

Dec. 18, 1928.

J. F. GAIL

1,695,421

MACHINE FOR SLITTING AND FOLDING FABRIC

Filed Oct. 5, 1925

5 Sheets-Sheet 1

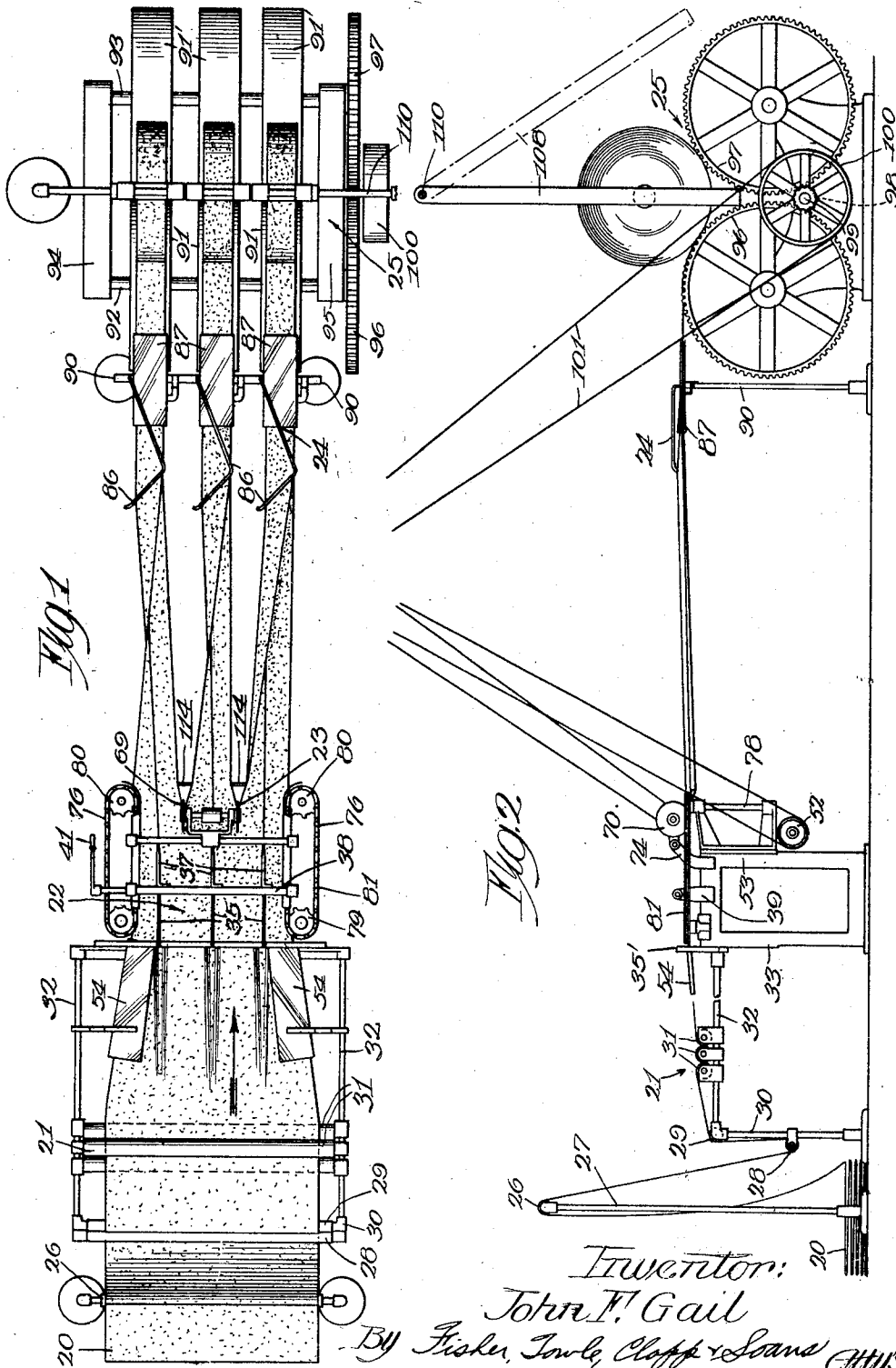


Fig. 2

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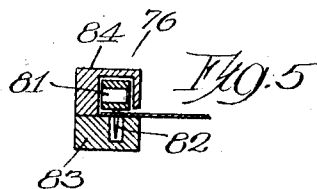
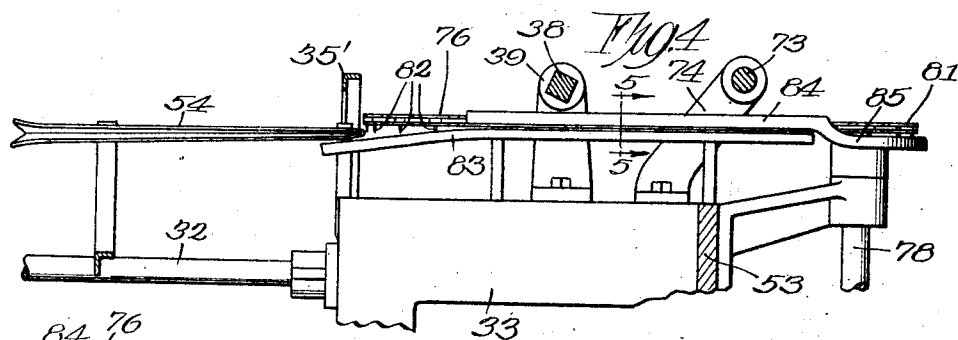
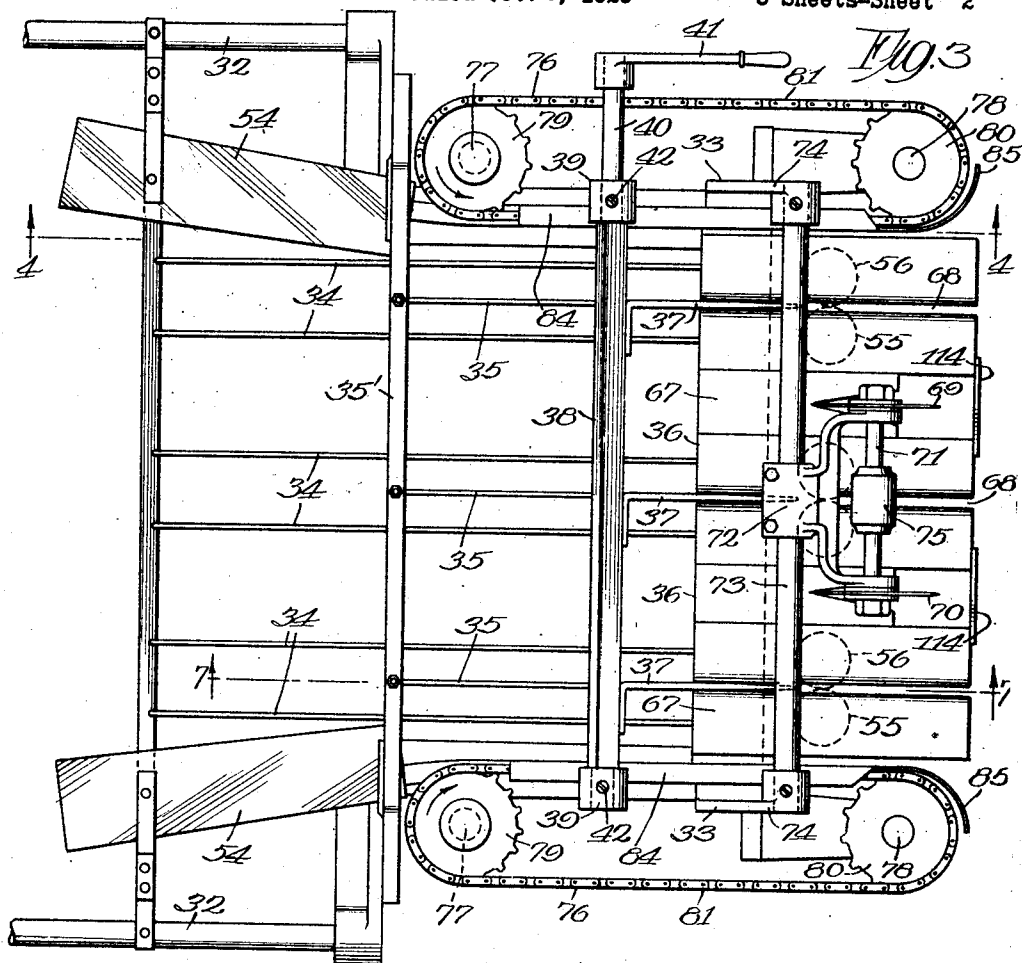
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MACHINE FOR SLITTING AND FOLDING FABRIC

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5 Sheets-Sheet 2



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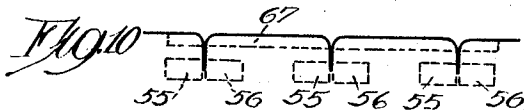
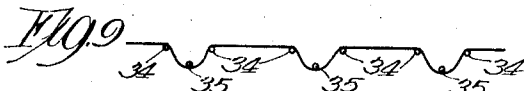
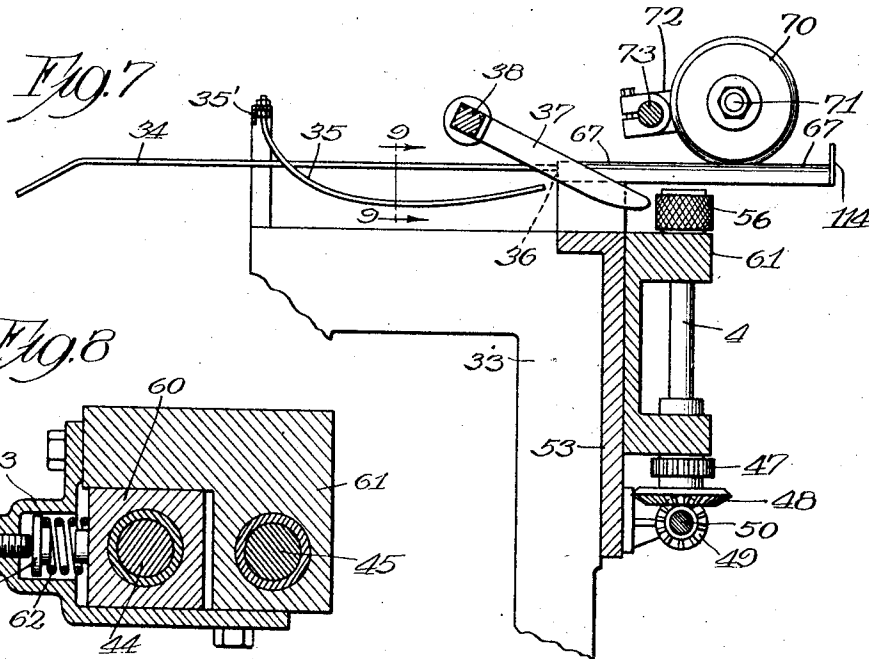
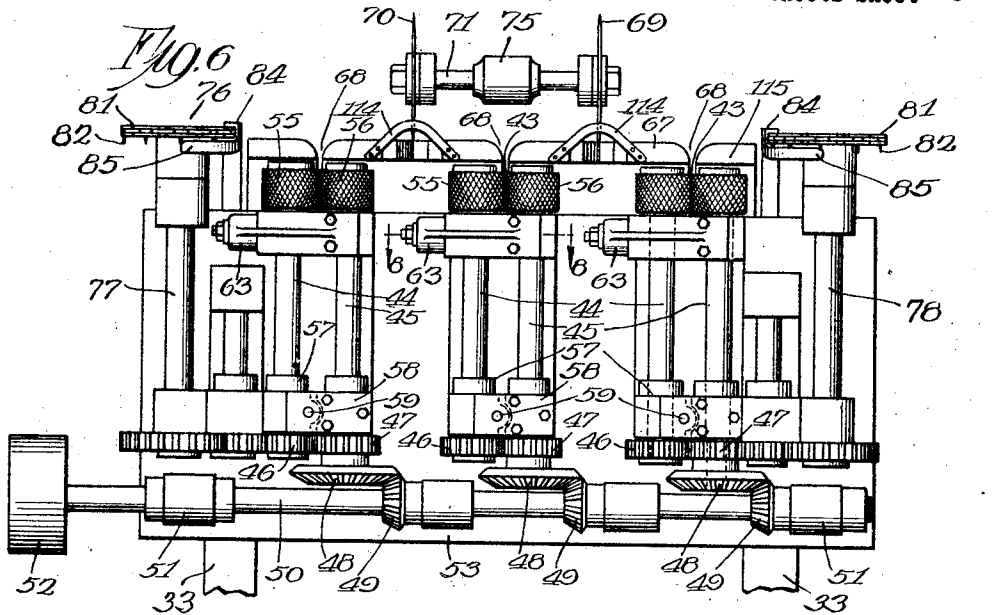
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MACHINE FOR SLITTING AND FOLDING FABRIC

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5 Sheets-Sheet 3



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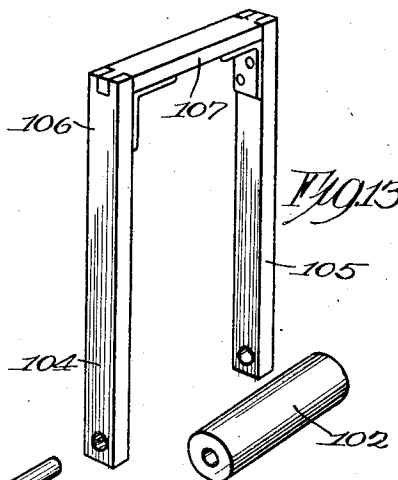
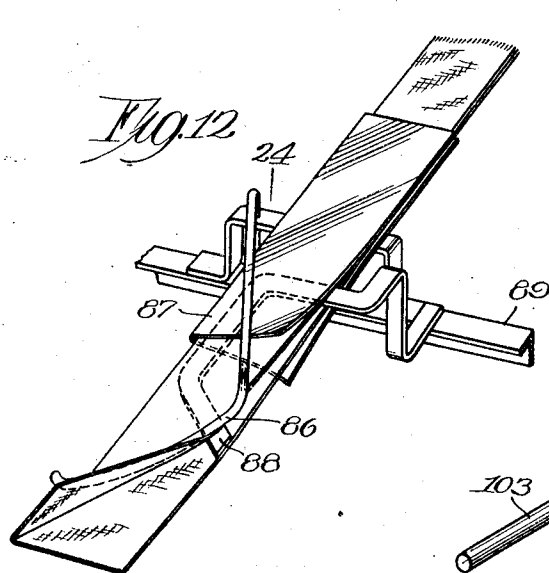
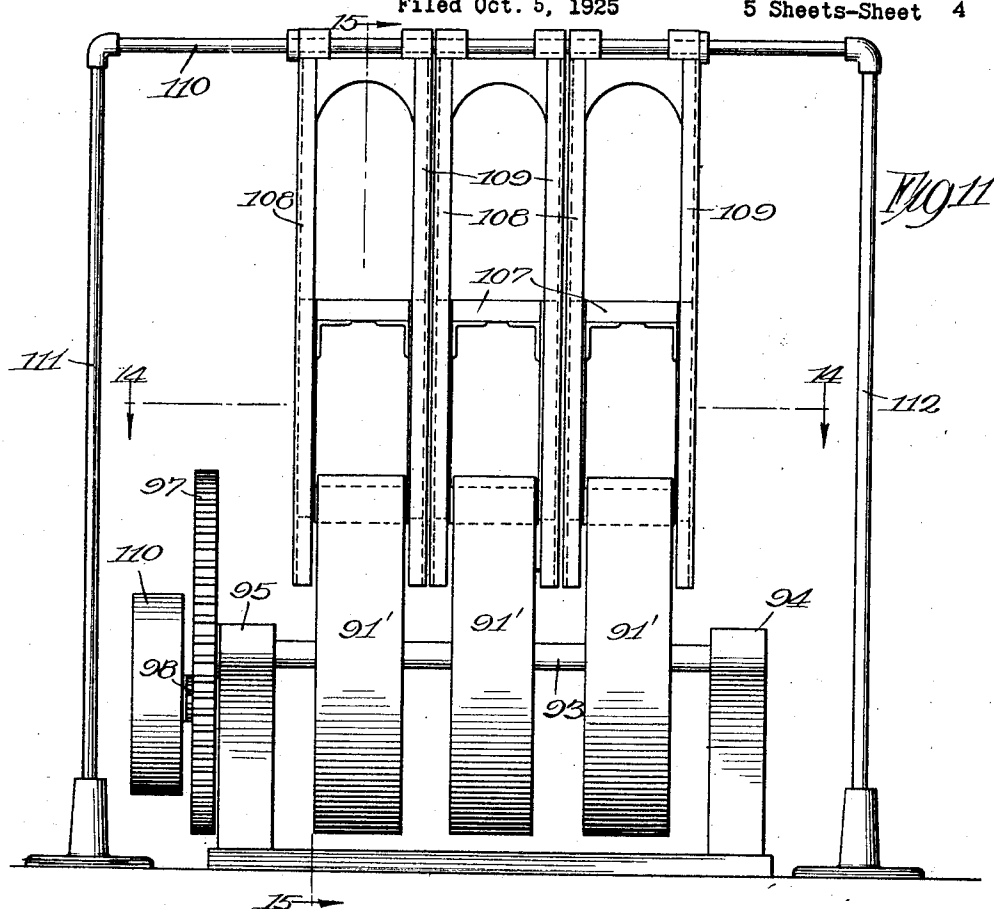
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MACHINE FOR SLITTING AND FOLDING FABRIC

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5 Sheets-Sheet 4



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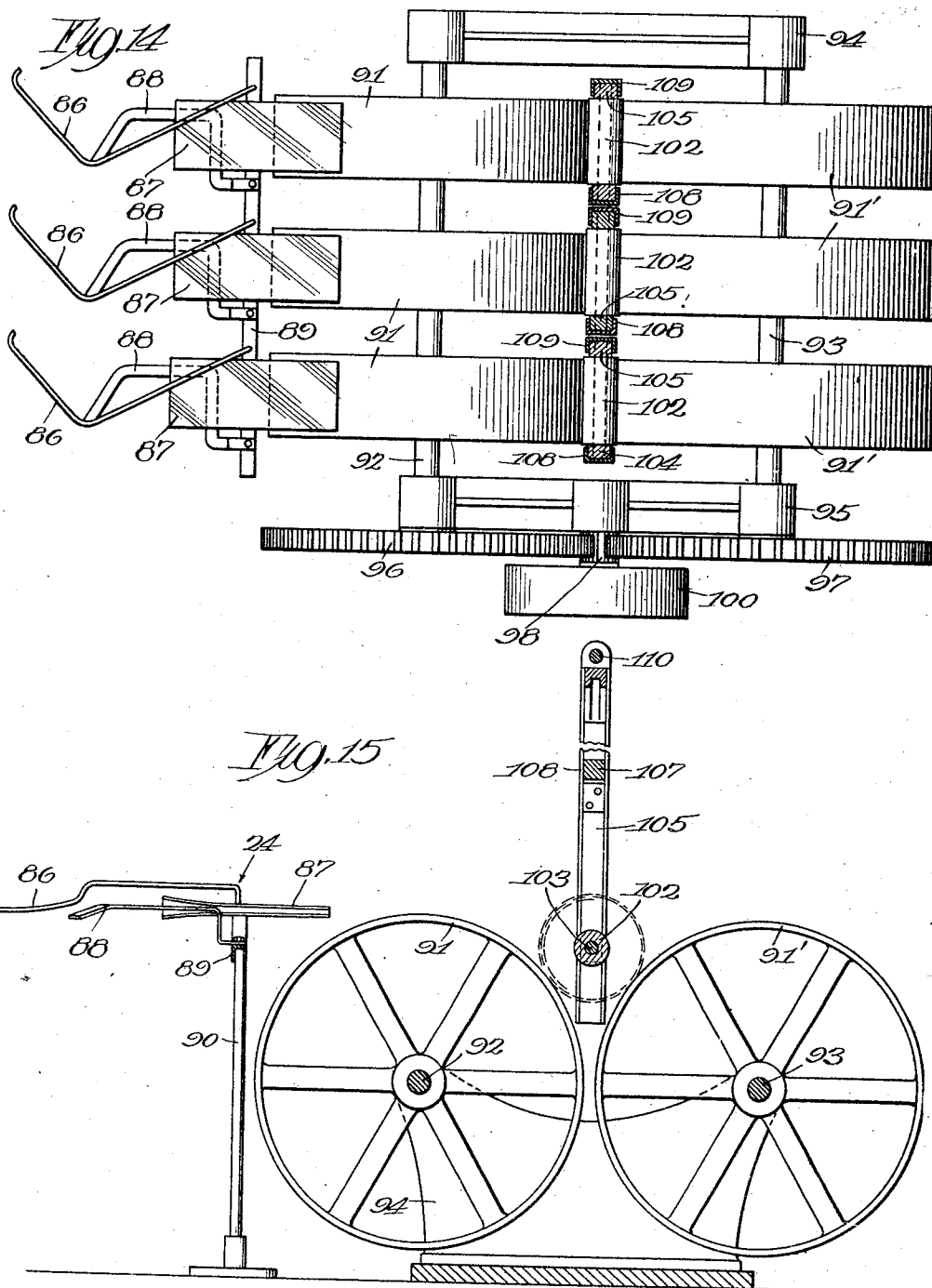
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MACHINE FOR SLITTING AND FOLDING FABRIC

Filed Oct. 5, 1925

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE.

JOHN F. GAIL, OF EVANSTON, ILLINOIS, ASSIGNOR TO SIMMONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

MACHINE FOR SLITTING AND FOLDING FABRIC.

Application filed October 5, 1925. Serial No. 60,382.

My invention relates to machines for operating upon a strip of fabric to slit the strip longitudinally into a plurality of narrower strips, and to fold the narrower strips into a strip of double thickness, and an object of my invention is to provide such a machine which will slit a comparatively wide strip of fabric into a plurality of strips of comparatively narrow width, fold the narrow strips upon themselves to form strips of double thickness, and then to roll the folded strips into a roll to be in convenient form for use.

Another object is to provide such a machine which will fold the narrow strips with a sharp folded edge in order to render the folded strips more easily rolled. It is also an object of my invention to provide such a machine of comparatively simple construction, involving few parts, and which may be adapted to operate on supply strips of a variety of widths by a simple adjustment which may be easily and quickly made.

Further objects and advantages of my invention will appear when reference is had to the following specification when considered in connection with the accompanying drawings, wherein I have illustrated a selected embodiment of my invention, in which:—

Fig. 1 is a plan.

Fig. 2 is a side elevation having a portion thereof broken away.

Fig. 3 is a plan of a portion of my machine illustrating the arrangement of the slitting knives and furrowing devices.

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

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is an end elevation of the delivery end of the slitting unit of the machine, (the right-hand end of Fig. 3).

Fig. 7 is a section on the line 7—7 of Fig. 3.

Fig. 8 is a section on the line 8—8 of Fig. 6.

Figs. 9 and 10 are diagrammatic illustrations of the method of furrowing the fabric preparatory to the slitting operation.

Fig. 11 is an end elevation of the rolling apparatus as viewed from the right-hand end of Fig. 2.

Fig. 12 is a perspective of the folding device.

Fig. 13 is a perspective of the roll mounting frame showing the various parts disassembled, and

Figs. 14 and 15 are sections on the lines 14—14 and 15—15 respectively of Fig. 11.

In the drawings, referring particularly to Figs. 1 and 2, 20 indicates a supply of fabric which is to be slitted into a plurality of strips, in this instance, three in number. This fabric is drawn through a series of straightening rolls indicated at 21, through furrowing devices indicated at 22, and a slitting device indicated at 23. From there it is drawn through folding devices 24, where the narrow strips are folded to form strips of double thickness, after which they are rolled up in a rolling device indicated at 25.

The supply of fabric may conveniently be in a pile where the fabric is folded back and forth upon itself as indicated in Fig. 2. From there it is drawn upwardly over a roll 26 journaled in the upper ends of supporting posts 27, from thence downwardly around a roll 28 and upwardly over a roll 29, both of which are journaled in suitable brackets on the frame post 30. A series of straightening rolls 31 are journaled in suitable brackets which are secured to a horizontal frame-member 32. The frame-member 32 is supported at one end by the post 30 and at the other end by the side-frame 33, which supports the furrowing and slitting mechanisms. The fabric is threaded over the two end rolls and under the intermediate roll, these rolls serving to smooth out the fabric preparatory to the furrowing and slitting operations.

The furrowing mechanism, best shown in Figs. 3 and 7, comprises horizontally extending pairs of supporting prongs 34 and downwardly and forwardly extending curved fingers 35, one of which is disposed intermediate the supporting prongs 34 of each pair. The supporting prongs 34 are mounted on the ends 36 of the slitting table 67 which is supported by side frames 33, and the fingers 35 are secured to a transverse member 35' which is also supported by being attached to the side-frames 33 in any suitable manner.

Furrow depth regulating fingers 37 are secured to a cross-bar 38, which is rotatably mounted in suitable brackets 39 on the side-frames 33. An extension 40 of the transverse member 38 is provided, as shown in Fig. 3, on which to secure a hand-lever 41 whereby the cross-member 38 and fingers 37 may be

rotated to raise or lower the outer ends of the said fingers 37. Any suitable means such as set screws 42—42 in the brackets 39 may be provided to maintain the fingers 37 in the desired position.

A plurality of pairs of propelling and creasing rolls 43 are secured to upright shafts 44 and 45 which are adapted to be rotated by any suitable means such as gearing, as shown most clearly in Fig. 6. At the lower end of each of the shafts 44 is secured a spur-gear 46 which meshes with a like gear 47 on the shafts 45. A beveled gear 48 is also attached to each of the shafts 45 and is adapted to be engaged by beveled gears 49, secured on the shaft 50, which is journaled in suitable bearings 51 and provided with a pulley 52, whereby the shaft may be rotated by suitable belting connections to a source of power. The bearings 51 are mounted on an end plate 53 which is supported by the side frames 33.

The fabric is drawn through the straightening or smoothing rolls 21 over the supporting prongs 34, and is furrowed by means of the fingers 35 which are disposed between the prongs of each pair of prongs 34. Edge guides 54—54 are provided to support the edges of the fabric and are angularly arranged to parallel the edge of the fabric as it is narrowed because of the material taken up in forming the furrows which is more clearly illustrated in the diagrammatic illustration Fig. 9. The furrowed portion of the fabric is then passed between the rolls 55 and 56 of each pair of rolls 43 where the bottom of the furrow is creased. The rolls 55 and 56 are preferably roughened or milled as indicated, in order to grip the fabric and thereby propel it. In order to render these rolls operable with fabric such as burlap, in which the thickness varies considerably, and in which heavy spots sometimes occur, one roll of each pair, for instance, 55, is mounted on a shaft which may be readily forced away from its coacting shaft 45. This is accomplished by pivotally mounting the lower bearing 57 in a bracket 58 as indicated at 59, and by slidably mounting the upper bearing 60 in the bracket 61. The roll 55 is normally pressed toward the roll 56 by means of a spring 62 disposed in a housing 63 and between the bearing block 60 and a disk 64. The pressure of the spring 62 may be varied by means of set screws 65 and lock-nut 66.

The depth of the furrow may be regulated as before described, by means of the finger 37, and the rolls 55 and 56 are made of a width which will allow sufficient variation in furrow depth to take care of the different widths of fabric supplied. The fabric intermediate the pairs of creasing and propelling rolls 43 is disposed over the slitting table 67 which is provided with slots 68 through which the furrows pass.

Rotatable slitting knives 69 and 70 are se-

cured to shaft 71 which is journaled in a suitable bracket 72, mounted on a stationary cross shaft 73 which is supported by brackets 74—74 attached to the side-frames 33. A pulley 75 is secured to the shaft 71 whereby the knives may be rotated by a suitable belt drive or by any other suitable means.

To maintain the spread of the fabric during the slitting operation and also to aid in propelling the fabric, fabric engaging devices 76 are disposed on either side of the furrowing and slitting devices and comprise upright shafts 77 and 78 on which are mounted sprockets 79 and 80 around which are disposed endless chains 81—81. The plurality of fabric engaging pins or spikes 82 project downwardly from the said chains 81 and are adapted to engage the edges of the fabric as they are raised into engagement with the pins, by means of the bottom guides 83. Top guides 84 are provided with a downwardly inclined tail-piece 85 which serves to disengage the fabric from the fabric-engaging devices 82, after furrowing and slitting operations have been completed.

After the slitting operation has been completed, the strip of fabric as drawn from the supply 20 having been divided into a plurality of narrower strips, (3, in this instance) these are then to be folded upon themselves to form strips of double thickness, substantially $\frac{1}{2}$ of the width of the original supply strip. Folding devices for this purpose, best shown in Figs. 12, 14 and 15, comprise top arms 86, folding chutes or sheaths 87 and inside member 88, all of which are supported by suitable brackets on cross-bar 89, which is supported by upright posts 90. As best shown in Fig. 12, half of each of the narrow strips of fabric is turned over at its crease, formed by rolls 55 and 56, by the top arms 86, and is then passed through the chute 87, the inside member 88 serving to keep the fabric well in the chute and to aid in folding the fabric at the said crease. As an aid to the proper action of the folding device, I prefer to provide deflecting members 114, (see Fig. 6) mounted on the end 115 of the table 67, which serve to deflect an edge of the strip upwardly in the direction in which the fold is to be made, and which members also aid in the slitting operation by separating the edges adjacent the slit as the fabric is propelled thereover.

After the strips of fabric are thus folded, they are ready for further use in the manufacture of mattresses or for other purposes and it is desirable to roll the strips into a large roll for convenient handling and storage purposes. To this end, I provide rolling mechanism indicated at 25, which comprises comparatively large drums 91 and 91' which are securely mounted on the shafts 92 and 93 respectively.

The shafts 92 and 93 are journaled in suit-

able bearings provided in the brackets 94 and 95 and are provided at one end with spur-gears 96 and 97 which are adapted to be engaged by a pinion 98. The pinion 98 is mounted on a shaft 99 journalled in the bracket 95, and which has provided at its other end, a pulley 100, adapted to be engaged by a belt 101 which may be driven by any suitable source of power. By rotating the pinion 98, the gears 96 and 97 are rotated in the same direction, whereby the said drums 91 and 91' are also rotated in the same direction, preferably clock-wise.

The fabric strips to be rolled, are wound one or two turns about a roll 102, by hand, the said roll 102 being journalled on a pin 103, which is journalled in the legs 104 and 105 of a frame 106. The rolls formed on the roll 102 are limited in their diameter by the top member 107 of the frame 105, and is desirable, the frame may be made of such size that it will act as a gauge for forming rolls of predetermined diameter. The frame 106 is adapted to be slidably engaged by upright guide-arms 108 and 109 which are, preferably pivotally suspended on a cross-bar 110, which is supported by means of post 111 and 112 on either side of the rolling mechanism. The guide-arms 108 and 109 are disposed in such a position that they will maintain the roll of fabric formed on the roll 102 in frictional engagement with the drums 91 and 92 whereby the fabric roll will be rotated, and the fabric drawn through the folding devices 24 of the machine. When a roll is completed, the upright arms 108 and 109 may be swung on the cross-bar 110 rearwardly as indicated in dotted lines in Fig. 2, to render the roll easily removed therefrom. The weight of the frame 106 and the roll of fabric will cause the frame to slide downwardly and out of the guide-arms 108 and 109. The pin 103 may then be removed from the roll 102, and arms 104 and 105 to free the roll from the frame 106 which may then be used again by substituting another roll 102 or by taking the original roll 102 out of the roll of fabric accordingly, as desired.

I am aware that changes in the form and construction of the various parts of my machine may be materially altered without departing from the spirit of the invention, and I reserve the right to make all such changes as fairly fall within the scope of the following claims.

I claim as my invention:

1. In a machine of the character described, means for furrowing the fabric supply strip, means for guiding the edges of said strip as it is narrowed by the furrowing operation, means for slitting the strip intermediate the furrow and an edge of the strip, and means for adjusting the furrowing operation to render the edge guiding and slitting mecha-

nism operable for guiding and slitting supply strips of various widths.

2. In a machine of the character described, means for slitting a strip of fabric into a plurality of narrower strips, means for creasing one of said narrower strips longitudinally and intermediate its edges and means for subsequently folding said strip at its crease.

3. In a machine of the character described, means for slitting a strip of fabric into a plurality of narrower strips, means for creasing one of said narrower strips longitudinally and intermediate its edges, means for folding said strip at its crease, and means for deflecting an edge of one of the narrower strips in the direction of the fold before the folding operation takes place.

4. In a machine of the character described, means for creasing a strip of fabric comprising a pair of coacting rolls, means for furrowing the fabric so as to facilitate feeding of the fabric between said rolls, and means for folding the fabric on one side of the crease over upon the fabric on the other side thereof.

5. In a machine of the character described, means for folding a strip of fabric comprising a creasing device for creasing the fabric along a line on which it is to be folded, a folding device for folding the fabric on one side of the crease over on to the fabric on the other side thereof including a folding sheath and an inner member for guiding the fabric so that the fold will occur on the said crease and means for propelling the fabric through said creasing device and said folding device.

6. In a machine of the class described, the combination of means for longitudinally slitting a strip of fabric along a plurality of lines so as to form a plurality of narrower strips, means for preliminarily furrowing the fabric intermediate the lines of slitting, and mounting means for said furrowing means for permitting the latter to be adjusted to vary the width of the fabric in the furrow, whereby said slitting means is in effect, adjustable to slit the fabric strip into a plurality of strips of desired width.

7. In a machine of the class described, the combination of means for slitting a relatively wide strip of fabric into a plurality of narrow strips, means for maintaining said wide strip spread to a predetermined width during the slitting operation, means for furrowing the wide strip intermediate the line of slitting and one edge of the strip before it is slitted, and means adjacent the zone of the furrow produced by said furrowing means for guiding the edge of the fabric into engagement with said spread maintaining means.

8. In a machine of the class described, the combination of means for slitting a relatively wide strip of fabric into a plurality of narrow strips, means for maintaining said

wide strip spread to a predetermined width during the slitting operation, means for furrowing the wide strip intermediate the line of slitting and one edge of the strip before
 5 it is slitted, means adjacent the zone of the furrow produced by said furrowing means for guiding the edge of the fabric into engagement with said spread maintaining
 10 means, and means for effecting disengagement of the edge of the fabric from said spread maintaining means after the fabric is slitted.

9. In a machine of the class described, the combination of a slitter for longitudinally
 15 slitting a relatively wide strip of fabric into a plurality of narrower strips, means for guiding one edge of the wide strip as it is slitted, means for longitudinally furrowing the fabric before it is slitted, along a
 20 line intermediate the guided edge thereof and the line of slitting, and means for mounting said furrowing means so as to permit adjustment thereof to vary the width of fabric in the furrow, thereby to vary the width of
 25 strip slitted between said guiding means and slitter.

10. In a machine of the class described, the combination of means for initially furrowing a relatively wide strip of fabric, means
 30 for creasing the strip at the bottom of the furrow, means for slitting the strip intermediate the furrow and an edge of the strip

so as to divide the strip longitudinally into a plurality of narrower strips, one of which includes a longitudinally extending crease, 35
 means for folding the fabric on one side of the crease in said strip over upon the fabric on the other side of the crease, and means for propelling the fabric through the machine.

11. In a machine of the class described, the combination of means for initially furrowing a relatively wide strip of fabric, means operable to propel and to crease the strip at the bottom of the furrow, means for slitting the strip intermediate the furrow and
 45 an edge of the strip so as to divide the wide strip into a plurality of narrower strips, one of which is creased longitudinally, and means for folding said narrow strip along its crease so as to form a narrow strip of double thick- 50
 ness.

12. In a machine of the class described, the combination of means for propelling a relatively wide strip of fabric, means for initially furrowing the strip longitudinally as
 55 it is propelled, means for slitting the strip intermediate one of its edges and the furrow therein to divide the relatively wide strip into a plurality of narrower strips, one of which includes a furrow, and means for subsequently folding the furrowed strip along the bottom of the furrow so as to form a relatively narrow strip of double thickness.

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