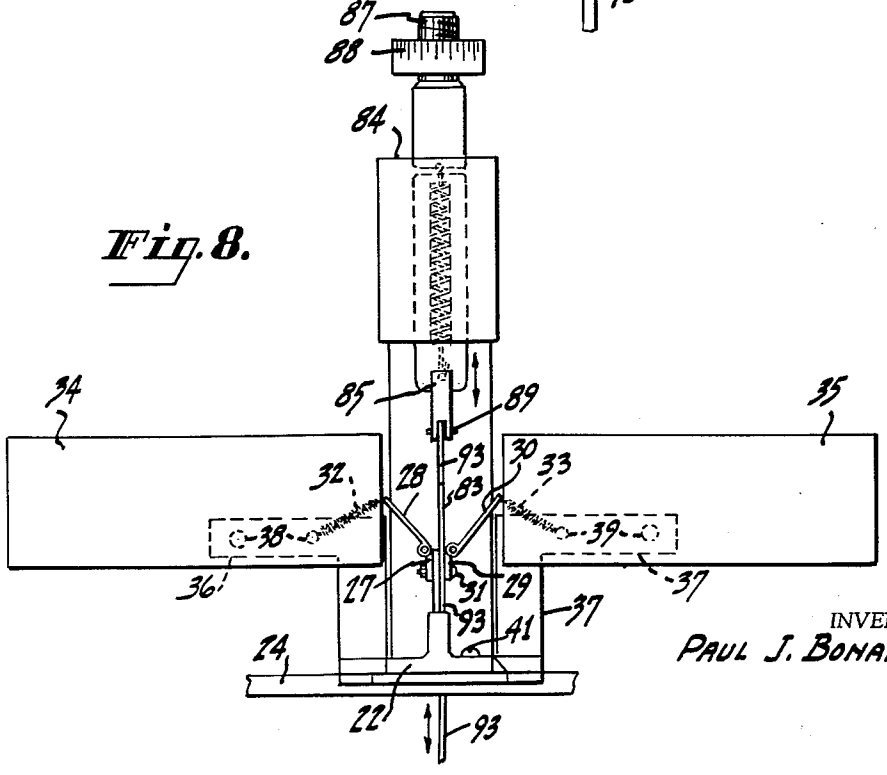


Fig. 8.



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United States Patent Office 3,010,621 Patented Nov. 28, 1961

3,010,621

PLEAT-FORMING DEVICES

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Filed Aug. 15, 1960, Ser. No. 49,560
8 Claims. (Cl. 223—31)

This invention relates to improved pleat-forming devices.

Pleat-forming devices have been provided previously which produce three pleats and which comprise a fixed elongated plate and a U-shaped member adapted to be rotated into engagement with said plate with the fabric to be pleated therebetween. In such previous devices, each time the fabric to be pleated is changed or the pleat depth is changed, a mechanic and special tools are required to readjust the device. Further, because of the construction thereof, previous devices go out of adjustment during the operation of the devices. Thus, neither short runs nor long runs are economical.

An object of this invention is to provide improved pleat-forming devices.

Another object is to provide pleat-forming devices which may be simply and easily adjusted by the device operator.

A further object is to provide pleat-forming devices which are sturdier and remain in adjustment during the course of operation.

Still another object is to provide pleat-forming devices which produce more than three pleats in a fabric.

In general, the pleat-forming devices of the invention comprise at least one fixed elongated plate, each plate having a longitudinal working edge adapted to receive fabric thereon, each of said working edges being fixed in a plane; an equal number of elongated members fixed to one another, each member having a substantially U-shaped cross section with its open side opposite the working edge of one of said first plates and operatively associated therewith and movable or slidable along an axis substantially perpendicular to said plane into engagement with said first plate with the working edge of each of said first plates being received within its facing member with the fabric therebetween; and a pair of second elongated plates, each having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plates are in operative engagement with said members with the fabric interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in said plane.

By providing first elongated plates having their working edges fixed in a plane in combination with opposed U-shaped members which are movable or slidable along an axis substantially perpendicular to said plane, two improvements result. First, the device is sturdier and remains in adjustment over extended periods of operation. Second, a depth adjustment convenient for the operator may be incorporated into the device simply as stops which limit the travel of the U-shaped members into engagement with the first elongated plates. Such stop adjustments are an additional feature of the invention.

The invention is described in detail in the following specification and illustrated in the accompanying drawings in which:

FIGURE 1 is a perspective view of a first embodiment of the invention, which is adapted to produce four pleats in a fabric,

FIGURE 2 is a front view of the embodiment of FIGURE 1,

FIGURE 3 is a side view of the embodiment of FIGURE 1,

FIGURE 4 is a fragmentary front sectional view along section lines 4—4 of FIGURE 3 illustrating the position of the fabric at the outset of the operation of the device of FIGURE 1,

FIGURES 4, 5, 6 and 7 are fragmentary front sectional views illustrating the sequence of movement of the working edges of the embodiment of FIGURE 1 to form four pleats in the fabric, and

FIGURES 8 and 9 are a front view and a side view respectively of a second invention which is adapted to produce three pleats in a fabric.

Similar reference characters are used for similar elements throughout the drawings.

FIGURES 1, 2, 3 and 4 illustrate a first embodiment of the invention. The first embodiment comprises a generally inverted T-shaped base 21 having a horizontal base section 22 and a vertical base section 23. The base 21 is stationary and is ordinarily fixed to a work table 24 as with holddown bolts 79, with a substantial portion of the horizontal base section 22 extending beyond the edge of the table 24 in cantilever fashion.

On each side of the horizontal base section 22 at the extended end thereof are mounted a left and a right fixed elongated plate 25 and 26 respectively, each plate 25 and 26 having a longitudinal working edge 25*a* and 26*a* respectively adapted to receive fabric thereon, the working edges 25*a* and 26*a* being fixed in a generally horizontal plane. The fixed plates 25 and 26 are spaced apart by the horizontal base section 22 and, if necessary, with shims 40 as shown in FIGURE 4.

Mounted alongside the left fixed plate 25 is a left hinge comprising a left stationary hinge section 27 and a left movable hinge section 28 having an upper working edge 28*a*. Mounted alongside the right fixed plate 26 is a right hinge comprising a right stationary hinge section 29 and a right movable hinge section 30 having an upper working edge 30*a*. The left and right hinges are positioned so that when the movable sections 28 and 30 are in their raised position, the working edges 28*a* and 30*a* thereof are in substantially the same plane as the upper working edges 25*a* and 26*a* of the first plate 25 and 26. The stationary sections 27 and 29 of the hinges, the fixed plates 25 and 26 and the shims 40 are attached to the horizontal base section 22 with bolts 31.

A left fabric guide support 36 and a right fabric guide support 38 are welded to a fabric connector 40 which is fastened to the horizontal base section 22 near the center thereof with support screws 41, so that the supports 36 and 37 are on the left and right sides thereof in opposed positions. The position of the guide connector 40 may be adjusted along the base. A left fabric guide 34 is attached to the left fabric guide support 36 with left fabric guide screws 38. A right fabric guide 35 is attached to the right fabric guide support 37 with right fabric guide screws 39. The left and right fabric guides 34 and 35 are in the form of flat rigid sheets and are positioned on the supports 36 and 37 to present major surfaces thereof in a common plane substantially perpendicular to the plane of the working edges 25*a* and 26*a* of the left and right fixed plates 25 and 26.

A left hinge spring 32 is mounted between a left fabric guide screw 38 and a hole near the working edge 28*a* of the left movable hinge section 28, so that normally the left movable hinge section 28 is in the open position resting against an inner edge of the left fabric guide 34, and so that it is movable by hand to a closed position substantially parallel to the left fixed plate 25.

A right hinge spring 33 is mounted between a right fabric guide screw 38 and a hole near the working edge 30*a* of the right movable hinge section 30, so that normally the right movable hinge section 28 is in the open position resting against an inner edge of the right fabric guide 35,

and so that it is movable by hand to a closed position substantially parallel to the right fixed plate **26**.

A stop support is welded to the upper part of the vertical base section **23** on the side facing the left and right fixed plates **25** and **26**. A first stop **44** is welded to the outer face of the stop support **43**. The first stop **44** is in the form of a square block having a hole therethrough. The hole is preferably some shape other than round for example square and has a center line substantially perpendicular to the plane of the fixed plate working edges **25***a* and **26***a*, and is of uniform cross-section. The stop support **43** has welded at the top thereof a second stop **45** having an arcuate portion thereof cut out.

A first arm **46** of uniform cross-section extends through the square hole of the first stop **44**. The first arm **46** is a close tolerance sliding fit in the hole of the first stop **44**. A left U-shaped member **66** and a right U-shaped member **67** are welded to the bottom of the first arm **46** in parallel spaced relation to one another with the open sides thereof opposite the fixed plate working edges **25***a* and **26***a*. The U-shaped members **66** and **67** are further fixed to one another with a strap **68**. The U-shaped members **66** and **67** are so positioned that when the first arm **46** has moved downwardly in the hole of the first stop **44**, each U-shaped member is in operative engagement with one of the fixed plates **25** and **26**.

A shield **60** is welded to the front face of the first stop **44**. A left and a right lift spring mounting **61** and **62** are welded to the upper portion of the shield **60** on each side of the first stop **44**. A left and a right lift spring pin **58** and **59** are attached to each side of the first arm **46** and extend sidewardly left and right respectively. A left lift spring **56** is mounted between the left pin **58** and the left mounting **61**. A right lift spring is mounted between the right pin **59** and the right mounting **62**. The lift springs **56** and **57** retain the first arm **46** in a normally raised position, but may be stretched downwardly when desired as explained below.

The first arm **46** has, at the upper portion thereof, a threaded section **47** and a close fit adjustable first stop nut **48** screwed thereon. The first stop nut **48** is of such size that when the first arm **46** is pulled downwardly, its travel is limited when the first stop nut **48** bears on the first stop **44**. Also, when the first arm **46** is returned upwardly, its travel is limited when the first stop nut **48** bears on the second stop **45**.

The first arm **46** also has a hole of uniform cross-section extending therethrough. The center line of the hole in the first arm **46** is parallel to the center line of the hole in the first stop **44**, and preferably is a round hole with a center line which coincides with the center line of the hole in the first stop **44**.

A second arm **49** of uniform cross-section extends through the hole in the first arm **46**. The second arm **49** is a close tolerance sliding fit in the hole of the first arm **46**. A planar member **65** is welded to the bottom of the second arm **49** in a position to occupy the space between the left and right U-shaped members **66** and **67** when both the first and second arms **46** and **49** are raised. The planar member **65** is further so positioned that when the second arm **49** has moved downwardly in the hole in the first arm **46**, the bottom edge thereof is between the fixed plates **25** and **26** and is parallel to the working edges **25***a* and **26***a*.

The second arm **49** has, at its upper portion thereof, a threaded section **50** and a close fit adjustable second stop nut **51** screwed thereon. The second stop nut **51** is of such size that when the second arm **49** is drawn downwardly, its travel is limited when the second stop nut **51** bears on the second stop **45**. The second stop nut **51** has a plurality of symmetrically spaced vertical holes **52** around the threaded part. A lock pin **53** is placed through a selected one of these holes and screwed into a corresponding hole in the first lock nut **48** to maintain the spacing relationship between the lock nuts **48** and **51**.

The second arm **49** is maintained in an ordinarily raised position through a second arm pull rod **77** by a second pull spring **72** which is mounted between the second pull rod **77** and the horizontal base section **22**. The second arm **49** may be pulled downwardly by downward pressure on a foot pedal **75** which pulls the second arm pull rod **77** downwardly through a first pull spring **71** and a pedal pull rod **74** connected to the first pull spring **71** and the pedal **75**. When the second stop nut **51** bears on the second stop **45**, further movement of the pedal **75** is taken up by the extension of the spring **71**. The pedal pull rod **74** extends through a hole in a portion of a first arm pull rod **76** which is connected to the first arm **46**. As the first pull spring **71** is extended the bottom thereof bears on the first arm pull rod **76** pulling it and the first arm **46** downwardly.

The operation of the device of FIGURES 1 to 3 is explained in connection with the fragmentary front sectional views FIGURES 4 to 7. A piece of fabric **80** is held above or on the working edges **25***a* and **26***a* of the fixed plates **25** and **26** with the edge of the fabric **80** against the fabric guides **34** and **35** as shown in FIGURE 4. The pedal **75** is depressed pulling the planar member **65** downwardly until the second arm stop nut **51** bears on the second stop **45**. At this point, as shown in FIGURE 5, the planar member **65** has pressed an amount of fabric between the fixed plates **25** and **26**. As the second arm **49** is pulled down to the second stop **45**, the second pull spring **72** is extended.

Further depression of the pedal **75** further extends the second pull spring **72** until the first pull spring **71** engages the first arm pull rod **76** pulling the first arm **46** downwardly until the first stop nut **48** bears on the first stop **44**. At this point, as shown in FIGURE 6 the U-shaped members **66** and **67** have moved downward bending the fabric **80** around the fixed plates **25** and **26**, thereby forming the first and second pleats. The lift springs **56** and **57** and the second pull spring **72** are extended. Further depression of the pedal **75** is taken up in the second pull spring **72**.

As shown in FIGURE 7, the movable hinge sections **28** and **30** are now moved to a position substantially parallel to the fixed plates **25** and **26**, by hand, against the pull of the hinge springs **32** and **33** pushing the fabric **80** against the outside of U-shaped members **66** and **67**. The fabric **80** is now folded manually around the working edges **28***a* and **30***a* of the movable hinge sections, thereby forming the third and fourth pleats in the fabric **80**. The four pleats are now grasped by hand and slid outwardly from between the U-shaped members **66** and **67** and the fixed plates **25** and **26** and sewn on a sewing machine. The pedal **75** and the movable hinge sections **28** and **30** are released, and the various springs return all of the structural members to their normal positions.

The first embodiment of FIGURE 1 may be simply and easily adjusted by the operator for different thicknesses of material and for different depths to the pleats formed. The lock pin **53** is removed and the two adjustable stop nuts **48** and **51** are rotated until they are in suitable positions so that when both arms are in the down position, the lower edge of the planar member **65** is in the desired position with respect to the lower edges of the U-shaped members **66** and **67**. The lock pin **53** is then passed through a convenient hole in the second stop nut **51** and screwed into the upper side of the first stop nut **48**. Next, the two stop nuts **48** and **51** are rotated together to a desired position which provides the desired depth of pleat. If desired, means may be provided for locking the stop nuts **48** and **51** in this position, as with an Allen screw **54** in the second stop nut **51**.

FIGURES 8 and 9 illustrate a second embodiment of the invention adapted for making three pleats instead of four. The embodiment of FIGURES 8 and 9 is similar in structure and operation to the first embodiment of FIGURE 1, except that some of the structure and opera-

tion of the first embodiment are omitted. Nevertheless, the feature of the upper U-shaped member which is slidable into engagement with lower plates forms an important part of this second embodiment. By virtue of this arrangement, the device is sturdier than previous devices. And, the device may include an adjustable stop by which the operator may adjust the depth of the pleat.

Briefly, the second embodiment of FIGURES 8 and 9 comprises a base **21** having horizontal and vertical sections **22** and **23** mounted on a table **24** as in the first embodiment. Further, the fabric guides **34** and **35** and supports **36**, **37** and **40** are the same as the first embodiment. Also the hinge sections **27**, **28**, **29** and **30** and hinge springs **32** and **33** are the same as in the first embodiment except that only one fixed plate **89** is mounted on the horizontal base section **22**.

A stop **84** is attached to the vertical base section **23** and has a hole of uniform substantially square cross-section therethrough in the vertical direction. An arm **86** of uniform square cross-section is slidably positioned in the hole of the stop **84**. A U-shaped member **85** is attached to the bottom of the arm **86** and positioned to slide into engagement with the fixed plate **83**. A stop nut **88** is adjusted upon the threaded section **87** at the upper end of the arm **86** to provide the desired pleat depth. The arm **86** is retained in a normally raised position by a spring **90** mounted between the U-shaped member **85** and a mounting pin **91** at the top of a vertical slot **92** adjacent the hole in the stop **84**. The arm **86** may be lowered by depressing a foot pedal (not shown) connected to the U-shaped member **85** by a pull rod **93** and pin **94**.

In operation, the fabric to be pleated is held over or on the working edge **25***a* with the edge of the fabric **80** against the guides **34** and **35**. The pedal **75** is depressed pulling the U-shaped member **66** into engagement with the fixed plate **25** with the fabric therebetween thereby forming the first pleat. The movable hinge sections **28** and **30** are closed with the fabric **80** between the U-shaped member **66** and the hinge sections **27** and **28**. The fabric **80** is now folded down by hand thereby forming the second and third pleats. Then the fabric is slipped off the device as in the first embodiment of FIGURE 1.

What is claimed is:

1. A pleat-forming device comprising at least one fixed first elongated plate, said plate having a longitudinal working edge adapted to receive fabric thereon, said working edge being fixed in a plane; an elongated member having a substantially U-shaped cross section with its open side opposite the working edge of said first plate and operatively associated therewith and movable along an axis transverse to said plane into engagement with said first plate with the working edge of said first plate being received within said member with the fabric therebetween; and a pair of second elongated plates, each having a longitudinal working edge and each second plate being hingedly mounted on opposite sides of said first plate and rotatable to a position substantially parallel to said first plate, when said first plate is in operative engagement with said member with the fabric adapted to be interposed between the outer sides of said member and each of said second plates and with the working edges of said first and second plates aligned in said plane.

2. A pleat-forming device comprising a pair of spaced fixed first elongated plates, each plate having a longitudinal working edge adapted to receive fabric thereon, said working edges being aligned in a plane; a pair of elongated members fixed to one another, each member having a substantially U-shaped cross section with its open side facing the working edge of one of said first plates and operatively associated therewith and movable by translation along an axis substantially perpendicular to said first plane into engagement with said first plate with the working edge of each of said first plates being received within its facing member with the fabric therebetween; and a pair of second elongated plates, each having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plates are in operative engagement with said members, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in said plane.

3. A pleat-forming device comprising a first elongated fixed plate having a longitudinal working edge adapted to receive fabric thereon; an elongated member of substantially U-shaped cross section positioned with its open side facing the working edge of said first plate and operatively associated with said first plate and movable by translation along an axis substantially perpendicular to said working edge into engagement with said first plate with the working edge of said first plate being received within said member with the fabric therebetween; and a pair of second elongated plates, each having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plate and rotatable to a position substantially parallel to said first plate when said first plate is in operative engagement with said member and with the fabric adapted to be interposed between said member and each of said second plates and with the working edges of said first and second plates aligned in a plane substantially perpendicular to said axis.

4. A pleat-forming device comprising a base, a plurality of first elongated plates fixed to said base, each first plate having a longitudinal working edge adapted to receive fabric thereon, said working edges being aligned in a plane; an equal number of elongated members mounted on said base and adapted to move as a unit, each member having a substantially U-shaped cross section with its open side facing the working edge of one of said first plates and operatively associated therewith, said members being adapted to move by translation along an axis substantially perpendicular to said plane into engagement with said first plates with the working edge of each of said first plates being received within its facing member with the fabric therebetween; an adjustable stop upon said base for limiting the distance of travel of said first plates within said members; and a pair of second elongated plates on said base, each second plate having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plate are in operative engagement with said members, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in said plane.

5. A pleat-forming device comprising a horizontal stationary base; a pair of spaced parallel elongated first plates attached to said base and extending upwardly therefrom, each plate having a first horizontal working edge adapted to receive fabric thereon, said working edges being aligned in a horizontal plane; a pair of elongated U-shaped members attached to each other in spaced relation and forming a channel of uniform cross-section therebetween, the open side of each of said U-shaped members facing the working edge of one of said first plates and operatively associated therewith; a planar member having a second horizontal working edge in said channel; a support fixedly mounted on said base, said support having a first vertical orifice of uniform cross-section therethrough; a first arm having said U-shaped members attached to the lower end thereof adapted to slide without rotation in said first vertical orifice to move said U-shaped members into engagement with said first plates with the working edge of each of said first plates within its facing U-shaped member with the fabric therebetween, said first arm further having a second vertical orifice of uniform cross section therethrough within said

first vertical orifice; a second arm having said planar member attached to the lower end thereof, said second arm adapted to slide in said second vertical orifice to move said planar member with said second working edge to a predetermined position below said first working edges between said first plates and with said fabric therebetween; means for maintaining said U-shaped and planar member in a normally raised position; adjustable means for limiting the movement of said planar member; adjustable means for limiting the movement of said U-shaped members; and a pair of second elongated plates, each having a third longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plates are in operative engagement with said U-shaped members, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates, and with the working edges of said first and second plates aligned in said plane.

6. A pleat-forming device comprising a horizontal stationary base; a pair of spaced parallel elongated first plates attached to said base and extending upwardly therefrom, each plate having a first horizontal working edge adapted to receive fabric thereon, said working edges being aligned in a horizontal plane; a pair of elongated U-shaped members attached to each other in spaced relation and forming a channel of uniform cross-section therebetween, the open side of each of said U-shaped members facing the working edge of one of said first plates and operatively associated therewith; a planar member having a second horizontal working edge in said channel; a support fixedly mounted on said base said support having a first substantially square vertical orifice of uniform cross-section therethrough; a first substantially square arm having said U-shaped members attached to the lower end thereof adapted to slide without rotation in said first vertical orifice to move said U-shaped members into engagement with said first plates with the working edge of each of said first plates within its facing U-shaped member with the fabric therebetween, said first arm further having a second substantially circular vertical orifice of uniform cross-section therethrough within said first vertical orifice; a second substantially circular arm having said planar member attached to the lower end of said second arm adapted to slide in said second vertical orifice to move said planar member with said second working edge to a predetermined position below said first working edges between said first plates with said fabric therebetween; spring means for maintaining said U-shaped and planar member in a normally raised position; adjustable screw means attached to said second arm for limiting the movement of said planar member between predetermined limits; adjustable screw means attached to said first arm for limiting the movement of said U-shaped members between predetermined limits; pedal means attached to said first and second arms and adapted to lower said second arm to its limit and then to lower said first arm to its limit; and a pair of second elongated plates, each having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plates are in operative engagement with said U-shaped members, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in said plane.

7. A pleat-forming device comprising a horizontal stationary base; an elongated first plate attached to said base and extending upwardly therefrom and having a first horizontal working edge adapted to receive fabric thereon; an elongated U-shaped member having the open side thereof facing the working edge of said first plate and operatively associated therewith; a support fixedly mounted on said base, said support having a vertical orifice of uniform cross-section therethrough; an arm having said U-shaped member attached to the lower end thereof adapted to slide without rotation in said vertical orifice to move said U-shaped member into engagement with said first plate with the working edge of said first plate within its facing U-shaped member with the fabric therebetween; means for maintaining said U-shaped member in a normally raised position; adjustable means for limiting the movement of said U-shaped member; and a pair of second elongated plates, each second plate having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plate and rotatable to a position substantially parallel to said first plates, when said first plate is in operative engagement with said U-shaped member, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in a horizontal plane.

8. A pleat-forming device comprising a horizontal stationary base; an elongated first plate attached to said base and extending upwardly therefrom and having a first horizontal working edge adapted to receive fabric thereon; an elongated U-shaped member having the open side thereof facing the working edge of said first plate and operatively associated therewith; a support fixedly mounted on said base, said support having a substantially square vertical orifice of uniform cross-section therethrough; a substantially square arm having said U-shaped member attached to the lower end thereof and adapted to slide without rotation in said first vertical orifice to move said U-shaped member into engagement with said first plate with the working edge of said first plate within its facing U-shaped member with the fabric therebetween; spring means for maintaining said U-shaped member in a normally raised position; adjustable screw means for limiting the movement of said U-shaped member between predetermined limits; pedal means attached to said arm and adapted to move said U-shaped member to its limit; and a pair of second elongated plates, each having a longitudinal working edge and each being hingedly mounted on opposite sides of said first plates and rotatable to a position substantially parallel to said first plates, when said first plates are in operative engagement with said U-shaped members, with the fabric adapted to be interposed between the outer sides of said members and each of said second plates and with the working edges of said first and second plates aligned in a horizontal plane.

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