

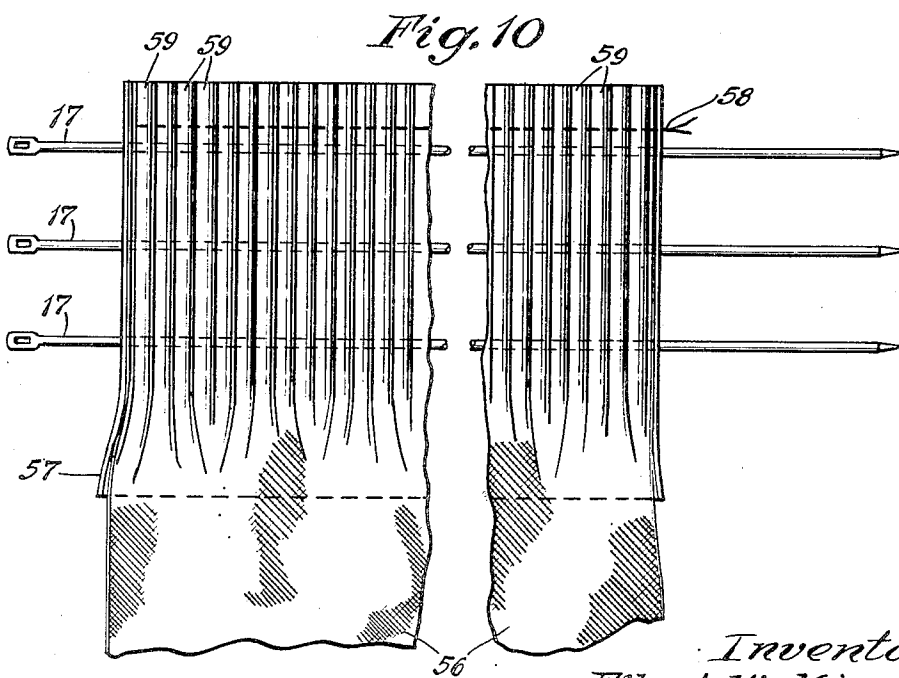
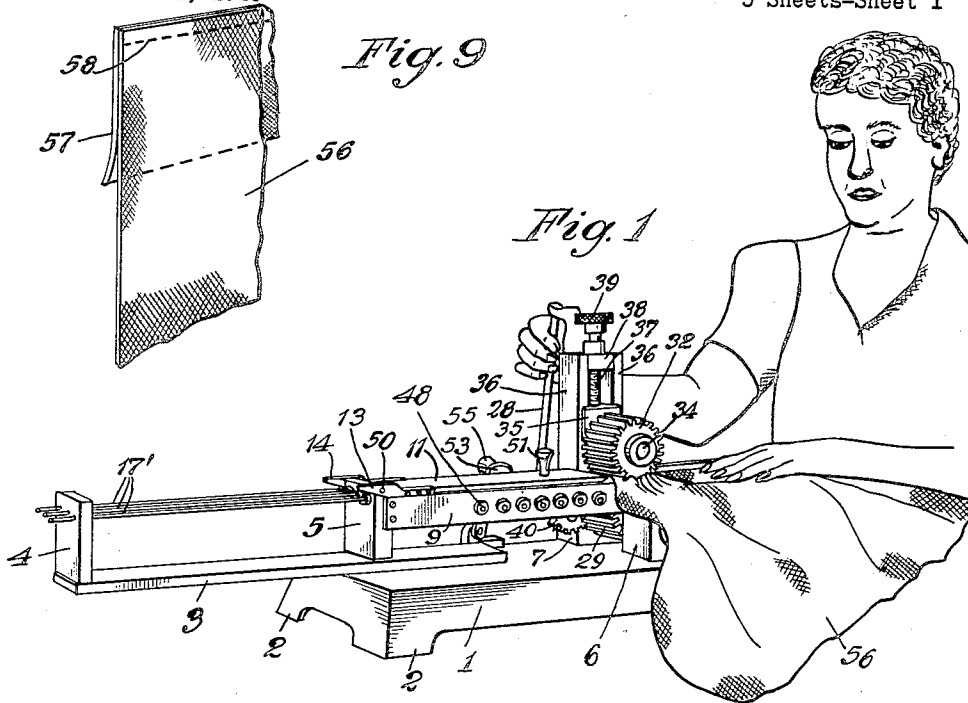
May 8, 1951

E. W. MINNS
FLUTING MACHINE

2,551,808

Filed Feb. 28, 1948

5 Sheets-Sheet 1



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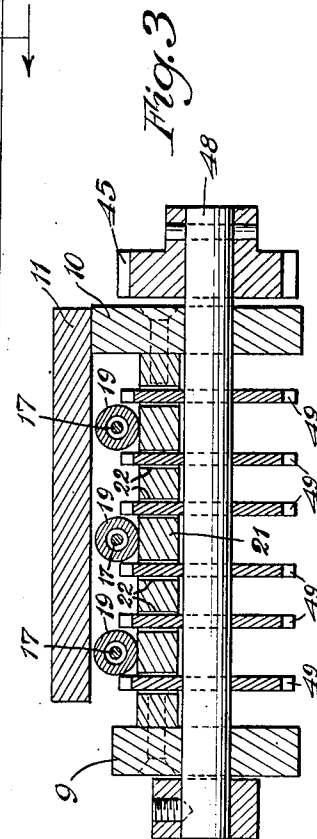
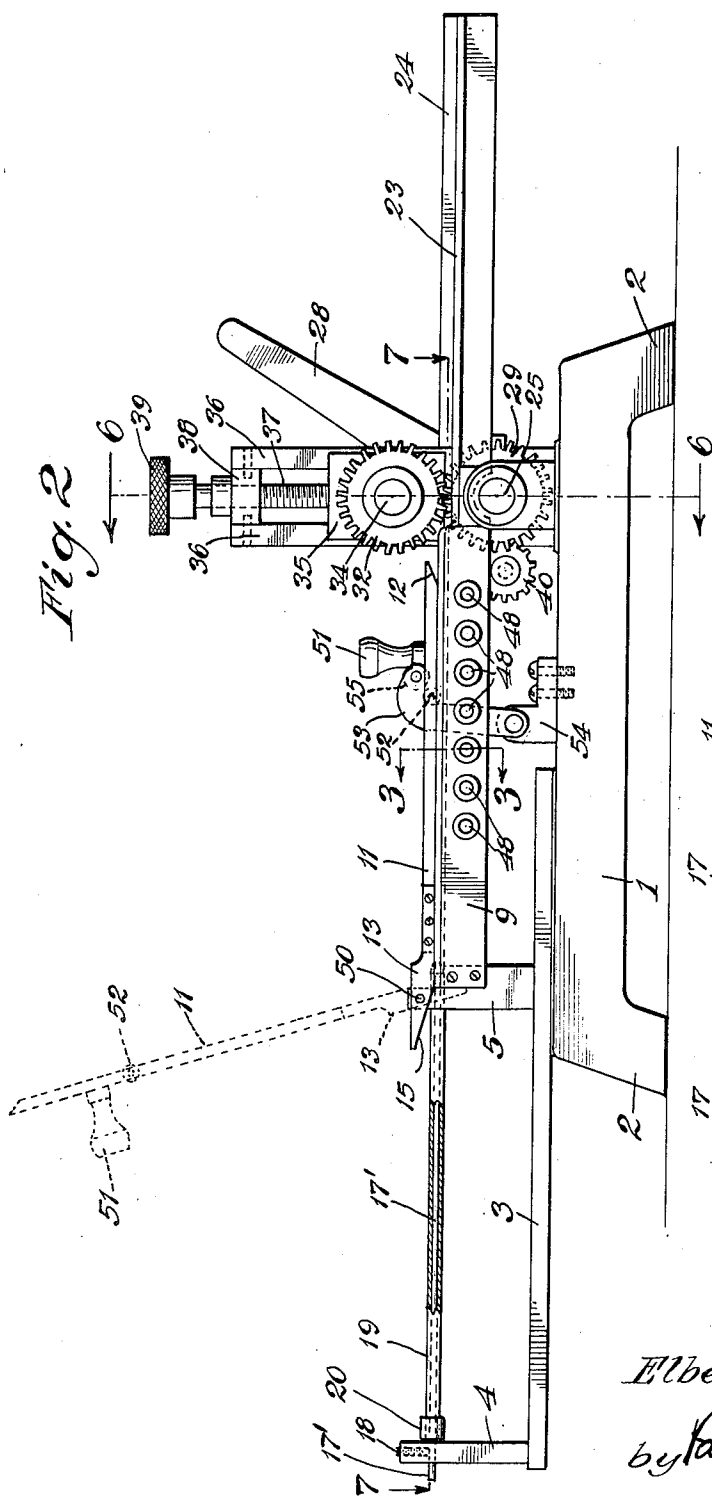
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5 Sheets-Sheet 2



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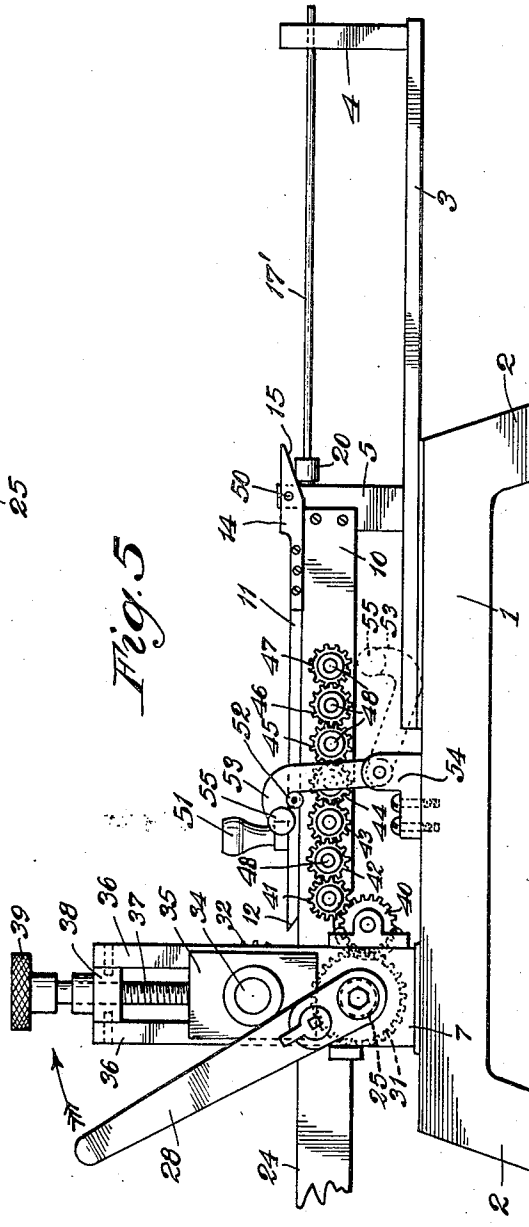
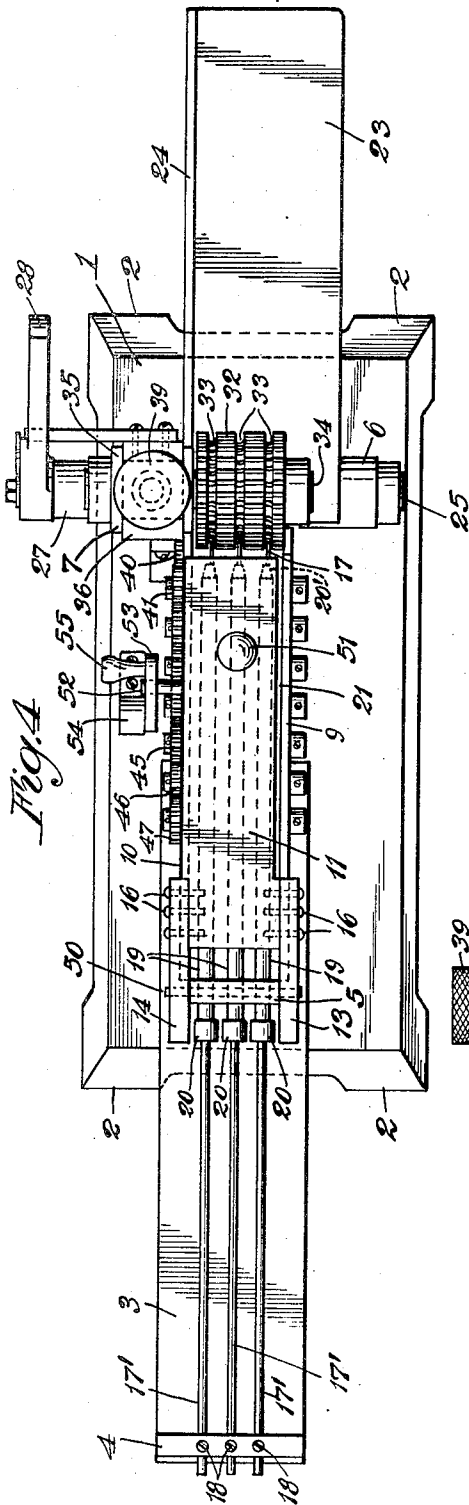
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5 Sheets-Sheet 3



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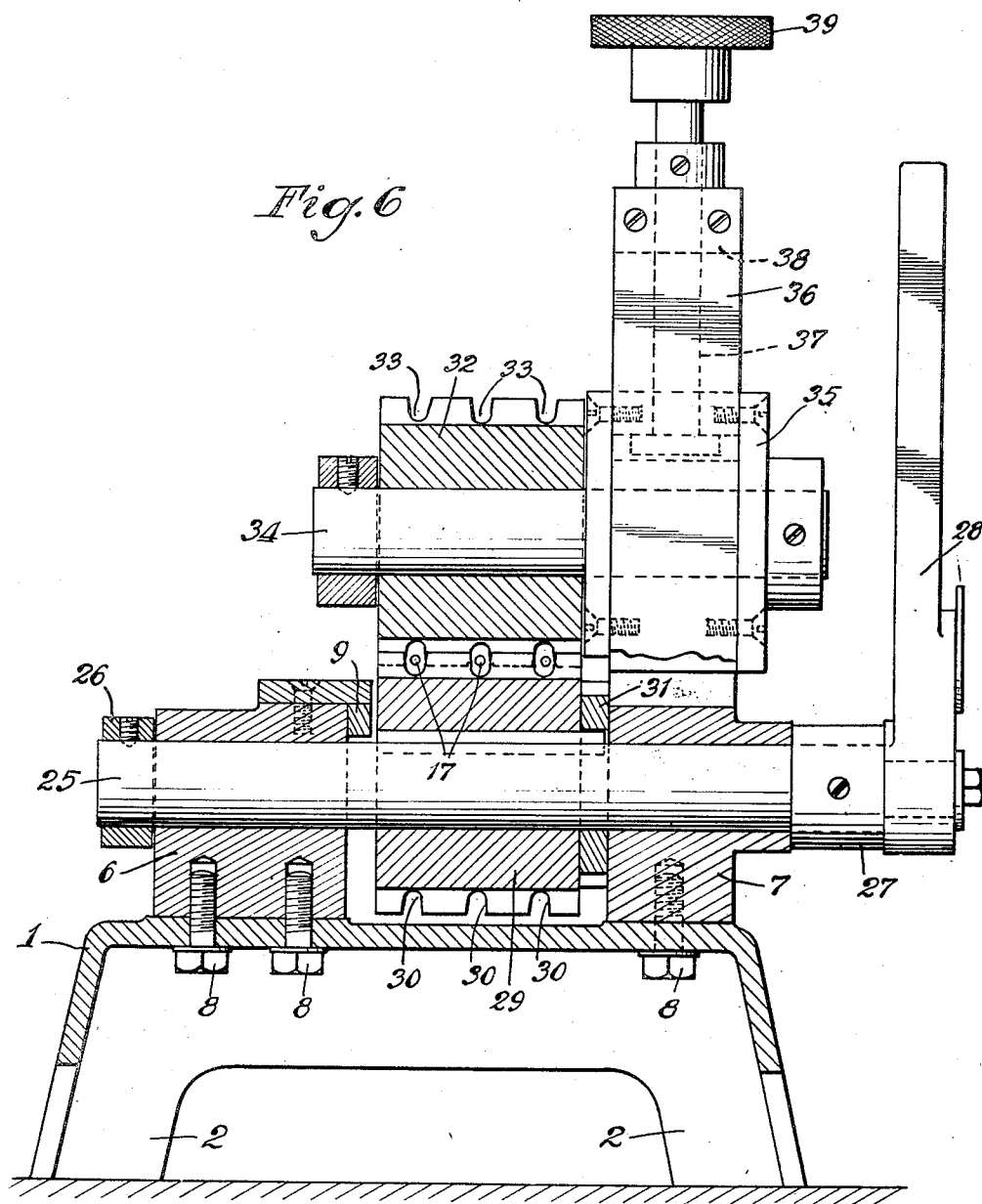
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FLUTING MACHINE

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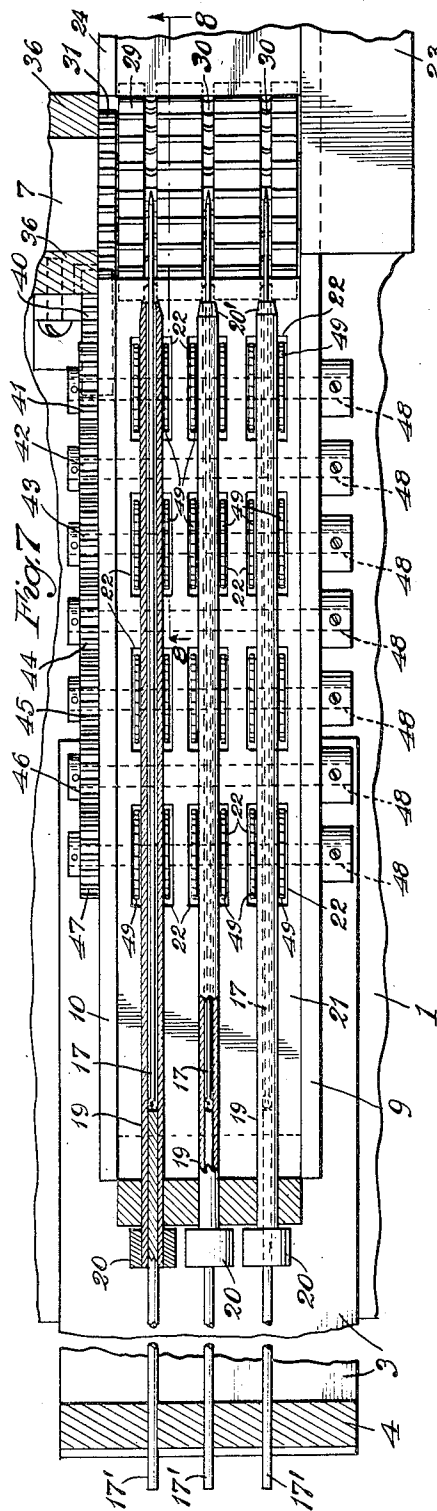
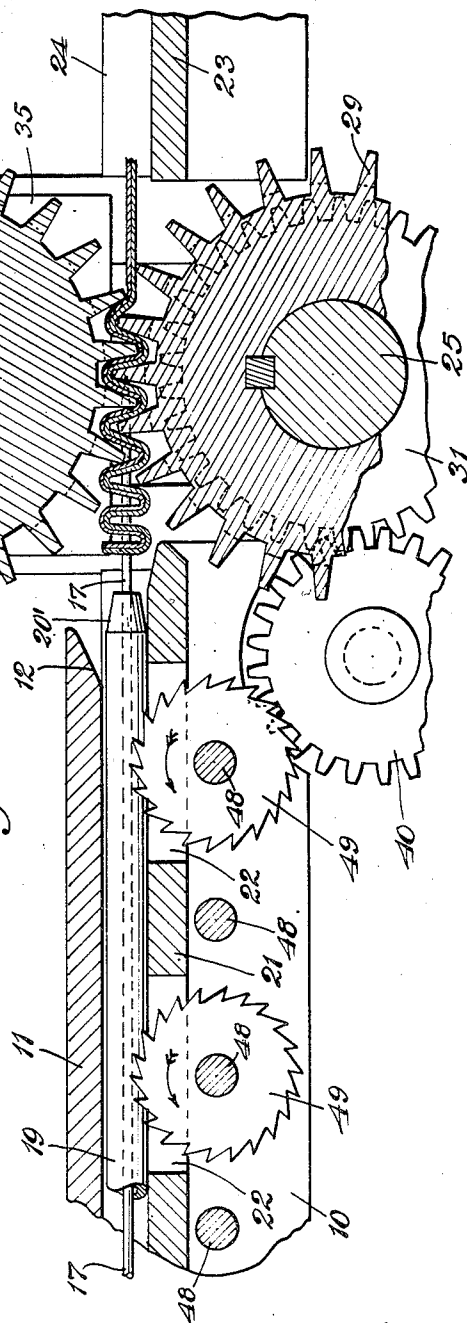


Fig. 8



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UNITED STATES PATENT OFFICE

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FLUTING MACHINE

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17 Claims. (Cl. 223—32)

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This invention relates to a mechanism for fluting. That is to say, a mechanism for putting flutes in pieces of fabric. It has for one object to provide a fluting machine so arranged that it can work in relatively heavy material having one or more plies.

Another object is to provide a fluting machine arranged to form fabric into fluted arrangement and to provide means for holding and retaining the fabric in that arrangement so that it can be given subsequent treatment either stitching or assembling in a garment.

Other objects will appear from time to time throughout the specification and claims.

This invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a perspective view of the machine in use;

Figure 2 is a side elevation on an enlarged scale showing the mechanism of Figure 1 with parts in section;

Figure 3 is a transverse sectional detail taken on an enlarged scale at line 3—3 of Figure 2;

Figure 4 is a plan view of Figure 2;

Figure 5 is a partial side elevation taken from the opposite side of Figure 2;

Figure 6 is a transverse section taken on an enlarged scale at line 6—6 of Figure 2;

Figure 7 is a horizontal section taken on an enlarged scale at line 7—7 of Figure 2;

Figure 8 is a vertical longitudinal sectional detail taken on an enlarged scale at line 8—8 of Figure 7.

Figure 9 is a perspective view illustrating a portion of a fabric member ready for fluting.

Figure 10 illustrates a portion of a fabric member after the completion of fluting.

Like parts are indicated by like characters throughout the specification and the drawings.

In the particular form here shown, the machine comprises a base 1 which may have feet 2 if desired. A frame member 3 is fixed to the base 1 and extends laterally from it and carries a support 4. A support 5 is positioned upon the member 3. A pair of bearing supports 6, 7 are fixed to the base 1 by screws 8 or otherwise. Side members 9, 10 are supported in part on the member 5 and in part on the bearing supports 6 and 7. A table 11 is carried in part upon the member 10. At one end, the table 11 is provided on its lower surface with an inclined part 12. At its opposite end, the table 11 is provided with a pair of side members 13, 14 which are inclined as at 15 on their lower surface. Screws 16 secure the members 13 and 14 to the table portion 11.

A plurality of needles 17 is supported at one end in the support 4 and may be held in place by screws 18 or otherwise. Tubular needle guides 19 are positioned one about each of the needles

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17. Stops 17' are also positioned within the guides 19. There is one such stop for each needle. The needle guides may, if desired, be provided with enlarged heads 20 and are preferably reduced at their opposite ends as at 20', as shown in Figures 7 and 8.

Beneath the table portion 11 is mounted a second table member 21 which is slotted as at 22, 22' for a purpose which will be described below. The needle guides 19 as shown particularly in Figure 8 may rest upon the member 21.

A feed table 23 which may have a raised side portion 24 is supported at any suitable place and may be conveniently supported upon the members 6 and 7 if desired.

25 is a shaft mounted for rotation in the bearing supports 6 and 7. It is provided on one end with a positioning ring 27. The opposite end is provided with a retaining collar 26. A handle 28 is fixed to the shaft 25. A gear-like pleating member 29 is fixed on the shaft 25, the teeth of this gear-like member are notched as at 30, as shown particularly in Figure 6. Fixed also on the shaft 25 is a gear 31.

Positioned above and meshing with the gear 29 is a second pleating gear 32; its teeth are notched correspondingly as at 33. It is mounted on a shaft 34 which is carried in a bearing block 35 mounted between guide-ways 36, 36 which are secured to or formed as a part of the bearing support 7. A screw 37 engages a correspondingly threaded nut 38 fixed with relation to the guide-ways 36. A handle 39 is fixed on the screw 37 and by means of it, the screw may be rotated for adjustment.

Meshing with the gear 31 is a pinion 40 which meshes with the first member 41 of a gear train shown particularly in Figures 4, 5 and 7. This gear train includes gears 42, 43, 44, 45, 46 and 47. The gears 42, 44 and 46 are idler gears between the gears 41, 43, 45, and 47. Each is fixed to a shaft 48. As shown particularly in Figures 7 and 8, each alternate shaft 48 carries a plurality of notched conveying members 49, these members 49 extend through the slots 22 in the plate 21. As shown, the teeth of the members 49 are pointed with their points extending rearwardly since they rotate counter-clockwise in the direction of the arrow in Figure 8. The points do not engage the fabric but serve merely to convey it out from between the members 29 and 32 and along the needles 17 and thus prevent becoming tangled in it.

The table or plate member 11 is pivoted as at 50 and may be swung upwardly to the dotted line position of Figure 2. It is, therefore, preferably provided with a handle 51 for convenience in raising it. At one side it may be provided with a projecting pin 52. A hook 53 is pivoted on the base 1 by means of the bearing support 54. The

hook is itself provided with a lateral projecting handle 55. When the hook is in the full line position of Figure 5, the member 11 is held against movement. When the hook is moved to the dotted line position of Figure 5, the member 11 may then be swung upwardly to the dotted line position of Figure 2.

Figure 10 illustrates a fabric member after the completion of fluting although a single ply of material may be fluted. As shown in Figure 9, the main fabric is designated by the numeral 56. A backing or reinforcing member 57 may be used and as shown, they are stitched together at 58. As shown in Figure 10 where fluting has been completed, the two-ply member has been shaped by the teeth of the pleating gears 29 and 32 into the pleats 59. The pleated fabric is then removed from the machine, and heavy thread or cord is inserted through the eyes of the needles 17. The needles 17 are then drawn through the fabric and pull the heavy thread or cord through. The needles are finally detached from the thread or cord and may be reused.

Although I have shown an operative form of my invention, it will be recognized that many changes in the form, shape and arrangement of parts can be made without departing from the spirit of the invention, and my showing is therefore to be taken as, in a sense, diagrammatic.

The use and operation of this invention are as follows:

The device is arranged in the position shown in Figure 1 in which the member 11 is in the lowered position and in which the number of needles 17 is positioned by stop members 17' fixed in the support 4. The guide tubes 19 are in position, one on each needle and they are pushed forwardly toward the fluting gears 29 and 32, as shown in Figure 8. The handle 28 is moved in the direction of the arrow, as shown in Figure 5, and material is fed along the table 23 to and between the gears 29 and 32. Movement of the handle 28 causes the gears to rotate, the uppermost gear 28 rotating clockwise and the lowermost gear 29 rotating counter-clockwise. This movement of the gears draws the fabric between the gear teeth and flutes it. At the same time, the fabric is fed upon the needles 17 which, as shown in Figures 6 and 8, project into the notches 30 and 33 in the teeth of the gears 29 and 32 respectively. The needles are held by the stop members 17' which also project into the guide tubes 19 as shown particularly in Figure 7. The needles are held against movement. As the fabric continues to be passed through the fluting gears, it is fed successively upon the needles. As this movement continues, the fluted fabric comes in contact with the tubes 19 and moves them rearwardly toward the support 4. When the heads 20 of the tubes 19 come in contact with the support 4, the operation of the machine is stopped and the fabric is fully engaged in fluted form on the needles. The fabric with the needles present in it may then be removed. Cords or threads are then put into the needles and the needles are drawn through so that the cords take the place of the needles. When the article has been removed from the machine and before the threads have been drawn through by the needles, it has the appearance shown in Figure 10. At this stage of the operation, the guide tubes 19 will have moved to the left from the position of Figures 7 and 8 and will have cleared the ends of the needles 17.

The handle 28 may be arranged for continuous

rotation, if desired, or a ratchet mechanism may be used so that when the handle is moved back and forth, the fluting gears 29 and 32 are rotated. Since the device is preferably manually operated, the operator has full control of it at all times and is able to stop and start the operation as required.

During the fluting movement the rotation of the shaft 26 rotates the gear 31 and the train of gears 41 to 47 inclusive. Since some of these gears are arranged to rotate conveyor member 49, these members rotate in unison and assist in conveying the fluted material away from the fluting gears and assist, therefore, in carrying the fluted material to the left from the position shown in Figures 1 and 8. The movement of the device need not be continued until the guide tubes 19 have reached the position shown in Figure 2. It may be stopped when desired.

I claim:

1. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles positioned to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing fluting gears, means for holding said needles against movement and guides positioned on said needles, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

2. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles penetrating the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears and means for holding said needles against movement and guides positioned on said needles, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

3. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles extending between said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, means for holding said needles against movement and guides positioned on said needles, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

4. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles penetrating the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears and extending between said fluting gears, means for holding said needles against movement and guides positioned on said needles, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

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5. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles positioned to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing fluting gears, means for holding said needles against movement and guides positioned on said needles, said guides being movable, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

6. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles positioned to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing fluting gears, means for holding said needles against movement and guides positioned on said needles, said guides being movable in response to movement of fabric past the fluting gears, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

7. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions, and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles extending between said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, means for holding said needles against movement and guides positioned on said needles, said guides being movable in response to movement of fabric past the fluting gears, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

8. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles penetrating the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears and extending between said fluting gears, means for holding said needles against movement and guides positioned on said needles, said guides being movable in response to movement of fabric past the fluting gears, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

9. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles positioned to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing fluting gears, means for holding said needles against movement and guides positioned on said needles, means for guiding said fabric to said fluting gears, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

10. In combination in a device for fluting fabric

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by impaling folds thereof upon needles, a pair of inter-meshing fluting gears provided with registering cut away portions and means for rotating said gears in a step by step movement, conveying gears positioned beyond said fluting gears in the direction of fabric travel, needles penetrating the cut away portions of said fluting gears and extending between said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, means for holding said needles against movement and guides positioned on said needles, said guides being movable in response to movement of fabric past the fluting gears, means for guiding said fabric to said fluting gears, said conveying gears comprising means for moving the fabric after it has passed from the fluting gears.

11. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing, and means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation, a plurality of needles fixedly positioned and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears.

12. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing, and means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation, a plurality of needles fixedly positioned between said conveying gears and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said intermeshing gears, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears.

13. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing, and means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation, a plurality of needles fixedly positioned and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears and a movably mounted cover member positioned over said conveying gears and said needles.

14. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing, and means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of

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rotation, a plurality of needles fixedly positioned between said conveying gears and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, tubular guide members slidably positioned on said needles, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears and a movably mounted cover member positioned over said conveying gears and said needles.

15. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing and said teeth being cut away in a plurality of separated areas, the cut away portions of each gear being in line with the cut away portions of the other gear, means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation, a plurality of needles fixedly positioned and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears.

16. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing and said teeth being cut away in a plurality of separated areas, the cut away portions of each gear being in line with the cut away portions of the other gear, means for rotating said gears in unison, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation and means for rotating said conveying gears in unison with the rotation of said fluting gears, a plurality of needles fixedly positioned and extending into the cut away portions of said fluting gears to penetrate the folds

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of the fluted fabric as the fabric is drawn through said inter-meshing gears, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears.

17. In combination in a device for fluting fabric by impaling folds thereof upon needles, a pair of fluting gears, the teeth of said gears meshing and said teeth being cut away in a plurality of separated areas, the cut away portions of each gear being in line with the cut away portions of the other gear, means for rotating said gears in unison in a step by step movement, a plurality of conveying members positioned beyond said fluting gears in the direction of fabric movement, said conveying members provided with teeth inclined away from their direction of rotation and means for rotating said conveying gears in unison with the rotation of said fluting gears, a plurality of needles fixedly positioned between said conveying gears and extending into the cut away portions of said fluting gears to penetrate the folds of the fluted fabric as the fabric is drawn through said inter-meshing gears, tubular guide members slidably positioned on said needles, a guiding surface member positioned adjacent said fluting gears and serving to support material as it is moved to said fluting gears and a movably mounted cover member positioned over said conveying gears and said needles.

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