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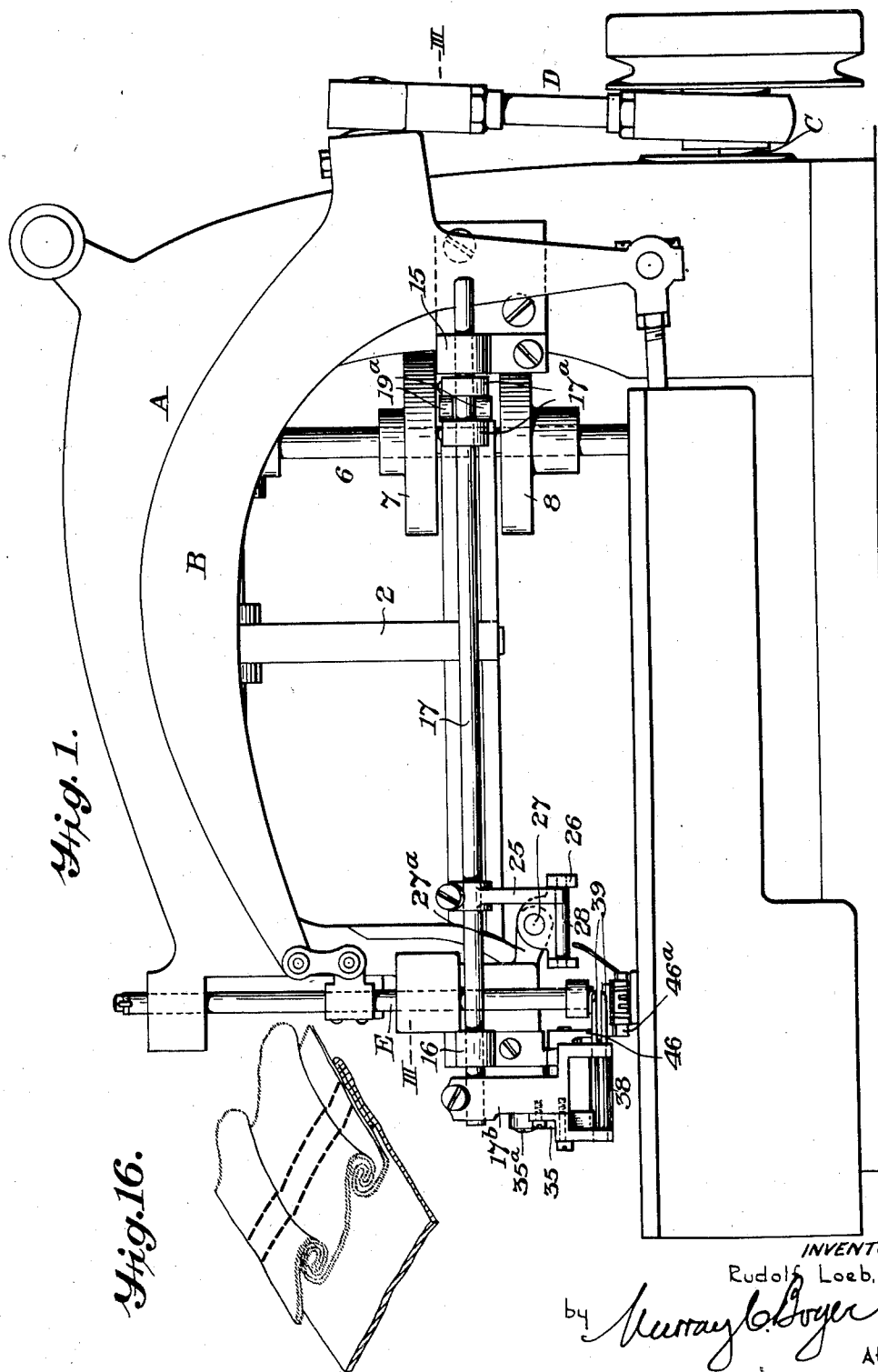
R. LOEB

1,978,432

RUFFLING MECHANISM

Filed Sept. 30, 1931

5 Sheets-Sheet 1



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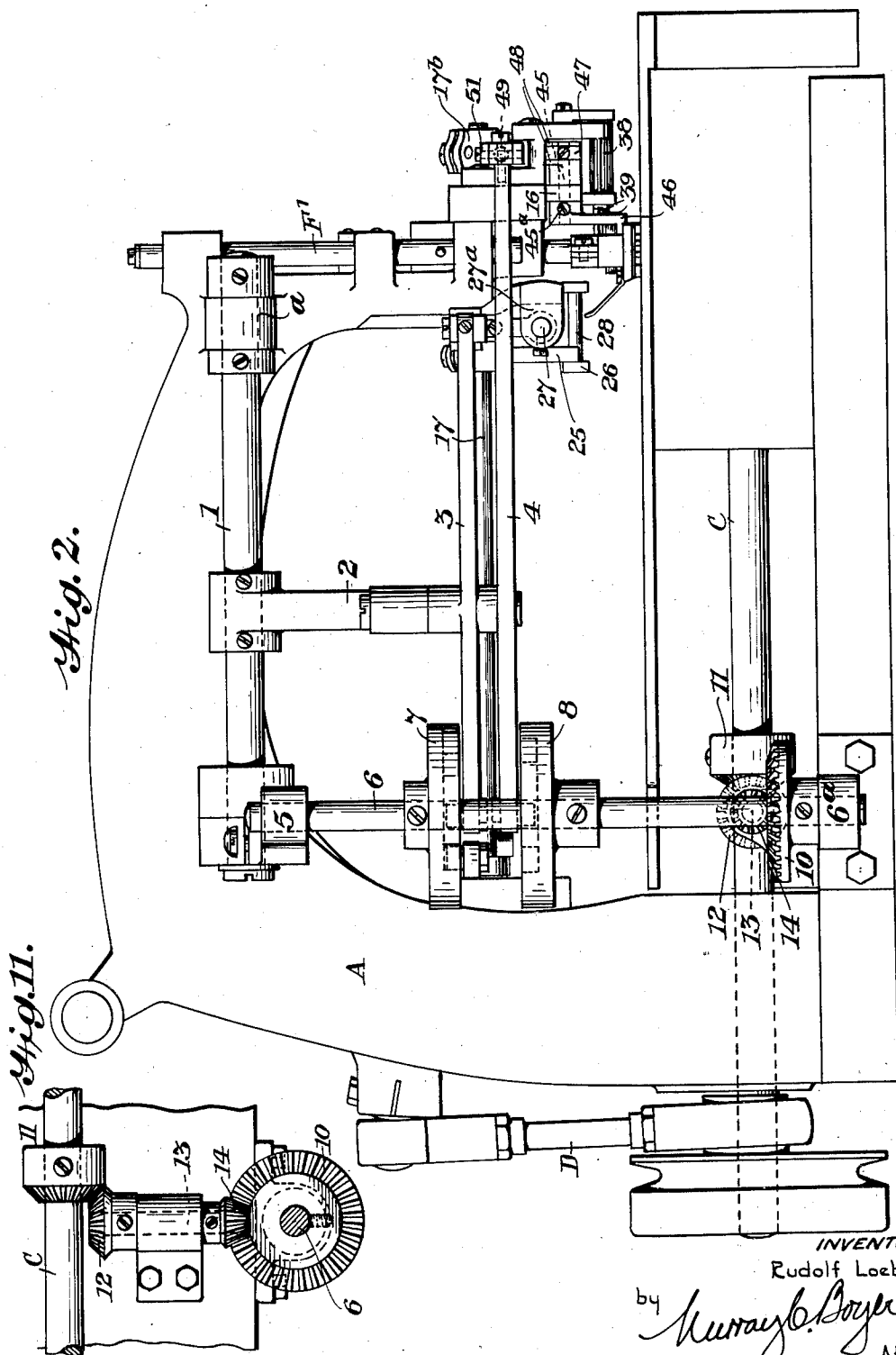
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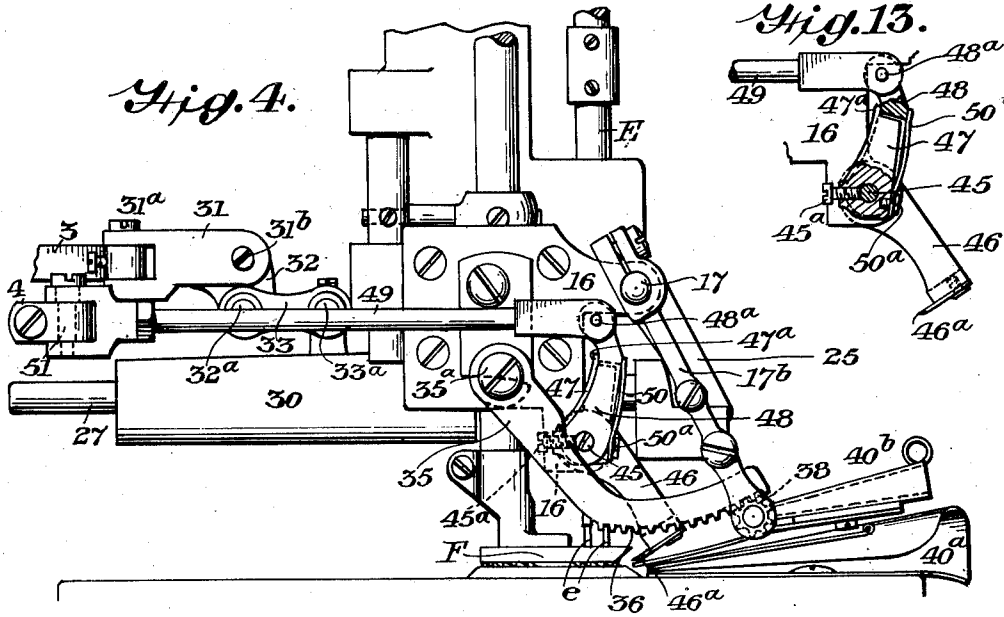
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Fig. 6

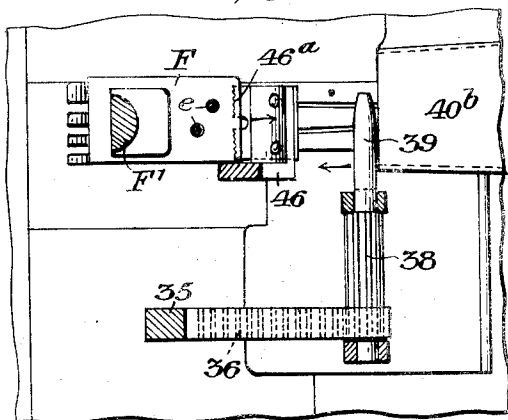


Fig. 7.

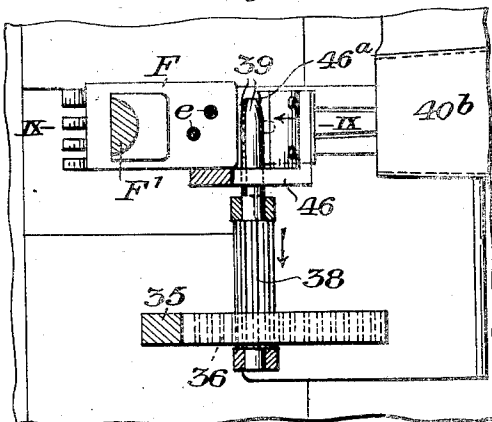


Fig. 8.

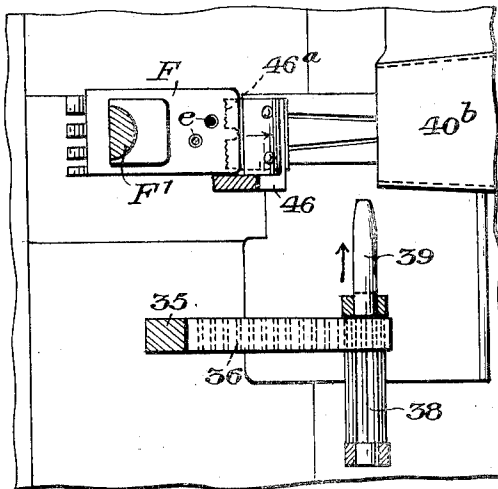


Fig. 15.

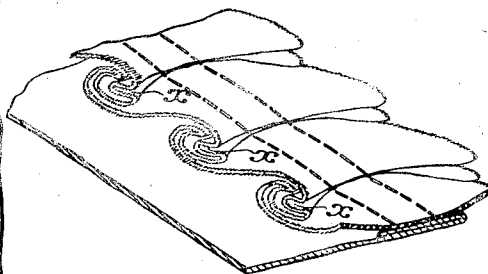
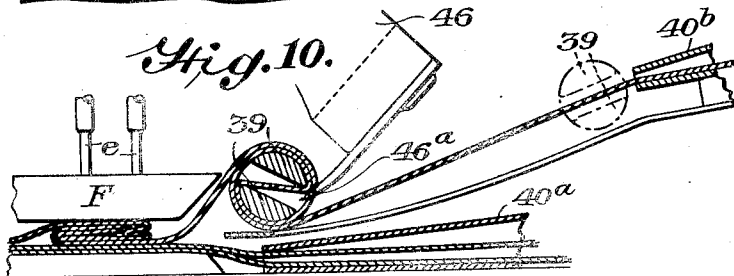


Fig. 10.



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UNITED STATES PATENT OFFICE

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RUFFLING MECHANISM

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Application September 30, 1931, Serial No. 566,055

13 Claims. (Cl. 112—132)

My invention relates to ruffling mechanism designed for attachment to a sewing machine or association with sewing mechanism, and in the present instance I have illustrated my improved mechanism in connection with sewing mechanism employing a plurality of needles.

My improved ruffling mechanism includes a curling or twisting element which is arranged to engage a strip (or strips) of fabric and impart a curl or twist thereto at regular intervals; and to present the successively curled or twisted portions of the fabric to the presser foot and feed of the sewing mechanism whereby it may be engaged by the needles thereof at regular intervals; means for withdrawing such curling or twisting element just in advance of the sewing operation, and means for retracting such element for fresh engagement with the strip (or strips) of fabric; all of such operations being carried on successively as the sewing mechanism is operated and a strip (or strips) of fabric is fed to suitable guiding means serving to direct it to the sewing point.

In addition to the curling or twisting operation imparted to the strip (or strips) of fabric, I provide means for imparting what may be termed a supplemental tuck or indentation to the several curled or twisted portions just before they are engaged by the needles and sewn down.

My improved mechanism may be employed to form strip ruffling consisting of the curled or twisted portions arranged in regular succession or order, with or without the final tuck; such strip ruffling being available for employment as an edging for fabrics, curtains, or the like, or such ruffling, consisting of the curled or twisted portions disposed in substantially regular succession or order, with or without the final or supplemental tuck, may be simultaneously applied to and sewn down upon the edge of a section of fabric, curtain or the like.

These and other features of my invention are more fully set forth hereinafter; reference being had to the accompanying drawings, some of which are more or less diagrammatic in character, in which:

Figure 1 is a front elevation of a sewing machine of a usual type employing in the present instance, two needles and having associated therewith the ruffling mechanism forming the subject of my invention.

Fig. 2 is a rear elevation of the sewing mechanism and ruffling attachment shown in Fig. 1.

Fig. 3 is a sectional plan view on the line III—III, Fig. 1.

Fig. 4 is an end elevation of the ruffling mechanism and associated elements, looking in the direction of the arrow *a*, Fig. 3.

Fig. 5 is a sectional elevation taken on the line V—V, Fig. 3, looking in the same direction.

Fig. 6 is a plan view of the twisting and curling element of the ruffling mechanism in the position it occupies just before the commencement of its twisting or curling operation.

Fig. 7 is a similar view showing the position of the twisting or curling element as it approaches the end of its twisting or curling movement.

Fig. 8 is a similar view showing the twisting or curling element in the position it occupies just before it engages (or reengages) the strip (or strips) of fabric.

Fig. 9 is a fragmentary view in section on the line IX—IX, Fig. 7; the fabric strip being omitted.

Fig. 10 is an enlarged view somewhat similar to Fig. 9, but diagrammatic in character, showing the curling or twisting element in engagement with the fabric; being twisted; the tucking member, and the sewing mechanism.

Figs. 11, 12 and 13 are fragmentary views illustrating details of mechanism employed in carrying out my invention.

Fig. 14 is a diagrammatic view of the successive steps or stages of the twisting and curling operation, and

Figs. 15 and 16 are perspective views illustrating types of ruffling which may be produced by my improved mechanism.

Ruffling produced by the operation of the mechanism forming the subject of my present invention is disclosed in my pending application for patent filed July 9, 1931, Serial No. 549,705.

One form of sewing machine which I may employ and to which my improved ruffling mechanism has been applied and which may be of usual type is shown in Figs. 1, 2, 3, et seq., and comprises the usual frame A, having the vibrating arm B, driven from a shaft C, through the usual eccentric connection D; such vibrating arm actuating the needle bar E which, in the present instance, is provided with two needles *e*, cooperating with a presser foot F, carried by the bar F' which is actuated in the usual manner, and the usual feed mechanism of a sewing machine; all of which forms no part of my present invention.

In the present instance the rear of the sewing machine frame A is provided with bearings *a* for a shaft or supporting bar 1 from which depends a support 2 upon the lower end of which two levers, 3 and 4, are pivotally mounted. In addition, the shaft or bar 1 supports an arm 5 providing an upper bearing for a vertical shaft 6 carrying cams

7 and 8 for operating the levers 3 and 4. The lower end of the shaft 6 is journaled in a bearing 6^a carried by the bed plate of the sewing machine and is provided with a bevel gear wheel 10 where-
 5 by it may be driven from the sewing machine shaft C; the latter carrying a bevel pinion 11 meshing with a pinion 12 carried by a short shaft 13, and said shaft 13 having a bevel pinion 14 at its oppo-
 10 site end meshing with the bevel gear wheel 10. This power transmitting means is clearly shown in Figs. 2 and 11.

The front of the sewing machine is provided with bearing brackets 15 and 16 in which a rod or shaft 17 is adopted to rock and slide. The recip-
 15 rocative sliding movement of said rod 17 is effected by means of a bell-crank lever pivoted at 18 to an arm 15^a of the bracket 15; one arm 19 of said bell-crank lever having a bifurcated end 19^a adapted to lie between and engage collars 17^a
 20 carried by the shaft 17, while the opposite arm 20 of said bell-crank lever is provided with a roller 20^a adapted to the cam path 7^a of the cam 7. When this cam is rotated by movement of the shaft 6, the rod 17 will be reciprocated in its bear-
 25 ings 15 and 16.

In addition to the reciprocative movement imparted to said rod or shaft 17 it is rocked in its bearings between its reciprocative movements. For this purpose it is provided with an arm 25
 30 adapted to slide with respect to the yoked end 26 of a sliding member 27 mounted adjacent to the sewing head; such yoked end 26 having a bar 28 engaged by the forked end 25^a of the arm 25 as clearly shown in Figs. 3 and 5. This sliding mem-
 35 ber 27 is actuated by the lever 3 under the influence of the cam path 7^a of the cam 7; the end of such lever having a roller 3^a engaging said cam path. The sliding member comprises a bar or rod 27 carrying the yoked end 26 and slidable in
 40 bearings 27^a carried by a bracket 30 which may be secured at one side of the sewing head, as shown in Figs. 3, 4 and 5. The sliding member 27 has a jointed connection with the lever 3 which may comprise the link 31 pivoted to said lever at 31^a
 45 and in turn pivotally connected at 31^b at right angles to a block 32, which in turn is pivotally connected at 32^a to a link 33, which in turn is pivotally connected at 33^a to an adjustable arm 34 carried by the bar or rod 27. This connection
 50 provides a flexible joint insuring that the vibrations or oscillations of the lever 3 may be properly transmitted to the rod or bar 27 to effect the desired rocking movement of the rod or shaft 17.

Fixed to the sewing head of the machine is an
 55 arm 35 having a rack or toothed portion 36 disposed on the arc of a circle struck from the axis of the rod or shaft 17. This arm 35 is mounted in fixed position and may be held in place by the screw 35^a. The end of the shaft or rod 17 carries
 60 an adjustable arm 17^b substantially at right angles thereto, and this arm supports at its lower end an elongated pinion 38 which meshes with the rack 36, as clearly shown in Figs. 4, 6, 7 and 8. When the rod or shaft 17 is rocked by the recip-
 65 rocative movements of the rod 27 under the influence of the lever 3 actuated by the cam 7, the elongated pinion 38 will be turned. The inner end of this pinion carries a bifurcated end comprising a pair of spaced fingers 39 and, as may be readily under-
 70 stood, these fingers turn with the pinion 38.

Directly in front of the needles a fabric guide 40 is placed. When the ruffling produced is to be attached to the edge of a curtain or other section of fabric, this guide may comprise a portion 40^a
 75 for the curtain or other fabric; and a guide 40^b

for the strip (or strips) of material from which the ruffling is made; the latter guide being superposed with respect to the guide 40^a as clearly shown in Figs. 4, 5, 9 and 10.

In order to effect the desired curling or twist-
 80 ing of the strip (or strips) to form the ruffling, the bifurcated end 39 of the pinion is engaged with the strip (or strips), and when the pinion 38 is turned, the fabric is curled or twisted by the fingers 39 constituting such bifurcated end.
 85 Fig. 8 shows these fingers in the position they occupy just before they engage said strip (or strips), and with the pinion at what may be termed the front end of the curved rack 36. Im-
 90 mediately following this position, the rod or shaft 17 is reciprocated in its bearings; to the right as viewed in Figs. 1 and 3, and this causes said bifurcated end to be moved in the direction of the arrow to the position illustrated in Fig. 6,
 95 where such forked end embraces the strip (or strips) of fabric to be ruffled (not shown), delivered from the guide 40^b. When the bifurcated end 39 reaches this position, actuation of the lever 3 by the cam 7 has commenced and this movement being imparted to the sliding rod 27,
 100 the latter, through the operative connection of the bar 28 of its yoked end 26 with the forked end 25^a of the arm 25 carried by the rod or shaft 17, rocks the latter and causes it to move the pinion 38 with respect to the curved rack 36,
 105 which in turn rotates said pinion and causes the bifurcated end 39 to twist or curl the strip (or strips) of fabric in the manner indicated in the diagrammatic view, Fig. 14; such view showing successive steps or stages in the formation of the
 110 twisted or curled portions of the ruffling. As the bifurcated element is advanced toward the needles it is also turned in the manner described; different positions of the same being indicated at r , r' , r'' , r^3 , r^4 and r^5 , and when it reaches the
 115 position r^5 , the bifurcated element is withdrawn. The presser foot is then brought into operation with the feeding mechanism of the sewing machine and the twisted or curled portion of the ruffle strip is advanced to a position where it
 120 may be sewn down by the needles.

In addition to the production of this curled or twisted effect to produce the desired ruffling, I desire to impart what may be termed an addi-
 125 tional tuck to each of the curled or twisted portions produced by the mechanism forming the subject of my invention. If the bifurcated element 39 simply acted to twist or curl the ruffle strip in successive folds or tucks, such tucks or folds would simply lie transversely of such
 130 ruffle strip, and the effect produced would be substantially as illustrated in Fig. 16. To further enhance the ornamental character of the tucked portions of the ruffle strip, I provide for the indenting or supplemental tucking of the
 135 central portion of the curled or twisted tucks produced in the manner described. For this purpose I may provide the following mechanism.

Carried by a stem or arbor 45 suitably journaled in the bearing bracket 16 supporting one
 140 end of the rod or shaft 17, is an arm 46, which carries a tucking blade 46^a, as illustrated more particularly in Figs. 4 and 13; such tucking blade being arranged to lie directly adjacent to and
 145 over the curled or twisted portions of the fabric as they are presented to the needles to be sewn down. Also carried by the stem or arbor 45 and secured thereto by a set screw 45^a, is an arm 47, having a fixed relation with respect to the arm 46 so that movement imparted to said arm 47 will
 150

in turn effect movement of the arm 46 carrying the tucking blade 46^a. The arm 47 is disposed between the sides of a bifurcated member 48 pivotally connected at 48^a to a rod 49 actuated by

for simultaneously turning said bifurcated member during its movement of translation, and means for guiding a strip of fabric into position for engagement by said bifurcated member.

5 The lower end of the bifurcated member is journaled on the stem or arbor 45. The arm 47 has a lip 47^a in engagement with the upper portion of the member 48, and such arm 47 is held in
10 operative engagement with said member 48 by means of a flat spring 50 which is attached to the hub of the arm 47 by a set screw 50^a. The spring 50 is of such tension as to hold the several parts in operative position, so that movement
15 imparted by the rod 49 to the bifurcated member 48 will in turn effect movement of the arms 47 and 46 which occupy a fixed relative position. By this means the tucking blade 46^a is operated toward the curled or twisted portions of the fabric to indent the latter. Should the tucking
20 blade 46^a meet with an obstruction in the tucking operation which might cause it to halt before the full movement of the rod 49 has occurred, such full movement will be expended on the spring
25 50 and the bifurcated member 48 will be moved away from the lip 47^a of the arm 47. Upon the return movement of the rod 49, the spring 50 will cause the parts to assume the normal position indicated in Fig. 13, and the tucking blade
30 46^a will be retracted. The operation of the tucking blade 46^a is so timed that just as the forked end 39 of the pinion 38 completes its twisting or curling operation, as shown in Fig. 10, the tucking blade engages the twisted or curled portion
35 of the strip (or strips) of fabric and imparts the central tucked condition indicated at *x*, Fig. 15.

2. The combination with a sewing machine, the needle mechanism thereof and the driving shaft, of a sliding rod, a bifurcated member carried at one end of said rod, means actuated by said driving shaft for rocking said rod and vibrating said bifurcated member, means for simultaneously turning said bifurcated member as it is vibrated by said rod, and means for guiding a strip of fabric into position for engagement by said bifurcated member.

3. The combination with a sewing machine, the needle mechanism thereof and the driving shaft, of a slidable rod, means for reciprocating said rod, a bifurcated member carried at one end of said rod, means actuated by said driving shaft for vibrating said rod, gearing including a fixed gear segment and a pinion carried by the bifurcated member and meshing therewith for simultaneously turning said bifurcated member as it is vibrated by the rod, and means for guiding a strip of fabric into position for engagement by said bifurcated member.

4. The combination with a sewing machine and the needle mechanism thereof, of means for feeding a strip of fabric thereto, a bifurcated element embracing said strip of fabric, means for engaging and disengaging said bifurcated element with said strip of fabric, a pinion carried by said bifurcated element, means for vibrating said bifurcated element, and a fixed gear segment engaged by said pinion for turning said bifurcated element during such vibration to impart a curling effect to said fabric; the curled portion of the fabric being presented to the needle mechanism at the end of such vibration.

5. The combination with a sewing machine and the needle mechanism thereof, of means for guiding a strip of fabric toward said needle mechanism, a bifurcated element arranged to embrace said strip of fabric, a rod carrying said bifurcated element, means for reciprocating said rod for the purpose of moving it into and out of engagement with the fabric, including a bell-crank lever and a cam for operating said lever, means for rocking said rod, and means for simultaneously turning the bifurcated element in one direction while in engagement with the fabric.

6. The combination with a sewing machine and the needle mechanism thereof, of means for guiding a strip of fabric toward said needle mechanism, a bifurcated element arranged to embrace said strip of fabric, a rod carrying said bifurcated element, means for reciprocating said rod for the purpose of moving the bifurcated element into and out of engagement with the fabric, means for rocking said rod to impart movement to said bifurcated element in line with the fabric feed, and gearing including a pinion carried by the bifurcated element and a fixed gear segment for simultaneously turning the forked element as it is rocked by its supporting rod.

7. The combination with a sewing machine and the needle mechanism thereof, of means for guiding a strip of fabric to said needle mechanism, means for curling said strip of fabric in one direction at regular intervals, and means for imparting a tuck to the successively curled portions of the fabric as they are presented to the needle mechanism.

8. The combination with a sewing machine and the needle mechanism thereof, of means for

The cam path 8^a in the cam 8 for effecting this operation of the tucking blade is clearly shown in Fig. 12. The rod 49 for actuating the tucking blade is pivotally connected to the lever 4 at the point 51, as clearly shown in Figs. 3 and 4.

It will be understood, of course, that when it is desired to omit the central tuck *x*, the tucking blade 46^a and its supporting arm 46 may be disengaged without affecting the mechanism which serves to curl or twist the strip (or strips) of fabric.

I have referred in the specification to the action of the bifurcated member 39, as a curling or twisting action, inasmuch as the operation of such member curls or twists the fabric as distinguished from box pleating, and the sewing operation holds such portions of the fabric in a curled or twisted condition. I have referred to this operation in the claims as a "curling" operation, and it will be understood that such term includes "twisting" as well; such language being intended to cover a condition that is distinguished from a box pleat.

It will be understood that various modifications may be made in the form and arrangement of the mechanism disclosed to which my present invention is broadly related, and such modifications are within the scope of the appended claims.

I claim:

1. The combination with a sewing machine, the needle mechanism thereof and the driving shaft, of a sliding rod, means for effecting longitudinal movement of said sliding rod including a cam operatively connected to the driving shaft, a bifurcated member carried at one end of said rod, means actuated by said driving shaft for rocking said rod and imparting movement of translation to said bifurcated member, means

- guiding a strip of fabric to said needle mechanism, a bifurcated element for curling said strip of fabric in one direction at regular intervals, and means for imparting a tuck to the successive curled portions of the fabric as they are disengaged from said bifurcated element and presented to the needle mechanism.
9. The combination with a sewing machine and the needle mechanism thereof, of means for guiding a strip of fabric to said needle mechanism, means for curling said strip of fabric in one direction at regular intervals, a tucking blade for imparting a tuck to the successive twisted or curled portions of the fabric as they are disengaged from said curling means and presented to the needle mechanism, and means for actuating said tucking blade.
10. In a structure of the character set forth in claim 1, a bell-crank lever for reciprocating said sliding rod, and a cam actuated by said driving shaft for operating said lever in both directions.
11. In a structure of the character set forth in claim 1, a bell-crank lever for reciprocating said sliding rod, a cam for operating said lever in both directions, a vertical shaft carrying said cam, and means for actuating said vertical shaft from the main driving shaft.
12. In a structure of the character set forth in claim 1, a pivotally mounted lever, a slidable member movable at right angles to the sliding rod, a connection between said slidable member and the lever, a connection between said slidable member and the sliding rod for effecting rocking movement of the latter, and a cam for operating said lever in both directions.
13. In a structure of the character set forth in claim 1, a pivotally mounted lever, a slidable member movable at right angles to the sliding rod, a connection between said slidable member and the lever, a connection between said slidable member and the sliding rod for effecting rocking movement of the latter, a cam for operating said lever in both directions, a vertical shaft carrying said cam, and means for actuating said shaft.
14. In a structure of the character set forth in claim 1, a tucking blade, a pivotal support for the same, a lever operatively connected to said tucking blade, and means for actuating said lever from the driving shaft of the sewing machine.
15. In a structure of the character set forth in claim 1, a tucking blade, a pivotal support for the same, a lever, a connection between said lever and the tucking blade, a cam for actuating said lever, and means for actuating said cam.
16. In a structure of the character set forth in claim 1, a tucking blade, a pivotal support for the same, a lever, a connection between said lever and the tucking blade, a cam for actuating said lever, a vertical shaft carrying said cam, and means for driving said vertical shaft from the driving shaft of the sewing machine.
17. In a structure of the character set forth in claim 1, a tucking blade, a pivotal support for the same, a lever, a resilient connection between said lever and the tucking blade, a cam for actuating said lever, and means for actuating said cam.
18. In a structure of the character set forth in claim 1, a bell-crank lever for reciprocating said sliding rod, a second lever for rocking said rod, a cam for operating each of said levers in both directions, a vertical shaft carrying said cam, and means for actuating said shaft.
- RUDOLF LOEB.