

Nov. 22, 1955

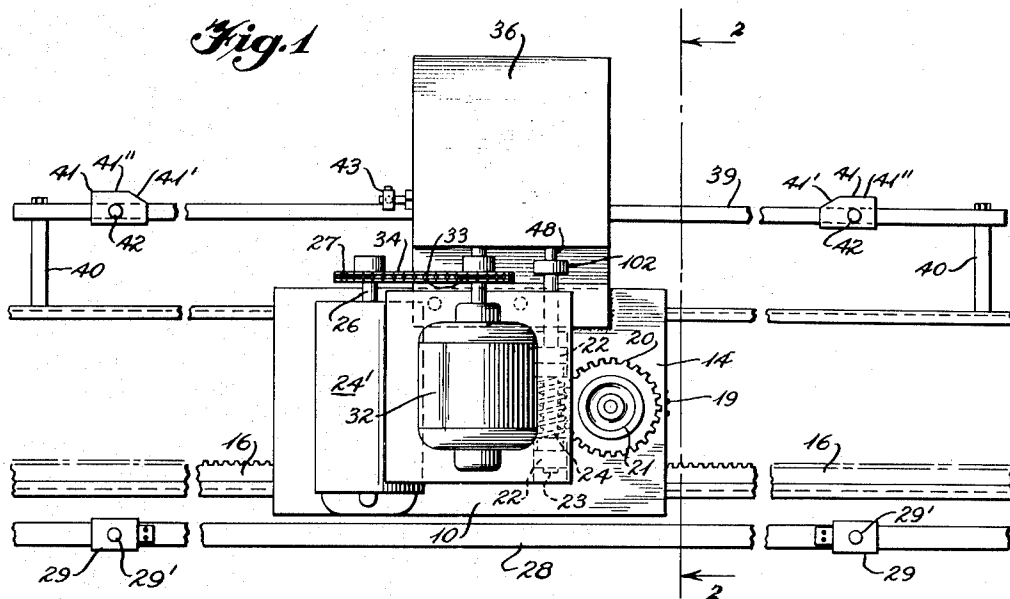
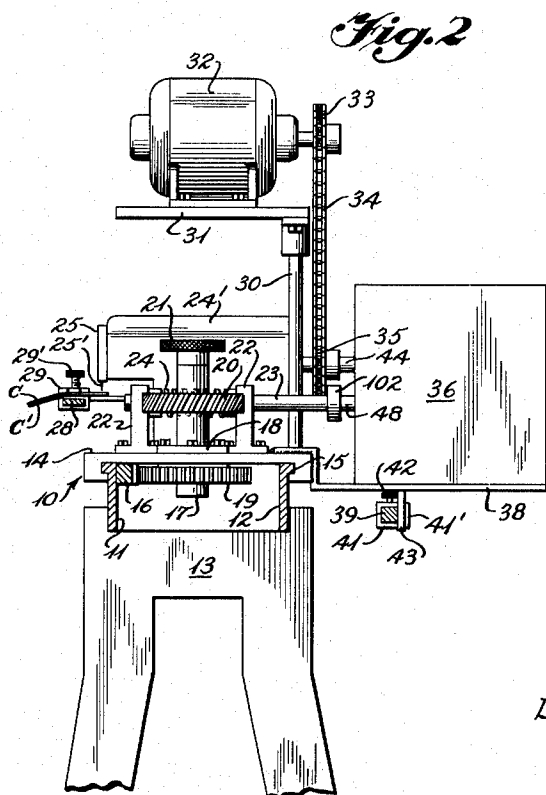
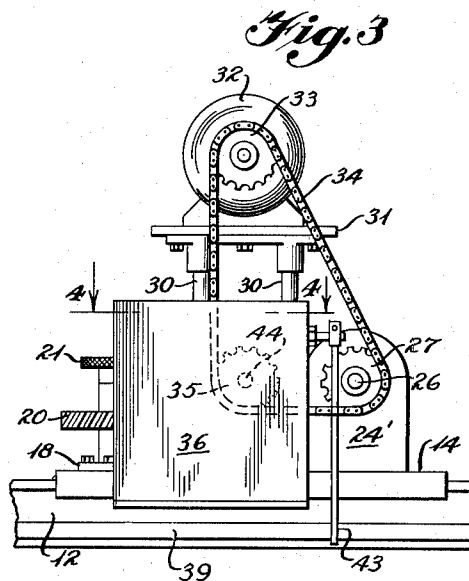
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2,724,352

VARIABLE SPEED FEED MECHANISM FOR RAILWAY SEWING MACHINE

Filed Sept. 4, 1953

3 Sheets-Sheet 1



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Fig. 6

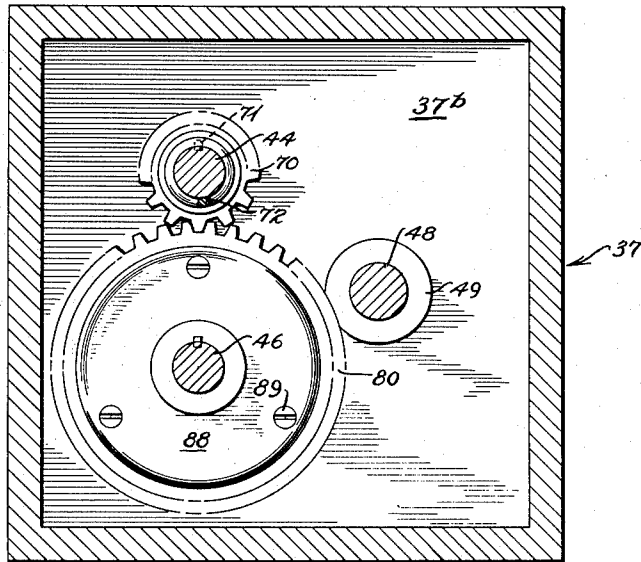


Fig. 7

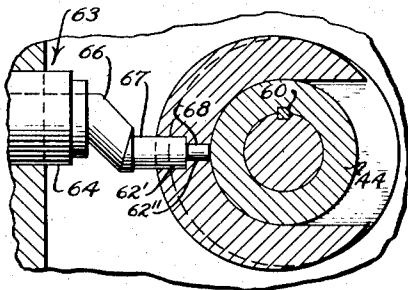


Fig. 9

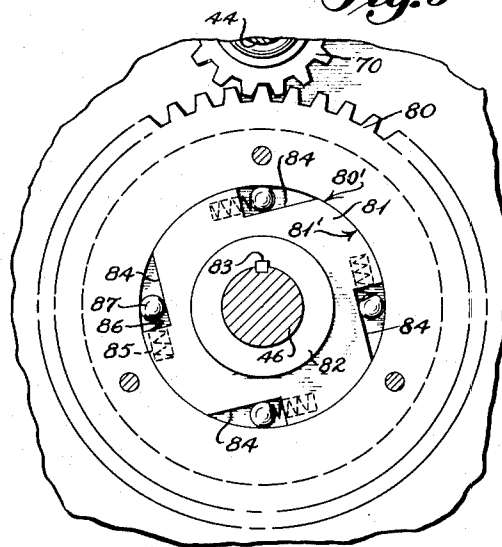
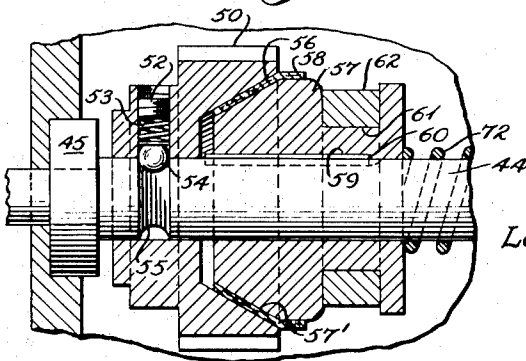


Fig. 8



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VARIABLE SPEED FEED MECHANISM FOR RAILWAY SEWING MACHINE

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5 Claims. (Cl. 112—2)

Our invention relates to the sewing together of relatively short lengths of cloth that come from a loom to form a continuous length of approximately 1000 yards so that the material may be subjected to finishing operations such as dyeing, bleaching, sanforizing and mercerizing as a single piece. It is customary to stitch the warp ends of consecutive pieces of cloth together by power sewing machines, which makes different kinds of seams including the so-called "Merrow" or butted seam.

The usual "Merrow" seam has about 8 stitches per inch and in order to provide a stronger seam between butted ends of pieces, the stitches are increased, say to 24 per inch, at each selvage edge to form a stronger seam.

The stitching may be accomplished by feeding the cloth past a stationary sewing machine, or by moving the sewing machine head along weft-wise of the cloth. This latter arrangement is usually called a "railway" sewing machine.

Our invention is directed to means for feeding a railway sewing machine at such speeds that at selected positions, a larger number of stitches may be produced per unit of length as contrasted with other positions along the seam.

Another object of our invention is to provide an attachment for a railway sewing machine which will without altering the machine's structure easily provide for moving the sewing machine along its rails at alternate slow and higher speeds thereby alternately producing a greater and a lesser number of stitches per unit of length of the seam being made.

A still further object of the invention is to provide an alternately variable speed drive for moving the railway sewing machine along its track at different speeds which includes a simple clutch and gearing mechanism that may be easily attached and driven by the usual motor drive for the railway sewing machine.

Another object of our invention is to provide an attachment for a railway type of sewing machine which includes a variable speed drive interposed between the motor and the traversing mechanism carrying the sewing machine and adjustable positioned operators along the machine which cause the variable speed drive mechanism to shift alternately from a high speed to a slow speed or vice versa.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific example is given by way of illustration only and, while indicating the preferred embodiment of the invention, is not given by way of limitation, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

For a more complete understanding of our invention reference is had to the following description and drawings in which;

Fig. 1 is a fragmentary plan view of a typical railway type sewing machine having our variable speed drive attached;

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Fig. 2 is an end view of the machine of Fig. 1 as seen from the right-hand end;

Fig. 3 is a fragmentary rear view of the machine showing our variable speed drive attached;

Fig. 4 is an enlarged cross sectional view of the variable speed drive attachment taken along line 4—4 in Fig. 3;

Fig. 5 is a cross sectional view of the variable speed drive mechanism as viewed along line 5—5 in Fig. 4;

Fig. 6 is a cross sectional view along line 6—6 of Fig. 4;

Fig. 7 is a fragmentary cross sectional view of the clutch collar and actuating arm therefor taken along line 7—7 of Fig. 4;

Fig. 8 is a cross sectional view of one of the clutches as viewed along line 8—8 in Fig. 4; and

Fig. 9 is a cross sectional view of another of the clutches in the variable speed drive mechanism as viewed along line 9—9 of Fig. 4.

Throughout the various figures in the drawing and the description like reference characters refer to similar parts.

Referring to Figures 1—3, a railway type sewing machine is generally indicated at 10. The customary rails 11 and 12 supported on a base 13 support a slidable bed plate or carriage 14 which is held on by dove-tailed joints 15. Attached on the inside vertical surface of one of the rail members such as 11 is a toothed rack 16. A vertical shaft 17 which extends above and below bed plate 14 is supported therein by a bearing 18 and has attached at its bottom end a gear 19 which meshes with the rack 16 while its upper end has another gear 20 attached by suitable clutch mechanism controlled by the knurled hand wheel 21. By means of the clutch connection controlled by wheel 21, gear 20 may be cast loose from the vertical shaft 17 as when it is desired to move the bed plate 10 along its supporting rails by hand.

Still referring to Figures 1—3 a pair of pillow blocks 22 mounted on carriage 14 support a transverse drive shaft 23 having a worm gear 24 secured thereto which meshes with and drives gear 20. A sewing machine generally indicated at 24' has a needle sewing head 25 and a needle 25' therein. At the rear of the sewing machine 24' is its drive shaft 26 having a sprocket 27 fixed thereto. A support rack 28 is provided at the front of the machine and it extends through its length adjacent the needle 25'. The rack 28 supports the two ends of cloth to be seamed together such as indicated at C and C' in Fig. 2. Suitable cloth engaging clamps 29 having clamping screws 29' thereon are slidably mounted on the cloth rack 28.

A pair of vertical standards 30 attached at their bottom ends to carriage 14 support a motor mounting shelf 31 at their upper ends. Mounted on shelf 31 is a motor 32 having a drive sprocket 33 over which is led a drive chain 34 about the drive sprocket 27 on the sewing machine 24 and over the drive sprocket 35 of the variable speed drive mechanism 36 to be described hereinafter.

In Figures 1—3 the variable speed drive mechanism is generally indicated at 36 and in Figures 4—9 it is shown in detail.

Reference to Figures 4—7 shows a box-like housing 37 for the variable speed drive which is supported on an outwardly extending shelf-like bracket 38 attached to the rear of the carriage 14 as illustrated best in Figure 2. Disposed just below mounting shelf 38 is an elongated bar 39 which extends for substantially the length of the railway sewing machine 10 and is supported therefrom by brackets 40—40, best shown in Fig. 1. Mounted on bar 39 is a pair of adjustable positional dogs 41 having knurl headed set screws 42 for securing them in selected position along rod 39. Each of the dogs 41 has cam surfaces 41' and 41'' against which rides an operating lever 43 on the variable speed drive mechanism 36 when the

carriage 14 carrying all the mechanism has been moved into position.

Variable speed drive mechanism

The variable speed drive mechanism generally indicated at 36 according to our invention and housed within box enclosure 37 will now be described.

The adjustably positionable dogs 41 on the attached bar 39, above described, shift the variable speed drive from a high to a low speed for moving the carriage 14 and the sewing machine 24 thereon either at a high or a low speed. This traverse of the sewing machine when its needle runs at a constant speed causes a large number of stitches per inch to be made in the selvage edges of the pieces of cloth being joined when the traverse is at a low speed. Conversely, when the traverse speed is high, the number of stitches per inch of travel over the cloth is low.

The variable speed drive mechanism has an input shaft 44 mounted in bearings 45 in the opposite walls 37a and 37b of box 37; a counter shaft 46 below and parallel to shaft 44 mounted in similar end bearings 45 as for shaft 44 also positioned in opposite walls 37a and 37b of box 37; and an output shaft 48 also parallel to shafts 44 and 46 but to one side and intermediate thereof and mounted in bearings 49 in walls 37a and 37b.

Input shaft 44 has rotatably mounted thereon a thirty-six tooth spur gear 50 adjacent wall 37a. Gear 50 has formed therein a radial recess which is threaded to receive a screw plug 52 which holds in place a spring 53 which urges a ball 54 into an annular recess 55 formed about the adjacent position of shaft 44 whereby axial displacement of gear 50 along shaft 44 is prevented yet the gear 50 is permitted to freely rotate on shaft 44. Gear 50 is formed with an internal axially disposed cone surface 56 for engagement by a clutch element 57 slidably mounted on shaft 44.

Referring to Fig. 8, slidable clutch element 57 has a cone face 57' of corresponding shape to cone surface 56 in gear 50 and a suitable anti-friction covering 58 is affixed to surface 57'. Clutch element 57 is formed with a keyway 59 in which is slipped a key 60 which fits in a keyway in shaft 44 and thus keys it to shaft 44 for rotation therewith but permits the element 57 to slide axially along shaft 44. Clutch element 57 is formed with an annular recess 61 therein which receives a U-shaped operating collar 62, see Figures 7 and 8.

The operating mechanism for clutch 57 consists of the mechanism generally indicated at 63, see Figures 4, 5 and 7, and is pivotally mounted in wall 37c by a collar 64 which extends through the wall and provides a bearing for shaft 65. Shaft 65 is formed on its inner end with a crank arm 66 extending in the same direction from shaft 65 as operating lever 43 and having a reduced inner end pin portion 67—68 which is received in apertures 62' and 62'' respectively in the U-shaped collar 62. The outer end of shaft 65 has the operating handle or lever 43 secured thereto as by the split take-up collar 43' attached to the end thereof and secured in adjusted position by take-up screw 43'', see Fig. 4. When handle 43 strikes the cam surfaces 41' and 41'' of dog 41, see Fig. 1, crank arm 66 is pivoted thus moving collar 62 out away from gear 50 and in turn clutch element 57 is disengaged from gear 50 permitting gear 50 to rotate on shaft 44.

In Fig. 4 there is shown fixed to the other end of shaft 44, opposite to gear 50, an eighteen tooth spur gear 70 keyed to shaft 44 by a key 71, see Fig. 6. Disposed about shaft 44 and between clutch element 57 and the integral hub 70' of spur gear 70 is a spiral spring 72 which constantly urges clutch element 57 into engagement with the clutch surface 56 in gear 50 thus causing shaft 44 and clutch element 57 to drive gear 50. However, when the operating handle 43 strikes cam surfaces 41' and 41'' on dog 41, the clutch element is slid along shaft 44 and its key toward gear 70, compressing spring 72 and disengaging clutch element 57 and its facing 58 from the conical surface 56 in gear 50.

Continuing the drive from gear 70 in this variable speed drive mechanism, gear 70 meshes with a fifty-four tooth gear 80 which has a clutch hub 81 by which it is mounted on the end of the countershaft 46 adjacent wall 37b. Hub 80 has an outer circular perimeter 81' over which is rotatably mounted the circular inner portion 80' of gear 80. Hub 81 is formed with a central collar portion 82 which is keyed to shaft 46 by key 83. Reference to Fig. 4 shows the outer end of spring 72 on shaft 44 pressing against the inner face of hub 70' of gear 70. Hub 81, see Fig. 9, has milled therein four inset tangentially-like pockets 84 having a cylindrical recess 85 drilled in the base of each pocket to receive a spring 86 which presses against a roller 87. Thus, gear 80 may rotate counterclockwise, see Fig. 9, about hub 81 since the rollers 87 will move in pockets 84 against springs 86 and relative movement between gear 80 and its hub 81 is permitted. However, under certain conditions as will be described hereinafter, gear 80 rotates with hub 81. Thus, there is provided an over riding clutch between gear 80 and the hub 81 which mounts it on shaft 46. The gear 80 is held on hub 81 by end plates 88, see Figures 4 and 6, which plates are held in place by screws 89 threadedly received in the gear 80. The end plates 88 permit gear 80 to rotate relative to its mounting hub 81.

As shown in Figures 4 and 5 countershaft 46 has fixed thereto a thirty-six tooth spur gear 90 as by a key 91. Gear 90 meshes with gear 50 and is driven thereby when clutch element 57 is in driving engagement otherwise when the clutch element is out of engagement, gear 90 drives gear 50 which is then free to rotate on shaft 44.

Output shaft 48, best shown in Figures 4 and 5, has a thirty-six tooth spur gear 100 keyed thereon as by key 101 so that it meshes with and is driven by spur gear 90. The end of output shaft 48 is coupled to drive shaft 23 of the traversing mechanism of the sewing machine by a coupling 102 as shown in Figures 1, 2 and 4. Coupling 102 replaces the normal drive sprocket which heretofore was on shaft 23. This sprocket which has been removed can be shifted and serve as sprocket 35.

Operation

A primary object is to join together two pieces of cloth C and C', as shown in Fig. 2, preferably in a butt end fashion by stitching of the "Marrow" type and in so doing to provide for a short distance at each end of the selvage edge, a greater number of stitches per inch than over the rest of the span of the butted seam which joins the selvage edges. This provides for rapid seaming yet affords a durable seam which holds the pieces of cloth together so that finishing operations may be performed with the assurance that the seam will not tear apart.

Our variable speed drive attachment 36 with the attached rod 39 and the adjustable positionable dogs 41 thereon when attached to a railway sewing machine such as described affords a joining seam for cloth ends as just above described.

The dogs 41 are set in the position desired toward each end of rod 39 in keeping with the position of the ends of the selvage edges of the cloth clamped in clamp 28 to be joined together by a seam sewn by the sewing machine 24'. The hand wheel 21 on the traversing mechanism is released so that gear 24 is free from vertical shaft 17 and the bed plate 14 carrying its mounted member may be moved to the starting edge of the cloth pieces C and C' to be joined together by a butted seam. Then hand wheel 21 is again tightened. Depending control arm 43 of the variable speed drive mechanism is riding up on the straight cam surface 41'' of dog 41 and thus crank arm 66, see Figures 5 and 7, is rotated in the same direction as arm 43, namely, back beyond the plane of the paper as depicted in Figures 5 and 7. When this occurs collar 62 on clutch element 57 slides the element to the right along shaft 44, see Fig. 8, and the clutch facing 56 is out of engagement with the conical clutch surface in

gear 50. Gear 50 is then in a condition not to be driven by shaft 44.

The motor 32 is then energized and the seam is made by the sewing machine 24' as the carriage 14 is first slowly moved over rails 11 and 12 from the right hand end of the machine, see Fig. 1, towards the left-hand end. A large number of stitches per inch of travel are sewn by the machine, such as twenty-four stitches per inch.

The traverse drive for the carriage 14 is through the variable speed gearing enumerated hereinafter. Chain 34 drives sprocket 35 and input shaft 44 at a constant speed. Spur gear 70 on the outer end of shaft 44 when rotated counterclockwise drives gear 80 clockwise with which it meshes and gear 80 through its clutch mechanism, see Fig. 9, rotates the hub 81 fixed to shaft 46 clockwise. Gear 90 on the other end of shaft 46 drives gear 100 and shaft 48 to which it is keyed. Shaft 48 through its coupling 102 drives shaft 23. Worm gear 24 on shaft 23 drives gear 20 and it in turn rotates shaft 17. Gear 19 fixed to shaft 17 and in mesh with the tooth rack 16 causes the carriage 14 carrying its attached medium to move along the supporting rails 11 and 12. The sewing machine 24' thus moves slowly from right to left and the stitches are placed closely together in cloth pieces C and C' until handle 43 moves out of engagement with the cam surfaces 41'' and 41', see Fig. 1, whereupon the clutch element 57 moves to the left, see Fig. 8, along shaft 44 under the influence of compression spring 72 and gear 50 is then rotated by shaft 44.

While shaft 44 is rotating counterclockwise, see Fig. 5, it is driving gear 50 and shaft 46 clockwise. Hub 81 on shaft 46 and a clutch within gear 80 is rotated clockwise but at a higher speed than at which gear 80 is rotated by gear 70 on shaft 44. Gear 80 is thus coupled to countershaft 46 by an over-riding clutch. In other words the clutch elements in hub 81 permit the gear 80 to rotate at a different speed than the speed of the hub 81. Gear 90 rotating at relatively high speed by being now driven by gear 50, rotates gear 100 at the same high speed since each of the gears 50, 90 and 100 have the same number of teeth, for example thirty-six teeth. Shaft 48 on which gear 100 is fixed through its coupling 102 in turn drives shaft 23 at high speed.

Shaft 23, as before, drives gear 24, shaft 17 and gear 19 at a relatively high speed and the gear 19 meshing with the toothed rack 16 affixed to the machine causes the carriage 14 to move at relatively high speed. The sewing machine 24' carried by bed plate 14 then moves at relatively high speed as contrasted with the prior slow speed, and a fewer number of stitches per inch are sewn into the cloth pieces C and C'. For example, eight stitches per inch are made in the seam. This continues until the carriage 14 has traversed to the left hand end of the rails 11 and 12 when clutch control lever 43 strikes the end dog 41 and the cam surfaces 41' and 41'' causing the clutch element 57 to become disengaged again from gear 50 and the slow speed drive takes over as before. With this slow speed drive a large number of stitches per inch, for example twenty-four per inch, are made in the seam at the other end of the selvage edge of the pieces of cloth C and C'.

Our variable speed drive attachment is easily manufactured and may be installed on railway sewing machines such as of the type described without altering the machines. The drive mechanism is positive in operation, is easily maintained and is flexible in operation. If it is desired to place in the butted seam a greater number of spots in the seam where the stitches are closely spaced, then additional dogs may be placed along rod 39. In such a case the additional dogs would be formed with double cam surfaces such as 41'. Without altering the regular railway sewing machine to any marked extent we have provided in our variable speed drive attachment a conversion mechanism which permits the making of a butted

seam which is strong yet the speed of sewing in the seam has not been decreased to any marked extent.

We claim as our invention:

1. In a traveling sewing machine outfit; a railway; a carriage on said railway; a sewing machine mounted on said carriage; driving mechanism to propel said carriage along said railway and having a drive shaft; variable speed driving mechanism mounted on said carriage for driving said shaft at a variable speed to move said carriage at a variable speed along said railway; means mounted on said carriage to drive said sewing machine and said variable speed driving mechanism; and a control device adjustable on and lengthwise of said railway to vary the speed of said variable speed driving mechanism; said variable speed driving mechanism comprising a housing having mounted therein a constant speed input shaft, said input shaft having rotatably mounted thereon a first gear, a first clutch detachably connecting said first gear to said input shaft, and a second gear fixed to the input shaft, a countershaft in spaced relation and parallel to said input shaft, said countershaft having a first gear coupled thereto by an over riding clutch, said last named gear being in mesh with said second gear on the input shaft, said countershaft having a second gear fixed thereto and in mesh with said first gear on the input shaft, an output shaft in parallel spaced relation to said input and countershafts and having a gear fixed thereto in mesh with said second gear on the countershaft, operating means for said first clutch on the input shaft and having an operating arm extending from said housing for operative engagement with said control device adjustable on and lengthwise of said railway; and means coupling said output shaft to said drive shaft of said driving mechanism to propel said carriage along said railway.

2. A traveling sewing machine outfit according to claim 1 wherein said over riding clutch gear attached to said countershaft comprises a hub adapted to be keyed to the countershaft, said hub having a plurality of equally spaced tangentially disposed recesses formed in an outer circular portion thereon, spring pockets formed adjacent and in line with said recesses, coil springs seated in said pockets and a roller in each of said recesses pressed by said coil spring therein, an annular gear mounted over said circular portion of the hub having the inside annular surface thereof in contact with said spring pressed rollers whereby on rotation of said annular gear in the same direction as said springs press said rollers, said hub is frictionally coupled through said rollers to said annular gear and rotated in the same direction therewith and when said hub is rotated by the countershaft to which it is attached and at a greater speed than said annular gear, said annular gear slips with respect to said hub.

3. In a traveling sewing machine outfit having a railway, a carriage on said railway, a sewing machine mounted on said carriage along said railway, said driving mechanism having a drive shaft, the improvement comprising a variable speed driving mechanism for driving said drive shaft at a variable speed to move said carriage at a variable speed along said railway, said variable speed mechanism comprising a control device adjustable on and lengthwise of said railway to control said variable speed mechanism, a housing adapted to be supported by said carriage, said housing having a constant speed input shaft, said input shaft having rotatably mounted thereon a first gear, a first clutch detachably connecting said first gear to said input shaft, and a second gear fixed to the input shaft, a countershaft in spaced relation and parallel to said input shaft, said countershaft having a first gear coupled thereto by an over riding clutch, said last named gear being in mesh with said second gear on the input shaft, and a second gear fixed to the countershaft in mesh with said first gear on the input shaft, an output shaft in parallel spaced relation to said input and countershafts and having a gear fixed thereto in mesh with said second gear on the countershaft, operating means for

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said first clutch on the input shaft and having an operating arm extending from said housing for operative engagement with said control device adjustable on and lengthwise of said railway, and means coupling said output shaft to said drive shaft of said driving mechanism to propel said carriage along said railway.

4. A traveling sewing machine outfit of the character described in claim 3 wherein said first clutch has an element thereof slidably mounted on said input shaft, said input shaft of the variable speed driving mechanism has mounted thereon a spring which is disposed between said clutch element slidable on the input shaft and said second gear fixed to the input shaft for urging said clutch into engagement with said first gear whereby said input shaft drives the first gear through said clutch.

5. A traveling sewing machine outfit of the character described in claim 3 wherein said over riding clutch gear attached to said countershaft comprises a hub adapted to be keyed to the input shaft, said hub having a plurality of equally spaced tangentially-like disposed recesses formed in an outer circular portion thereof, spring pock-

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ets formed adjacent and in line with said recesses, coil springs seated in said pockets and a roller in each of said recesses pressed by said coil spring therein, an annular gear mounted over said circular portion of the hub having the inside annular surface thereof in contact with said spring pressed rollers whereby on rotation of said annular gear in the same direction as said springs press said rollers, said hub is frictionally coupled through said rollers to said annular gear and rotated in the same direction therewith and when said hub is rotated by the countershaft to which it is attached and at a greater speed than said annular gear, said annular gear slips with respect to said hub.

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