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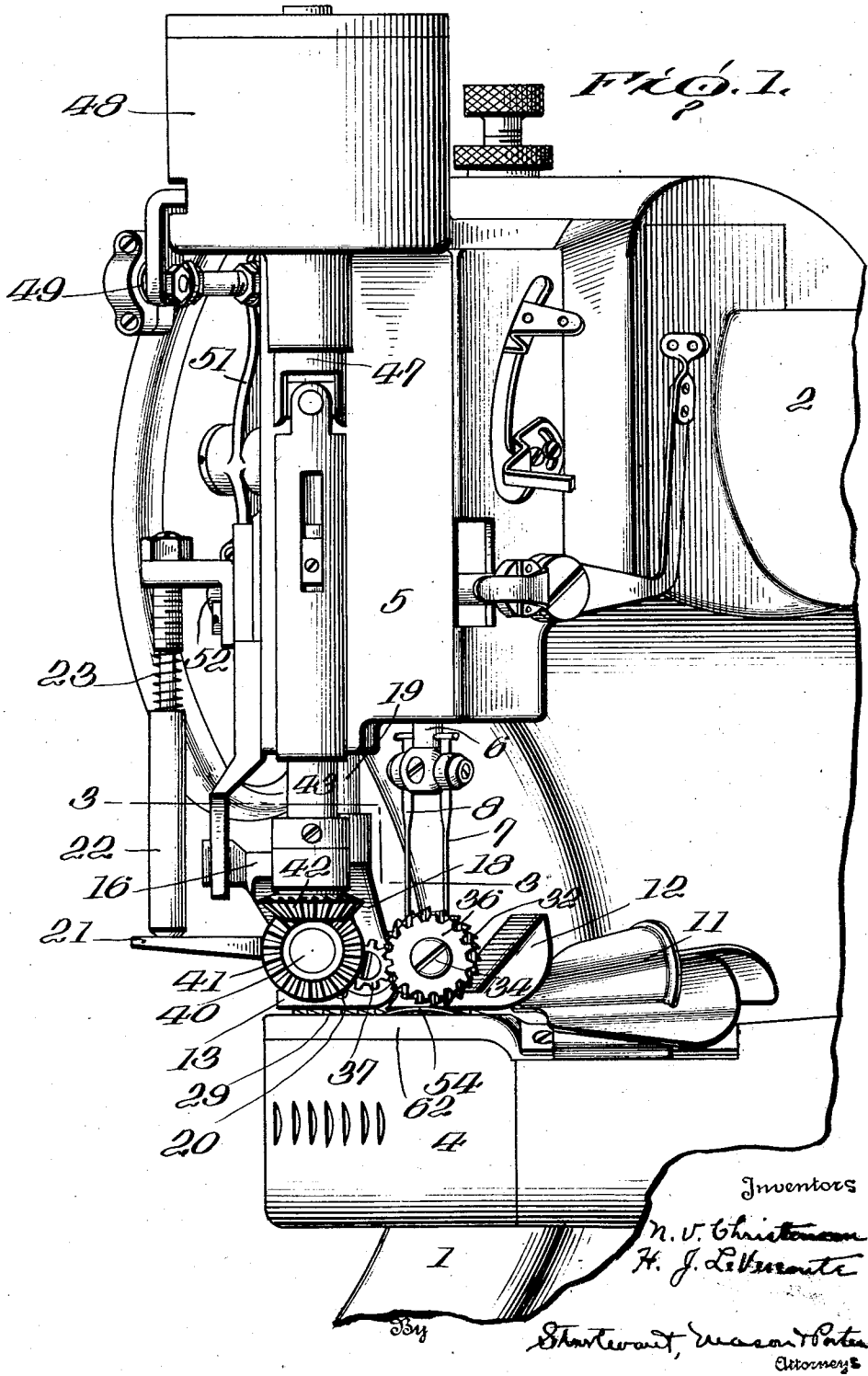
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1,988,372

FELLING MACHINE

Filed Oct. 5, 1932

5 Sheets-Sheet 1



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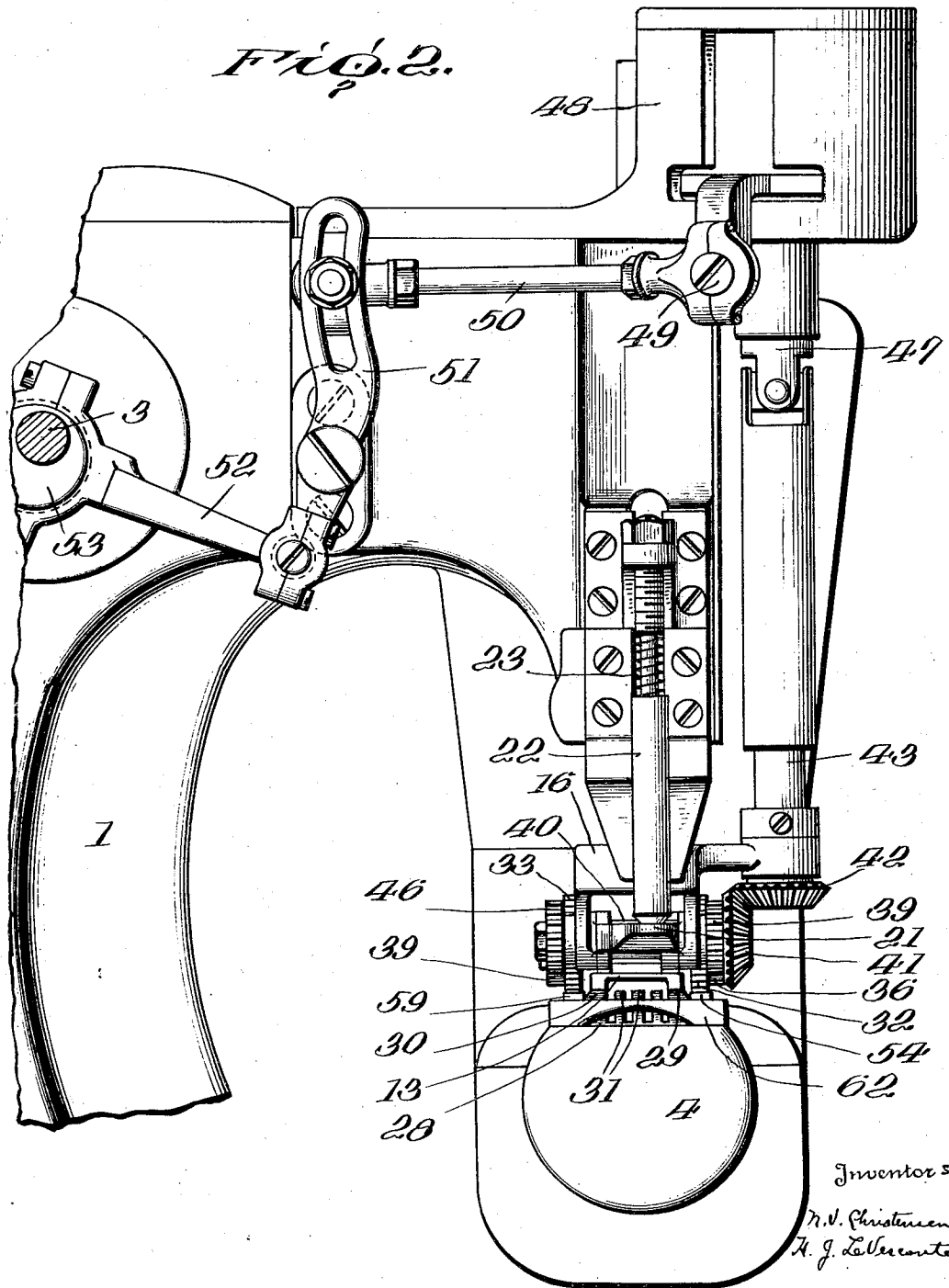
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FELLING MACHINE

Filed Oct. 5, 1932

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Jan. 15, 1935.

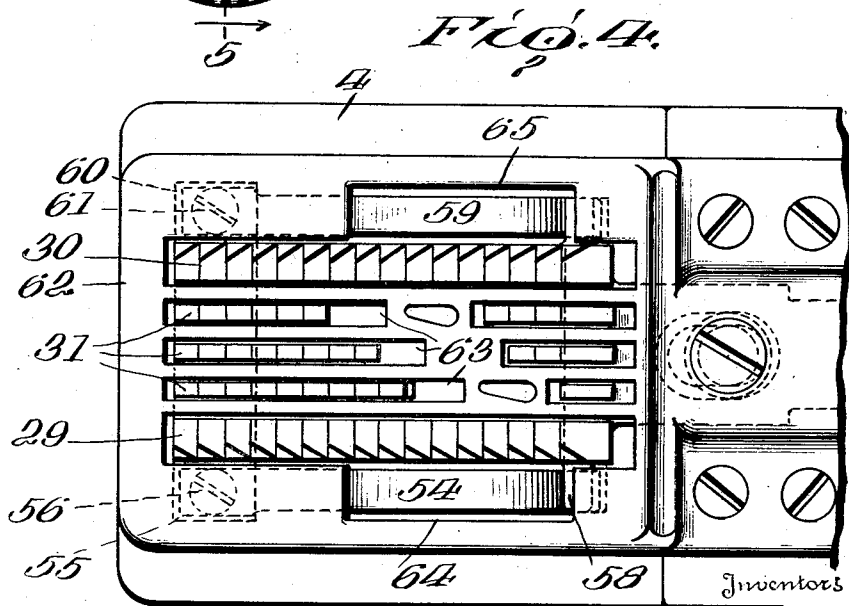
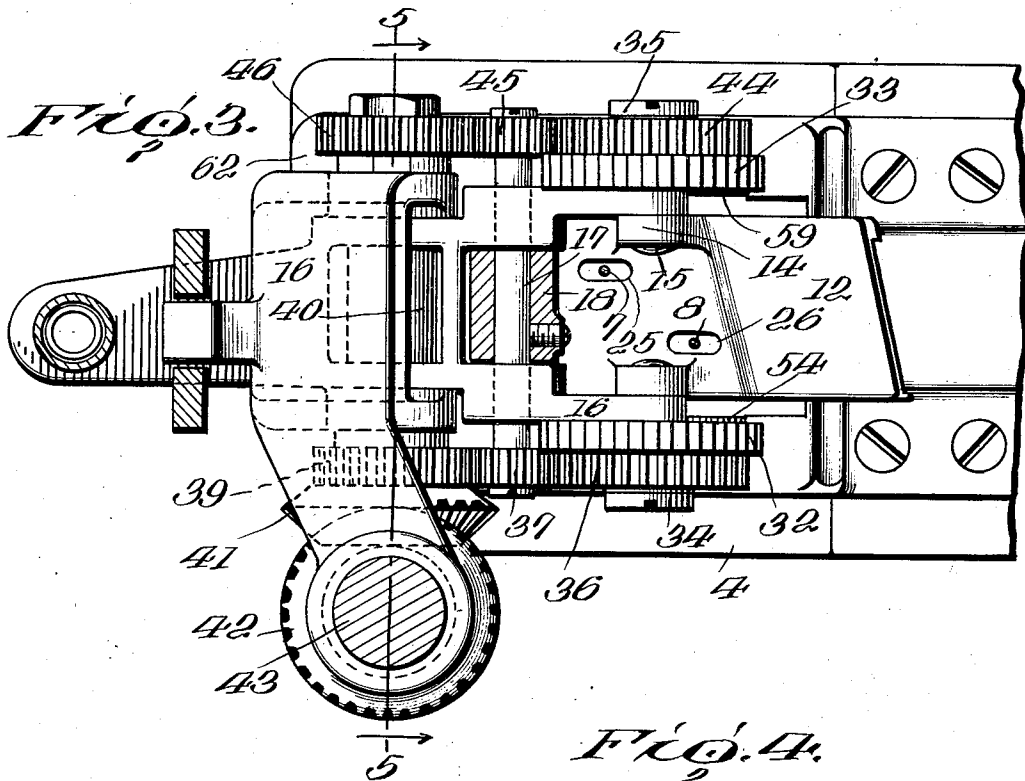
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FELLING MACHINE

Filed Oct. 5, 1932

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Jan. 15, 1935.

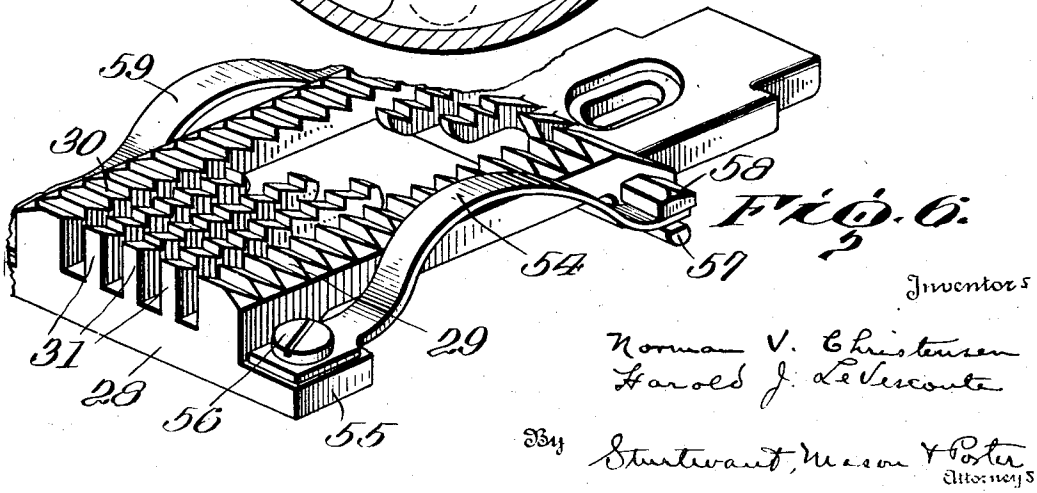
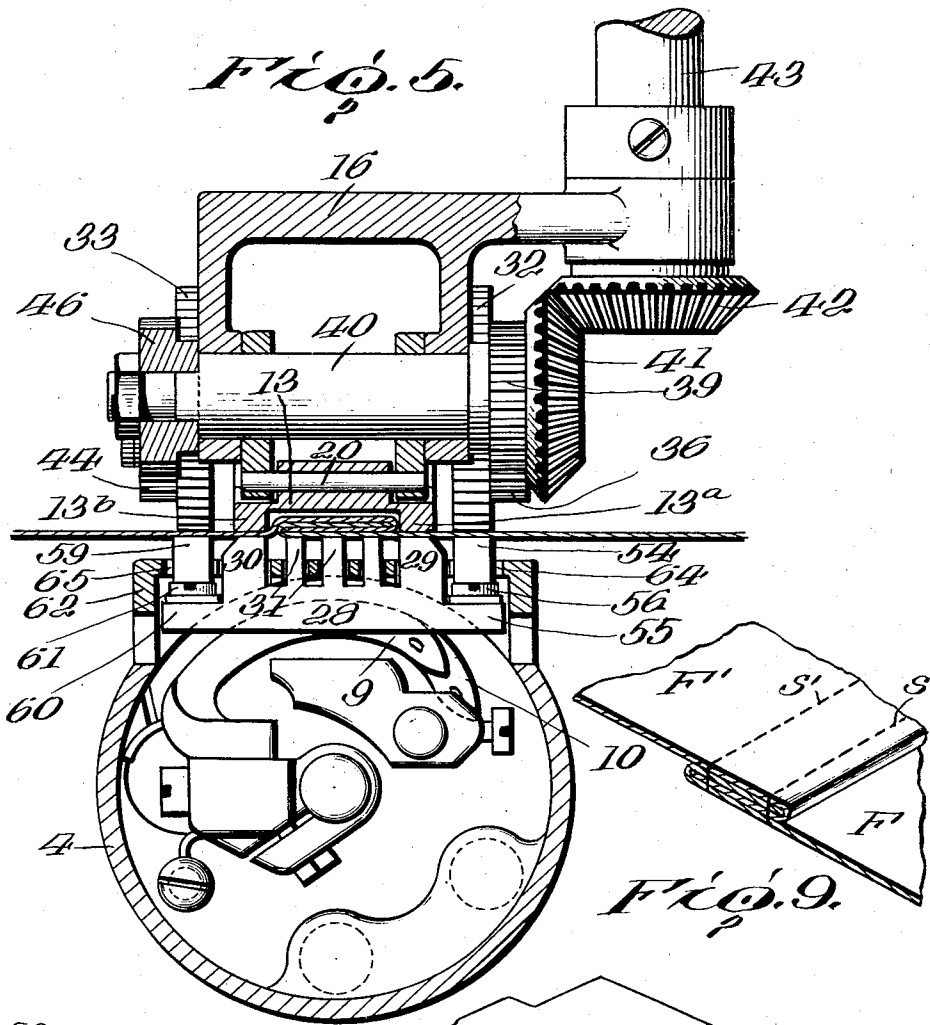
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FELLING MACHINE

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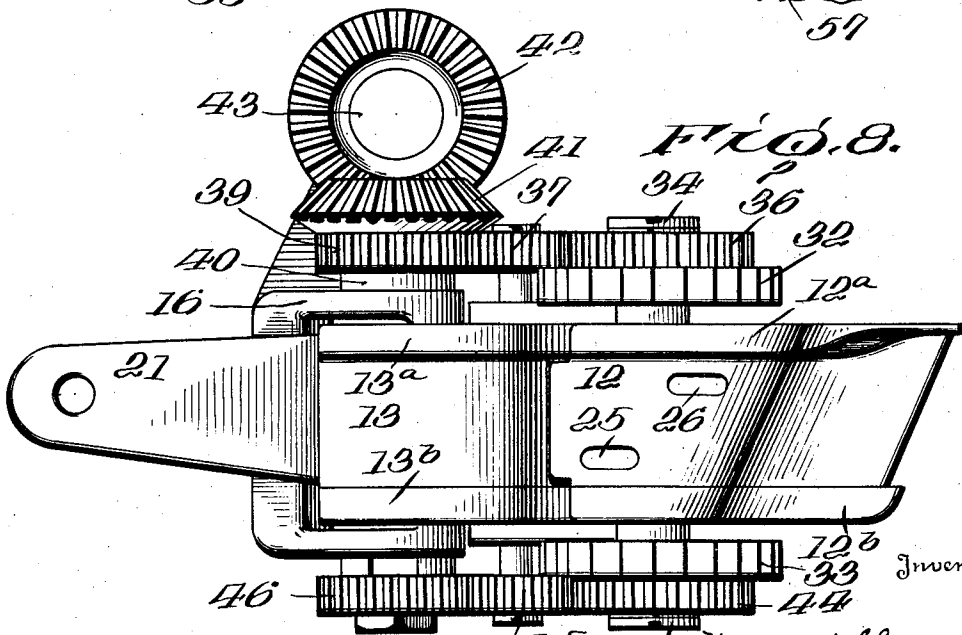
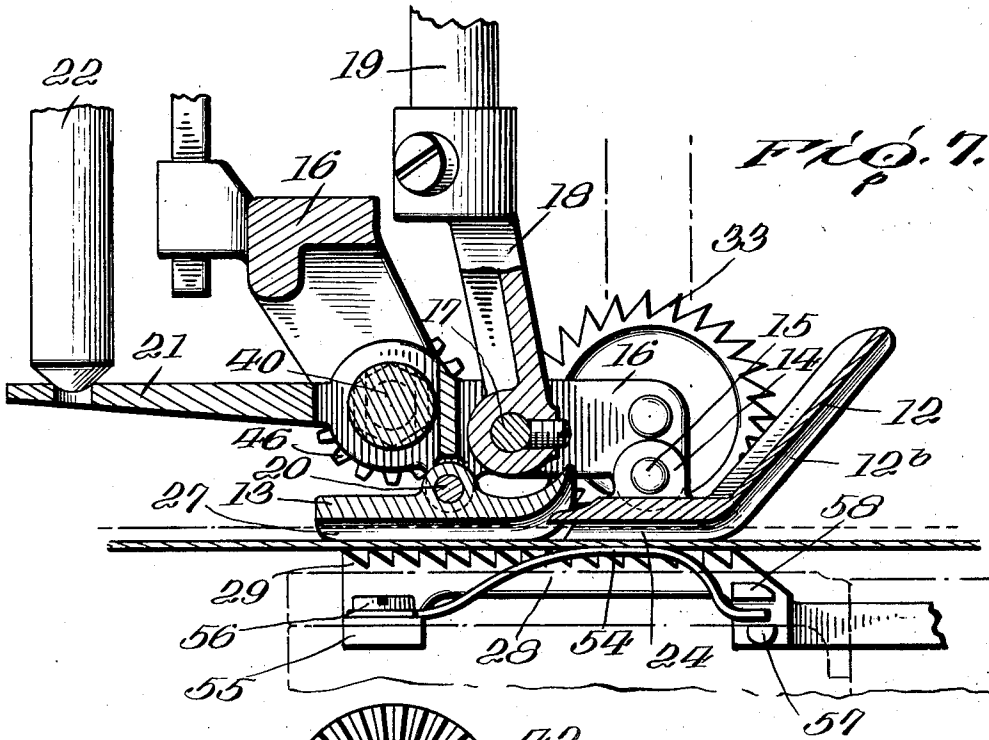
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1,988,372

FELLING MACHINE

Filed Oct. 5, 1932

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

1,988,372

FELLING MACHINE

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Application October 5, 1932, Serial No. 636,394

20 Claims. (Cl. 112—214)

The invention relates to new and useful improvements in a felling machine for interfolding and stitching the edge portions of fabric sections, and more particularly to the mechanism for feeding the material.

An object of the invention is to provide a feeding mechanism which includes devices for engaging the fabric sections along each side of the presser foot and in the region of stitching.

A further object of the invention is to provide a feeding mechanism of the above type wherein the fabric sections are engaged by feed rollers and the feed rollers are so mounted as to move up and down with the presser foot bearing on the fabric in the region of stitching.

A still further object of the invention is to provide a feeding mechanism of the above type wherein the feed rollers at the opposite sides of said presser foot are each positively driven.

A still further object of the invention is to provide a feeding mechanism which includes a feed dog operating on the under face of the fabric sections, and feed rollers operating on the upper face of the fabric sections at each side of the feed dog.

A still further object of the invention is to provide a feeding mechanism of the above type wherein the yielding presser foot cooperates with the feed rollers in their feeding action.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings—

Figure 1 is a view of a portion of the sewing machine embodying the invention, the end of the work arm being in side elevation and the parts above the same in perspective;

Fig. 2 shows the same parts as in Fig. 1, viewed from the end of the work arm;

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1, with the presser bar sectioned at its connection with the supporting yoke for the presser members;

Fig. 4 is a plan view of the end of the work supporting arm showing the feed dog and the yielding members carried thereby;

Fig. 5 is a sectional view on the line 5—5 of Fig. 3;

Fig. 6 is a perspective view of the feed dog;

Fig. 7 is a longitudinal sectional view centrally through the presser feet;

Fig. 8 is a bottom plan view of the presser feet, the feed rollers and the operating mechanism therefor, and

Fig. 9 is a view in section and perspective

showing a felled seam such as is produced on the machine.

The invention is directed to a sewing machine which is particularly adapted for forming a felled seam. The machine includes a guiding device for guiding and interfolding the edge portions of fabric sections and for directing the same to the stitching mechanism. The stitching mechanism, as shown, includes two needles and a looper for each needle so as to produce two independent rows of stitching. The material is held on the work support by a presser foot mechanism which, as shown, includes two presser feet mounted on a supporting yoke, and the yoke in turn is pivoted to the presser bar at a point intermediate the support for the presser feet. Each presser foot has a channel in its under face for receiving and guiding the interfolded portions of the fabric sections. The fabric is fed beneath the presser feet and to and from the stitching mechanism by a feeding mechanism which includes a four-motion feed dog operating on the under face of the fabric sections beneath the presser feet. It also includes feed rollers, one at each side of the forward presser foot, and in the region of stitching. These feed rollers are mounted on a yoke which carries the forward presser foot, and they move up and down with said presser foot. The rollers are positively driven by a train of gears leading to each roller and operated from a common shaft which is intermittently rotated. The driving connections for the rollers are such as to permit the rollers to move up and down freely without interfering with the driving connections therefor.

Cooperating with each feed roller beneath the fabric is a yielding member which is mounted on and movable with the feed dog. It is thought the invention will be better understood by a detail description of the present illustrated embodiment thereof.

The sewing machine to which the invention is applied includes a standard 1 carrying an upper housing 2 in which the main driving shaft 3 is mounted. Suspended from the housing 2 is a work supporting arm 4. Also carried by the housing 2 is a needle head 5 in which a needle bar 6 reciprocates. The needle bar carries two needles 7 and 8. There is a looper for each needle, so that two independent lines of stitching are formed. These loopers are shown in the drawings at 9 and 10, respectively.

In Fig. 9 of the drawings, two fabric sections F and F' are shown. The edge portions of

these fabric sections are folded and interfolded to form a felled seam, and they are joined by the two lines of stitching *s* and *s'*. These fabric sections are directed to a folding guide 11 which is of the usual construction and operates to interfold the edge portions and direct the same beneath the presser foot of the sewing machine. As shown in the drawings, there are two presser feet. The forward presser foot 12 contacts with the fabric sections in the region of stitching, and the rear presser foot 13 engages the fabric sections after they have been stitched. The presser foot 12 is provided with upstanding lugs 14, and there is a pivot bolt 15 connecting each lug to a yoke lever support 16. This yoke lever support is mounted on an axis rod 17 which in turn is mounted in a supporting member 18 attached to the lower end of the presser bar 19. The rear presser foot 13 is mounted on a rod 20 which is also supported by this yoke lever support 16. The pivotal connection between the presser foot 12 and its support is in front of the pivotal connection between the yoke lever support and the presser bar, while the pivotal connection between the presser foot 13 and its support is in rear of this pivotal connection between the yoke lever support and the presser bar. When one presser foot is lifted, the other will be held in contact with the fabric. This allows a cross seam to pass beneath the presser feet and one foot to ride over the cross seam and then the other. Each foot is also pivoted so that it tips or tilts as it rides over the cross seam. The yoke lever support 16 has a rearwardly extending arm 21. A bar 22 bears against the rear end of this arm, and this bar is yieldingly pressed downwardly by means of a spring 23. The presser bar is yieldingly pressed downwardly by the usual spring. The tension of the spring on the presser bar is greater than the tension of the spring 23. This tension spring 23 operates to put a heavier pressure on the rear presser foot. This particular construction of presser foot is shown, described and claimed in the application of Charles F. Rubel, Serial No. 532,934, filed April 25, 1931, and *per se*, forms no part of the present invention.

The forward presser foot has a channel 24 which extends all the way across the bottom thereof and along the under face of the upturned toe portion. This channel is of a greater depth than the combined thicknesses of the interfolded fabric sections, so that the fabric sections will freely pass along the channel without undue pressure being exerted thereon, which retards their movement and interferes with the needles penetrating the same. The channel is of sufficient width so as to receive the interfolded portions and guide the same. There is a foot portion 12^a at one side of the channel and a foot portion 12^b at the other side of the channel, which foot portions contact with the fabric sections at each side of the interfolded parts. The needles 7 and 8 pass through the openings 25 and 26 in the advance presser foot 12, and this may be said to be the stitching region.

The presser foot 13 is likewise provided with a channel 27 which is of greater depth than the thickness of the interfolded fabric sections. At one side of the presser foot 13 is a portion 13^a which engages one of the fabric sections, and at the other side is a portion 13^b which engages the other fabric section. The presser foot 13 has an upturned toe, and the channel extends

along the under face of the upturned toe. There is a heel on the presser foot 12 which extends rearwardly into this channel at the toe of the presser foot 13.

The fabric is fed from the guide beneath the presser feet by a feeding mechanism which includes a feed dog 28. This feed dog is given the usual four motions, and the mechanism for accomplishing the same has not been shown in detail. The feed dog is provided with a feeding section 29 which is located beneath the portions 12^a and 13^a of the presser feet. It is also provided with a feeding section 30 which is located beneath the portions 12^b and 13^b of the presser feet. These feeding sections of the feed dog engage the fabric sections F and F', respectively, alongside of the interfolded portions of the fabric sections. There are feeding sections 31 which engage the fabric sections at the interfolded portions and operate thereon in front and in rear of the needles. These feeding sections will aid in the feeding of the interfolded sections without undue pressure thereon, and will not, in any way, disturb the stitches which are being formed or the stitches of passing cross seams.

Located alongside of the presser foot 12 and adjacent the portion 12^a thereof, is a feed roller 32. At the other side of the presser foot and alongside of the portion 12^b thereof is a feed roller 33. The yoke lever support 16 is provided with a journal stud 34, and the feed roller 32 is mounted for rotation thereon. The yoke lever support is also provided with a journal stud 35 and the feed roller 33 is freely mounted thereon. Adjacent the feed roller 32 and co-axial therewith is a gear 36 which is attached thereto for rotating the feed roller. This gear meshes with a pinion 37 mounted for rotation on the axis rod 17 of the yoke lever support 16. The pinion 37 meshes with a pinion 39 which is fixed to the shaft 40. The shaft 40 is journaled in the yoke lever support 16 and carries a bevel gear 41 meshing with a bevel gear 42 on a vertical shaft 43. Alongside of the feed roller 33 is a gear 44 which is secured thereto for rotating the feed roller 33. This gear 44 meshes with a pinion 45 journaled on the axis rod 17, and the pinion 45 meshes with a pinion 46 carried by the shaft 40. The vertical shaft 43 is intermittently rotated, and this imparts positive intermittent rotations to each of the feed rollers 32 and 33. The shaft 43 has a telescoping connection and a universal connection with an upper shaft section 47. This upper shaft section 47 is operated through a clutch drum 48 which is of the usual construction. This clutch drum is provided with an actuating clutch lever which is pivoted at 49 to a link 50. The link 50, in turn, has a shiftable connection with a lever 51, and the lever 51 has a direct connection to an eccentric 53 on the main shaft 3. These feed rollers 32 and 33 are disposed alongside of the front presser foot 12 and contact with the fabric sections substantially on a line passing between the needles, and therefore, they contact with the fabric in the region of the stitching and will feed the fabric sections up to the stitching point and away from the stitching point. Cooperating with the feed roller 32 beneath the fabric section is a bowed spring 54. This bowed spring is rigidly clamped to a projecting lug 55 carried by the feed dog 29 by a clamping screw 56. The other end of the bowed

spring extends between a projecting pin 57 and a lug 58, both of which are carried by the feed dog. There is a similarly bowed spring 59 on the other side of the feed dog which cooperates with the feed roller 33. Said bowed spring 59 is clamped to a projecting lug 60 on the feed dog by a clamping screw 61. The forward end of the spring is free and extends between a pin and a lug similar to those described in connection with the bowed spring 54. The work supporting arm 4 is provided with a throat plate 62 which has the usual feed slots 63 through which the fabric engaging sections of the feed dog operate. The throat plate is also provided with an opening 64 through which the bowed spring 54 is lifted when the feed dog is raised. There is a slot 65 at the other side through which the bowed spring 59 makes contact with the fabric sections. When the feed dog is raised for feeding movement, these bowed springs will press the fabric section into contact with the respective feed rollers. The feeding sections of the feed dog lift the fabric sections off from the work support by the feeding movement thereof. This lifts the presser foot, and as the presser foot moves up, the feed rollers carried thereby are also moved upward, but the bowed springs hold the fabric against the feed rollers so that even though the feed rollers are raised with the presser foot, they maintain their operative feeding grip on the fabric sections.

From the above it will be apparent that a feeding mechanism has been provided which grips the fabric sections in the region of the stitching so as to positively and evenly feed the fabric sections. This insures that both fabric sections will be moved the same distance, and though they may be heavy fabric sections, they will be positively shifted in such a way as not to distort or shift the interfolded parts. The machine is particularly adapted for stitching heavy fabrics, such as used in the manufacture of overalls. It will also accommodate cross felled seams, as the fabric at the stitching point is always under the control of the feed rollers which are held in contact therewith with a uniform gripping feed, regardless of the position of the presser foot.

While the invention is shown as applied to a sewing machine having a work supporting arm, it will be understood that it may be used in connection with other types of sewing machines, such as flat bed machines and the like. It will also be understood that the feeding mechanism may be used with other forms of presser feet, although the one described has particular advantages in stitching heavy fabrics. It is also obvious that minor changes in the details of construction may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent, is—

1. The combination of a work support, stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region and having a channel in its under face adapted to receive and direct interfolded portions of fabric sections, a feeding member located beneath the presser foot, and a feeding device at each side of said presser foot engaging the upper face of the fabric beyond the confines of said presser foot.

2. The combination of a work support, stitch-

ing mechanism including a needle, a presser foot contacting with the fabric in the stitching region and having a channel in its under face adapted to receive and direct interfolded portions of fabric sections, a feeding member located beneath the presser foot, a feeding device at each side of said presser foot engaging the upper face of the fabric beyond the confines of said presser foot, and yielding means for supporting the presser foot and the feeding devices, whereby they move up and down together.

3. The combination of a work support, stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region and having a free and unobstructed channel in its under face adapted to receive and direct interfolded portions of fabric sections, a feeding member located beneath the presser foot, a feeding roller at each side of the presser foot and engaging the upper face of the fabric beyond the confines of said presser foot, and means for intermittently rotating said feeding rollers.

4. The combination of a work support, stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region and having a channel in its under face adapted to receive and direct interfolded portions of fabric sections, a feeding member located beneath the presser foot, a feeding roller at each side of the presser foot and engaging the upper face of the fabric beyond the confines of said presser foot, means for intermittently rotating said feeding rollers, and yielding means for supporting said presser foot and feeding rollers, whereby the feeding rollers move up and down with the presser foot.

5. The combination of a work support, stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region, a feeding member located beneath the presser foot, a feeding device at each side of the presser foot, means for supporting the presser foot and the feeding devices whereby they move up and down together, and a yielding member beneath each feeding device and cooperating therewith in the feeding of the fabric.

6. The combination of a work support, stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region, a feeding member located beneath the presser foot, a feeding roller at each side of said presser foot, means for supporting the presser foot and feeding rollers whereby they move up and down together, and a yielding member located beneath the fabric section and cooperating with each feeding roller in the feeding of the fabric.

7. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region, a feed dog located beneath the presser foot and having up and down and back and forth movements, a feeding roller at each side of said presser foot engaging the upper face of the fabric, and a yielding member carried by the feed dog and disposed beneath each feeding roller and cooperating therewith in the feeding of the fabric.

8. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region, a feed dog located beneath the presser foot and having up and down and back and forth movements, a feeding roller at each side of said presser foot engaging the upper face

of the fabric, a yielding member carried by the feed dog and disposed beneath each feeding roller and cooperating therewith in the feeding of the fabric, and a yielding means for supporting the presser foot and the feeding rollers whereby they move up and down together.

9. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the stitching region, a feed dog located beneath the presser foot and having up and down and back and forth movements, a feeding roller at each side of said presser foot engaging the upper face of the fabric, a yielding member carried by the feed dog and disposed beneath each feeding roller and cooperating therewith in the feeding of the fabric, and means for positively and intermittently rotating said feeding rollers in timing with the movements of the feed dog.

10. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the region of stitching and having a channel in its under face adapted to guide the interfolded portions of fabric sections, a feed dog mounted beneath the work support and contacting with the fabric sections beneath the presser foot, a feeding device at each side of the presser foot movable up and down with the presser foot, and a yielding device beneath the work support and movable up and down with the feed dog and cooperating with each feeding device.

11. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the region of stitching and having a channel in its under face adapted to guide the interfolded portions of fabric sections, a feed dog mounted beneath the work support and contacting with the fabric sections beneath the presser foot, a feeding roller at each side of the presser foot contacting with the upper face of the fabric sections, and a yielding member carried by the feed dog and located beneath each feeding roller for engaging the fabric sections for holding the same in contact with the feeding rollers during the feeding movement.

12. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the region of stitching and having a channel in its under face adapted to guide the interfolded portions of fabric sections, a feed dog mounted beneath the work support and contacting with the fabric sections beneath the presser foot, a feeding roller at each side of the presser foot contacting with the upper face of the fabric sections, a yielding member carried by the feed dog and located beneath each feeding roller for engaging the fabric sections for holding the same in contact with the feeding rollers during the feeding movement, and means for supporting said presser foot and feeding rollers whereby they move up and down together.

13. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the region of stitching and having a channel in its under face adapted to guide the interfolded portions of fabric sections, a feed dog mounted beneath the work support and contacting with the fabric sections beneath the presser foot, a feeding roller at each side of the presser foot contacting with the upper face of the fabric sections, a yielding member carried by the feed

dog and located beneath each feeding roller for engaging the fabric sections for holding the same in contact with the feeding rollers during the feeding movement, and means for positively and intermittently rotating the feeding rollers in timing with the feeding movements of the feed dog.

14. The combination of a work support, a stitching mechanism including a needle, a presser foot contacting with the fabric in the region of stitching and having a channel in its under face adapted to guide the interfolded portions of fabric sections, a feed dog mounted beneath the work support and contacting with the fabric sections beneath the presser foot, a feeding roller at each side of the presser foot contacting with the upper face of the fabric sections, a yielding member carried by the feed dog and located beneath each feeding roller for engaging the fabric sections for holding the same in contact with the feeding rollers during the feeding movement, means for supporting said presser foot and feeding rollers whereby they move up and down together, and means for positively and intermittently rotating the feeding rollers in timing with the feeding movements of the feed dog.

15. The combination of a work support, a stitching mechanism including a needle, a presser foot mechanism including an advance presser foot section and a rear presser foot section, said presser feet sections having channels in their under face for receiving and directing the interfolded portions of fabric sections, a presser bar, a yoke lever support on which said presser foot sections are pivotally mounted, yielding means on which said yoke lever support is pivotally mounted, a feeding roller at each side of said advance presser foot section, said feeding rollers being journaled on said yoke lever support in vertical alinement with the pivot of the advance presser foot, a feed dog located beneath the work support and contacting with the fabric sections beneath the presser foot sections, and a yielding member located beneath each feeding roller and operating to hold the fabric sections in contact with the respective feeding rollers.

16. The combination of a work support, a stitching mechanism including a needle, a presser foot mechanism including an advance presser foot section and a rear presser foot section, said presser feet sections having channels in their under face for receiving and directing the interfolded portions of fabric sections, a presser bar, a yoke lever support on which said presser foot sections are pivotally mounted, yielding means on which said yoke lever support is pivotally mounted, a feeding roller at each side of said advance presser foot section, said feeding rollers being journaled on said yoke lever support in vertical alinement with the pivot of the advance presser foot, a feed dog located beneath the work support and contacting with the fabric sections beneath the presser foot sections, and a yielding member located beneath each feeding roller and operating to hold the fabric sections in contact with the respective feeding rollers, said yielding members being carried by the feed dog and movable therewith.

17. The combination of a work support, a stitching mechanism including a needle, a presser foot mechanism including an advance presser foot section and a rear presser foot section, said presser feet sections having channels in

their under face for receiving and directing the interfolded portions of fabric sections, a presser bar, a yoke lever support on which said presser foot sections are pivotally mounted, yielding means on which said yoke lever support is pivotally mounted, a feeding roller at each side of said advance presser foot section, said feeding rollers being journaled on said yoke lever support in vertical alinement with the pivot of the advance presser foot, a feed dog located beneath the work support and contacting with the fabric sections beneath the presser foot sections, a yielding member located beneath each feeding roller and operating to hold the fabric sections in contact with the respective feeding rollers, and means for positively and intermittently rotating said feeding rollers in timing with the feeding movements of the feed dog.

18. The combination of a work support, a stitching mechanism including a needle, a presser foot mechanism including an advance presser foot section and a rear presser foot section, said presser feet sections having channels in their under face for receiving and directing the interfolded portions of fabric sections, a presser bar, a yoke lever support on which said presser foot sections are pivotally mounted, yielding means on which said yoke lever support is pivotally mounted, a feeding roller at each side of said advance presser foot section, said feeding rollers being journaled on said yoke lever support in vertical alinement with the pivot of the advance presser foot, a feed dog located beneath the work support and contacting with the fabric sections beneath the presser foot sections, a yielding member located beneath each feeding roller and operating to hold the fabric sections in contact with the respective feeding rollers, and means for positively and intermittently rotating said feeding rollers in timing with the feeding movements of the feed dog, said last-named means including a gear attached to each

feeding roller, and a gear meshing therewith and mounted for rotation about the pivotal axis of the yoke lever support.

19. The combination of a work support, a stitching mechanism including a needle, a presser foot mechanism including an advance presser foot section and a rear presser foot section, said presser feet sections having channels in their under face for receiving and directing the interfolded portions of fabric sections, a presser bar, a yoke lever support on which said presser foot sections are pivotally mounted, yielding means on which said yoke lever support is pivotally mounted, a feeding roller at each side of said advance presser foot section, said feeding rollers being journaled on said yoke lever support in vertical alinement with the pivot of the advance presser foot, a feed dog located beneath the work support and contacting with the fabric sections beneath the presser foot sections, a yielding member located beneath each feeding roller and operating to hold the fabric sections in contact with the respective feeding rollers, said yielding members being carried by the feed dog and movable therewith, and means for positively and intermittently rotating said feeding rollers in timing with the feeding movements of the feed dog.

20. The combination of a work support, a throat plate having feed slots, a feed dog movable through said feed slots, said throat plate having a slot at each side of the feed dog, a bowed spring carried by the feed dog at each side thereof and contacting with the fabric on the work support during the feeding movement of the feed dog, a presser foot mounted above the fabric and cooperating with said feed dog, and a feeding device at each side of the presser foot with which said bowed springs, respectively, cooperate.

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