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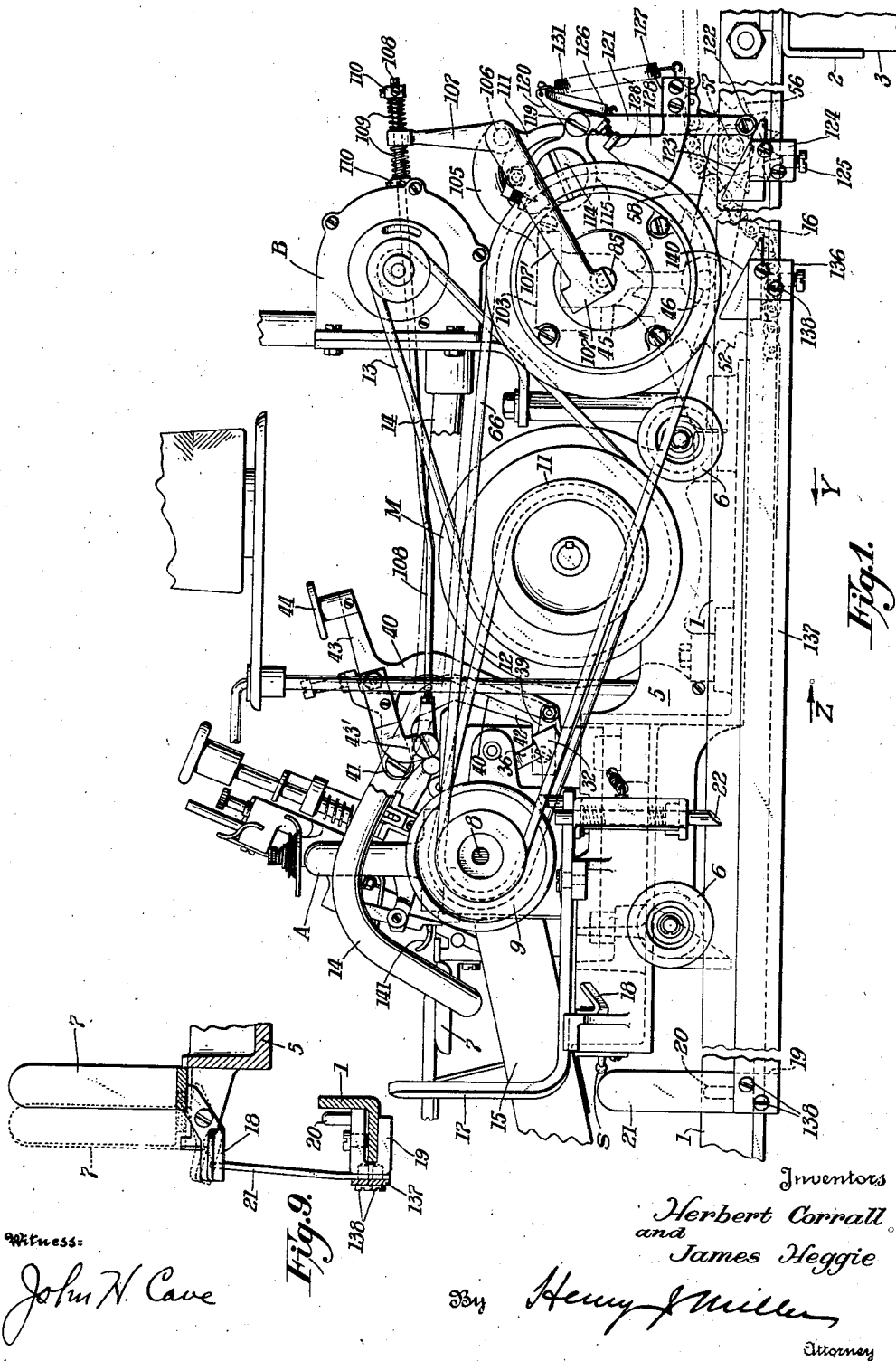
H. CORRALL ET AL

2,269,253

PIECE-END STITCHING MACHINE

Filed Nov. 13, 1939

5 Sheets-Sheet 1



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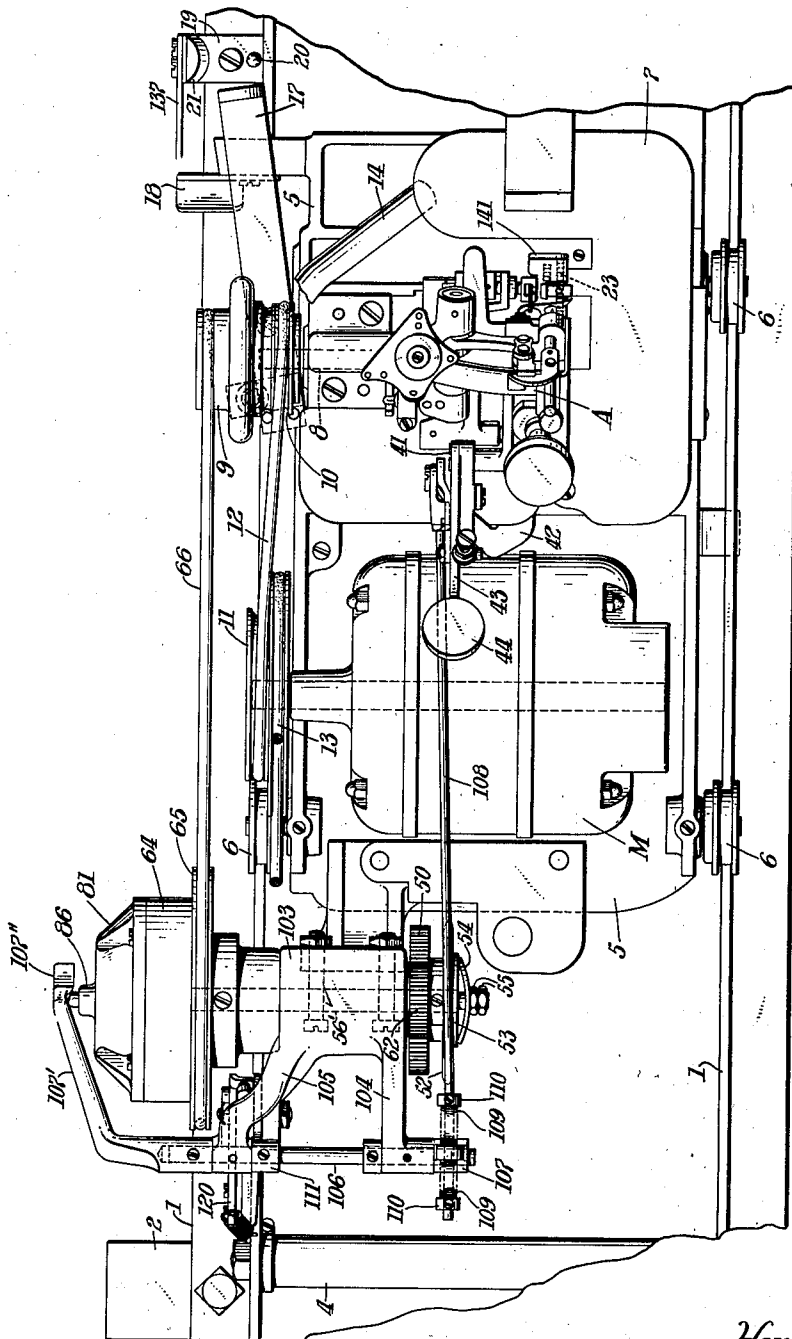


Fig. 2.

Witness:

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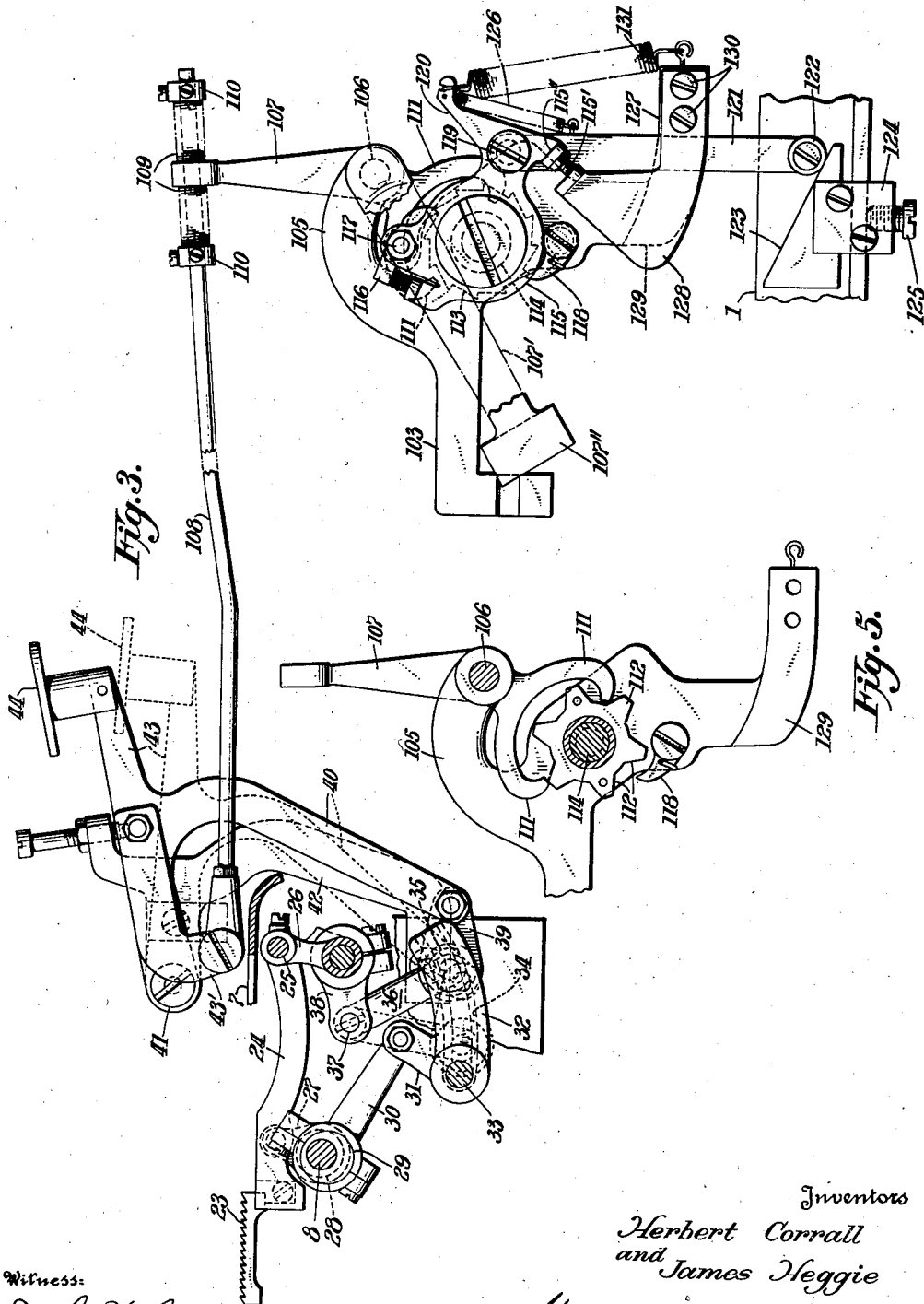
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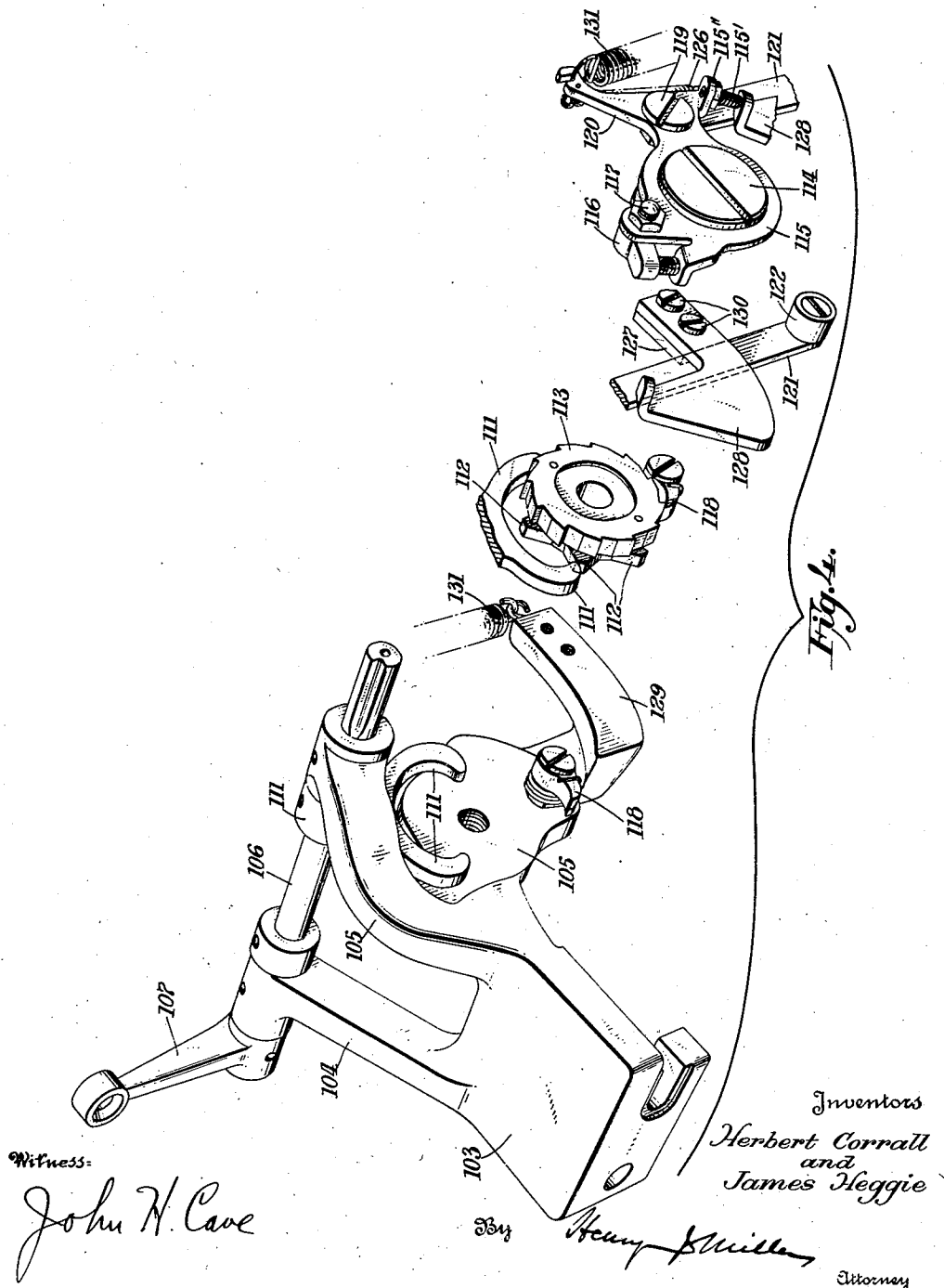
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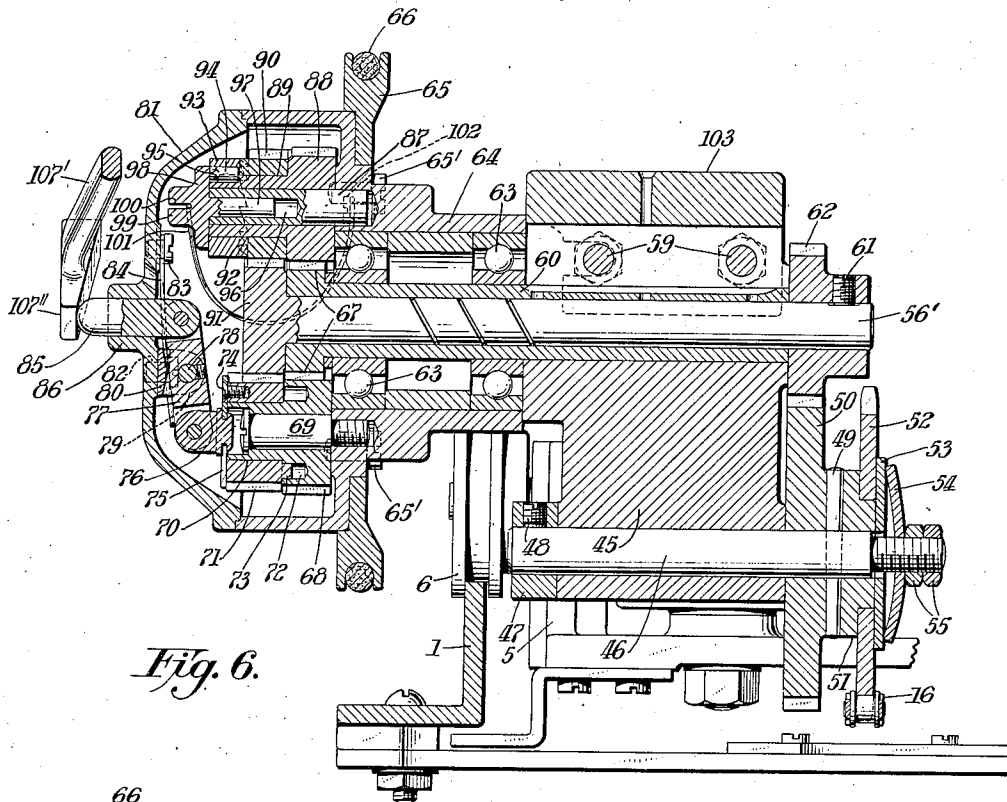


Fig. 6.

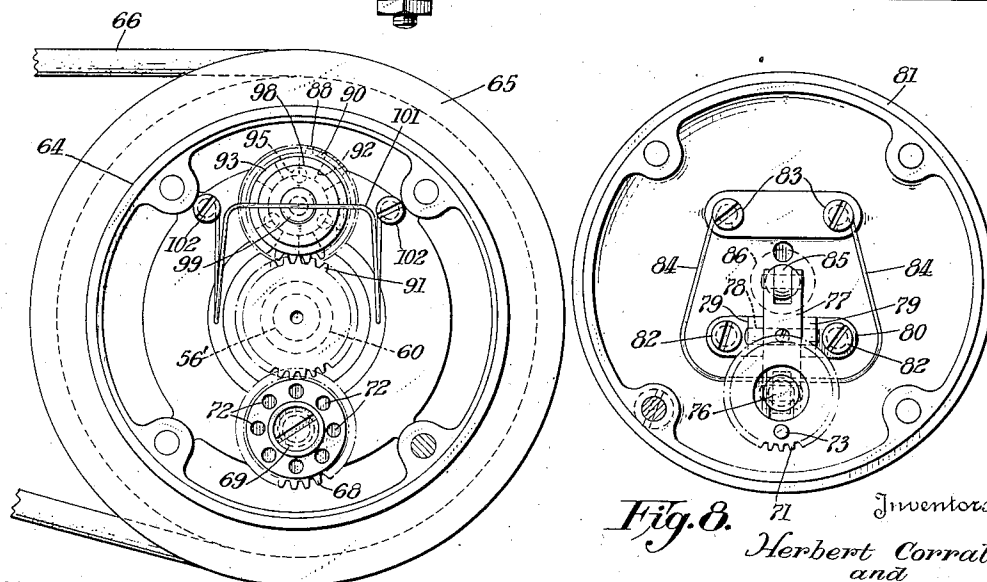


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Fig. 7.

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UNITED STATES PATENT OFFICE

2,269,253

PIECE-END STITCHING MACHINE

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Application November 13, 1939, Serial No. 303,996
In Great Britain November 14, 1938

11 Claims. (Cl. 112—2)

This invention relates to a type of sewing machine used in textile and analogous industries for trimming and stitching together the ends of fabric pieces, and may be regarded as an improvement of the machine forming the subject of our prior United States Patent No. 2,163,304, granted June 20, 1939.

In said prior patent there is described an apparatus comprising a sewing machine mounted upon a carriage adapted to be propelled along spaced rails by means of a sprocket wheel engaging a normally stationary chain and forming an element of a driven gear-train mounted upon the carriage.

The object of the present invention is to provide a machine of this type with an automatically operable device whereby the travelling speed of the carriage upon the rails and the work-feeding movements of the feed-dog of the sewing machine are automatically and synchronously retarded for a predetermined period at the start and at the finish of a seam whereby the stitches at the start and finish are more closely spaced than those intermediate thereof and the seam consequently reenforced at those portions.

With the above and other objects in view, as will hereinafter appear, the invention comprises combinations and arrangements of parts hereinafter set forth, and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings, Fig. 1 is a side elevation of a piece-end stitching machine embodying the invention, inclusive of the railway upon which travels the carriage supporting the sewing machine. Fig. 2 is a top plan view of the machine. Fig. 3 is an enlarged detail view of the mechanism for changing the work-feeding movements of the feed-dog and synchronizing the travelling movements of the carriage therewith. Fig. 4 is a disassembled view of certain of the parts shown in Fig. 3. Fig. 5 is a detailed view of the forked escapement lever and escapement wheel. Fig. 6 is a sectional elevation of the change-speed gear, Figs. 7 and 8 represent details thereof and Fig. 9 is a detail view of the belt-shipper and its holding latch.

In the preferred embodiment of the invention, as illustrated, 1 are spaced, horizontal rails of L-cross section secured upon the channel cross-members 2, one of which is partially shown in

each of Figs. 1 and 2. The cross-members 2 are supported by leg-members 3, one of which is shown in Fig. 1. The rails 1 are maintained in spaced relation by tie-rods 4, one of which is partially shown in Fig. 2.

Adapted to freely run forward and backward upon the spaced rails 1, constituting a railway, is a carriage 5 fitted with grooved wheels 6 which rest upon the rails. Mounted upon the carriage 5 is a sewing machine A, preferably of the well known Singer Class 81-24 single-thread overedge stitching type, more fully illustrated in the U. S. Patent to I. F. Webb, No. 1,983,258, of Dec. 4, 1934. This machine is provided with the usual cloth-plate 7 and a main shaft 8 upon which are mounted the tight pulley 9 and loose pulley 10.

An electric motor M, for driving the sewing machine A, and for propelling the carriage along the railway is also mounted upon the carriage 5 and has its driving pulley 11 connected with the pulleys 9 and 10 of the sewing machine by means of the belt 12.

As described in our earlier patent above referred to, B is a blower suitably mounted upon the carriage 5 and driven by a belt 13 from the motor M. The blower is provided with a tube 14 which terminates above an inclined chute 15. The blower directs a blast of air against the trimmer chute and clears it of trimmings severed from the piece-ends being joined and prevents such trimmings from clogging the stitch-forming and feeding mechanisms of the sewing machine.

Disposed longitudinally of and between the rails 1 is an endless chain 16, a portion of which is shown in Fig. 1. As more fully described in our said patent previously referred to, this chain constitutes an element of an auxiliary feeding mechanism for positively moving the carriage 5 upon the rails during the stitching operation and for returning the carriage to starting position on said rails after completion of a stitching operation.

Also pivotally secured upon the carriage is a manually operable belt-shipper 17 which is spring-biased to normally retain the driving belt 12 on the loose pulley 10. A latch-lever 18 retains the belt-shipper when manually shifted in "running" position to start the sewing machine. There is also adjustably secured upon one of the rails a slotted block 19 having a stop-pin 20 and a tripper-arm 21 the rounded upper end of which is in the path of travelling movement of the tail of the latch-lever 18 to lift it at the end of a sewing operation for release of the belt-shipper 17 which shifts the motor-belt 12 from the tight

pulley 9 to the loose pulley 10, thereby stopping the sewing machine. The stop-pin 20 engages the spring-pressed plunger 22 at the lower end of an arm depending from the belt-shipper 17 and prevents overrunning or coasting of the carriage 5 beyond seam-finishing position. A similar stop-block (not shown) is adjustably clamped upon the same rail, near the end from which the sewing starts, having a similar stop-pin in the path of movement of the spring-pressed plunger 22 which retains the carriage in starting position preparatory to a sewing operation.

The machine is further provided with a feeding mechanism whereby the initial and finishing stitches of a seam may be shortened. As described in our prior patent, previously referred to, the feeding mechanism comprises a feed-dog 23 secured upon the free end of the feed-bar 24 pivotally mounted at 25 upon the feed-rocker 26. The feed-bar is connected by a short pitman 27 with a feed-lift eccentric 28 on the sewing machine main shaft 8. The feed-advance eccentric 29 is connected by a pitman 30 with the bell-crank lever 31, 32 fulcrumed at 33 on the machine frame. The arm 32 of the ball-crank lever is provided with a curved undercut slot or guideway 34 for the slide-block 35 connected to the lower end of a link 36 the upper end of which is connected at 37 to an arm 38 of the feed-rocker 26. As in the device of our prior patent, the slide-block 35 is connected by a link 39 with the lower end of a manually operable plural-armed lever 40 pivotally mounted upon the screw-stud 41 entering the fixed arm 42 rising from the sewing machine bed. The plural-armed lever 40 is provided with an arm 43 terminating in a button 44 for convenient actuation by the operator.

As thus far described the present machine is made substantially in accordance with the disclosure of our prior U. S. Patent No. 2,163,304 previously referred to.

The present machine differs from the machine of our earlier patent in the provision of an improved construction wherein the stitching speed of the carriage along the railway and the work-feeding movements of the feed-dog of the sewing machine are automatically and synchronously retarded for a predetermined period, without stopping the stitch-forming mechanism, at the start and at the finish of a seam, whereby to form closely spaced or typing stitches at these parts of the seam and to prevent distortion of the joined fabric pieces.

Rising from the carriage 5 (Fig. 6) is a split upright bearing standard 45 in which is journaled a stud-shaft 46 retained in its bearing at one end by a collar 47 secured by a set-screw 48. Secured upon the other end of the stud-shaft by a pin 49 is a gear 50 upon the hub 51 of which is frictionally mounted a sprocket-wheel 52 retained upon said hub by a collar 53 and spring-washer 54 secured upon the reduced threaded end of the stud-shaft 46 by nuts 55. The teeth of the sprocket-wheel 53 are in permanent mesh with the upper flight of the normally stationary chain or feeding element 16 disposed between the rails 1. An idler sprocket-wheel 56 (Fig. 1) journaled upon a screw stud 57 fixed in an arm 58 extending laterally from the bearing standard 45, maintains the chain 16 in mesh with the sprocket-wheel 52.

Clamped in the upright standard 45 by the bolts 59 is a stationary bearing-bushing 60 for the shaft 56, on one end of which shaft is se-

cured by set-screw 61 the pinion 62 which meshes with the gear 50 secured upon the shaft 46. Disposed on the other end of the bushing are two spaced ball bearings 63 upon which rotates a planetary pinion carrier or housing 64 of a change-speed gear, e. g., a two-speed gear drive preferably constituted as an epicyclic gear provided with two pairs of planetary pinions. Secured to the housing by screws 65' is a belt-wheel 65 connected by a belt 66 with the tight pulley 9 on the sewing machine main shaft 8.

The housing end of the bearing-bushing 60 is formed as a pinion 67 which meshes with a second pinion 68 journaled upon a headed bearing stud 69 entering a threaded aperture in the pinion carrier or housing 64. Journaled for endwise movement upon a bearing 70, afforded by the hub of the pinion 68, is a third pinion 71 of slightly smaller pitch diameter than that of pinion 68. Pinion 68 is provided with a circular series of apertures 72 adapted to be entered by a coupling-pin 73 fixed in the pinion 71. Secured upon the exposed face of the pinion 71 by fastening screws 74, one of which is shown in Fig. 6, is a disk 75 freely rotatable upon a necked stud 76 which is pivotally connected to one end of a rock-lever 77, journaled upon a pin 78 passing through ears 79 of the bracket 80 which is fastened upon the inner face of the housing cover 81 by screws 82. Also secured upon the inner face of the housing cover, by screws 83, is a U-shaped wire spring 84 which urges and maintains the pinion 71 in driving relation with the pinion 68 by means of the coupling-pin 73 entering one of the apertures 72. Pivotaly secured upon the other end of the lever 77 is a plunger-stud 85, with a rounded outer end, passing through a bearing lug 86 formed in the housing cover 81.

Pinions 68 and 71 constitute one of the two pairs of pinions supported on the carrier or housing 64 and maintained in driving relation by the coupling-pin 73. These pinions are adapted to be uncoupled by a selector herein-after to be described.

Journaled upon a bearing stud 87 entering the rear wall of the pinion carrier or housing 64 and disposed diametrically opposite the bearing stud 69 of the pinion 68 is another pinion 88 which also meshes with the pinion 67 of the fixed bearing bushing 60. Journaled upon the hub 89 of the pinion 88 is another pinion 90. Pinions 90 and 71 mesh with the pinion 91 upon the end of the shaft 56. Pinions 88 and 90 constitute the second pair of planetary pinions supported upon the carrier or housing 64. Pinion 90 has formed on the face thereof, remote from the pinion 88, a series of ratchet teeth 92 adapted to be engaged by similar shaped teeth formed on the adjacent face of clutch collar 93. This clutch collar is maintained in driving relation with pinion 90 by means of circularly disposed coupling pins 94 entering apertures 95 provided by grooves, respectively, in the collar and in the hub 89 of the pinion 88. Entering a central aperture 96 in the stud 89 is the pin 97 of a spring-urged collar 98 provided with a reduced portion 99 having a diametrical slot 100 entered by the cross-member of a U-shaped wire spring 101 secured to the inner wall of the pinion carrier or housing 64 by fastening screws 102. The spring-urged collar 98 with its ratchet teeth constitutes a slipping clutch between the one pair of pinions 68 and 90 when the other pair of pinions, 63 and 71 are in coupled relation.

By way of example, the stationary pinion 67 and the pinions 68 and 88, which mesh therewith, may have 28 teeth each. Pinion 90, which is slightly smaller than pinion 88 in pitch-diameter, also has 28 teeth, while pinion 71, which is smaller than pinion 68 in pitch-diameter, has 27 teeth. Pinion 91 has 29 teeth. Pinions 88 and 90 are, by the spring-pressed ratchet teeth 92, permanently coupled together in one-way driving relationship. Pinions 68 and 71 are coupled together or uncoupled by the action of the pivoted lever 77 and plunger stud 85.

When the pinions 68 and 71 are uncoupled, the shaft 56' is positively driven at a certain slow speed by the operation of the differential gearing 67, 88, 90, 91; the power being transmitted against the coacting ratchet teeth 92 so that there is no slippage between them. When the coupling pin 73 is thrown in to couple the pinions 68 and 71 together, they take over from pinions 88 and 90 the drive of the shaft 56' and drive the latter at another slow speed which is somewhat faster than the speed of drive through pinions 88 and 90. This overdrive through pinions 68 and 71 simply causes the ratchet-coupled pinions 88 and 90 to slip relatively to one-another in a direction opposite their torque-transmitting direction of axial rotation.

The gear ratios are such that when the pinions 67, 68, 71 and 91 drive the shaft 56', the carriage 5 with the sewing machine A travels twice as fast, and results in stitches twice as long, intermediate the ends of the seam, as when the pinions 67, 88, 90 and 91 drive the shaft 56', producing relatively short stitches at both ends of the seam.

We will now describe the mechanism for automatically operating the selector to synchronize the retarded feed of the carriage 5 with corresponding retarded work-advancing movements of the feed-dog 23 in order to more closely space the stitches.

Secured upon the top of the upright standard 45, for the stud-shaft 56', by the fastening bolts 59, is the seat of a bearing bracket 103 (Fig. 4) having spaced inclined arms 104, 105 apertured to receive a rock-shaft 106. Secured upon one end of the rock-shaft 106 is an arm 107 whose free end is apertured to receive a pull- and push-rod 108 and pivotally connected at one end with the downwardly extending arm 43' of the manually operable plural-armed feed-adjusting lever 43. The connection between the rod 108 and the arm 107 of the rock-shaft 106, is cushioned by two buffer springs 109 retained by collars 110.

Secured upon the rock-shaft 106 is a depending forked escapement-lever 111 which cooperates with an escapement wheel 112 unitary with a ratchet wheel 113 mounted upon a bearing stud 114 entering the depending arm 105 of the bearing bracket 103. Also journaled upon said bearing stud 114 is an actuator 115 having a spring-pressed actuating pawl 116 journaled upon the screw-stud 117 near the top thereof. A spring-pressed holding pawl 118 is mounted upon a screw-stud near the lower portion of the arm 105. Pivotally mounted upon a bearing stud 119 entering the lateral arm 120 of the actuator 115 is the upper end of a depending lever or follower 121 whose lower end carries a roller 122 engageable by a tripping device or cam 123 carried by the block 124 adjustably clamped upon the rail 1 by the set screw 125. A coil-wire spring 126 secured at one end to the arm 120 and its other

end to the lever 121 urges said lever against a stop-block 127 embraced between a guide-plate 128 and an angular extension 129 of the arm 105 and secured to the latter by screws 130. Another coil-wire spring 131 secured at its upper end to the arm 120 and its lower end to the extension 129 urges the lever 121 downwardly so that its roller 122 is normally in the path of the tripping device or cam 123, which is secured upon the block 124 adjustably mounted upon the rail 1 by the screw 125 near the end at which the carriage starts at the beginning of a sewing period. It will be observed that the lever 121, pivotally mounted upon the bearing stud 119 is normally maintained, by the action of the coil-wire spring 126, against the stop-block 127 when the carriage 5 travels in the direction indicated by the arrow y shown in Fig. 1 but that it is free to swing away from said block sufficiently high for the roller 122 to pass over the high point of the cam 123 when the carriage travels in the opposite direction or that indicated by the arrow z. An ear 128' extending from the plate 128 forms an abutment for the adjustable stop screw 115' threaded into an ear 115'' extending from the actuator 115.

Also adjustably secured upon the rail 1, (Fig. 1) near the end where the carriage stops at the completion of a sewing period, is another slotted block 136 maintained in fixed spaced relation with the slotted block 19 by a bar 137 secured to the blocks by fastening screws 138. Block 136 is fitted with a tripping device or cam 140 similar to the cam 123 also secured to the rail 1.

In the operation of stitching two piece-ends together, these are secured in a customary manner upon impaling pins (not shown) in overlapping relation, with the free ends of the fabric pieces disposed between the presser-foot 141 and the cloth plate 7 of the sewing machine A. The electric motor M is then started by a conventional toggle-switch S mounted upon the carriage 5 and, as the driving belt 12 from the motor to the sewing machine is on the loose pulley 10, the carriage 5 with the sewing machine will remain stationary. When it is desired to begin stitching, the belt 12 is shifted from the loose pulley 10 to the tight pulley 9 by manual actuation of the shipper 17 which is retained in "running" position by the latch-lever 18.

When the motor belt is shifted on the tight pulley 9, stitching will begin and, by means of the driving belt 66 between the tight pulley 9 and the belt-wheel 65 secured to the planetary pinion carrier or housing 64, the speed-reducing gearing will be set in motion and, through the sprocket wheel 52 meshing with the normally stationary chain or feeding element 16, the carriage 5 with the sewing machine A, will be propelled along the rails 1.

Under normal conditions, while the carriage and sewing machine are at rest, the slide-block 35 of the feeding mechanism is so positioned in its guideway 34 (dotted lines in Fig. 3) in the arm 32 of the bell-crank lever 31, 32 that, when the sewing machine is started, the feed-dog 23 will execute relatively short strokes, resulting in closely spaced stitches. The cam 107' holds the plunger-stud 85 pushed in to hold uncoupled the pinions 68, 71 for the slowest or short stitch drive through the pinions 88, 90. As the follower or link 121, with its roller 122, contacts the tripping device or cam 123, it rides up the incline on said cam thereby turning the actuator 115 until

its pawl 116 drops into a depression formed between successive ratchet-teeth. In the continued travel of the carriage 5, the follower or link 121 will ride and drop off the cam 123 and, due to the forceable depression of the link or follower 121 by the action of the spring 131, the actuator 115 (coupled with the ratchet 113 by the pawl 116) will perform a partial rotation and, in so doing, one of the teeth of the escapement-wheel 112 will engage one of the arms 111 of the escapement-lever carried by the rock-shaft 106 and thereby impart to the latter a slight rotary movement, which, through the arm 107 will impart an end-wise pull to the push- and pull-rod 108 connected to the feed-adjusting lever 43. The slide-block 35 is thus shifted in that portion of the guideway 34 in the feed bell-crank lever 31, 32 (full lines Fig. 3) to cause the feed-dog 23 to execute relatively long strokes of normal stitch-length. During the slight rotation of the rock-shaft 106, the arm 107' will, with its cam 107'', be shifted to the position shown in Figs. 1 and 6 and thus permit the plunger 85 and lever 77 to react under the influence of the spring 84 and effect the coupling of the pinion 71 to pinion 68 to effect a faster travel of the carriage 5 in the production of relatively long stitches.

As the carriage 5 approaches the end of its range of travel, the depending lever or follower 121 will ride up another tripping device or cam 140, which will again operate the actuator 115 and trip the mechanism to produce relatively short stitches during the completion of the seam.

When the carriage 5 arrives at the end of its range of travel, the latch-lever 18 will be released by engagement of the rounded upper end of the tripper-arm 21 whereby the belt-shipper will be moved to "off" position wherein the belt 12 will be shifted from the tight pulley 9 to the loose pulley 10 to cause the sewing machine to come to rest.

The carriage 5 with the sewing machine A is then returned to its starting position by manual actuation of the chain 16, as fully disclosed in our earlier patent previously referred to.

In the return travel of the carriage to starting position the roller 122 of the lever or follower 121 contacts, respectively, the vertical end walls of the stationary cams 140 and 123 against which it rolls upwardly, in the continued return travel of the carriage, until the roller 122 clears, respectively, the high points of said cams when the lever with its roller is returned to vertical position against the block 127 by the coil-wire spring 126.

Having thus set forth the nature of the invention, what we claim herein is:

1. In a travelling sewing machine outfit, a railway, a wheeled carriage on said railway, a sewing machine mounted on said carriage and including stitch-forming mechanism and variable stitch-length work-feeding mechanism, variable speed driving means independent of said variable work-feeding mechanism to propel said carriage along said railway at different speeds, and interconnected governing devices to concomitantly and commensurately vary the work-feeding speed of the sewing machine work-feeding mechanism and the speed at which said carriage is propelled along said railway independently of said work-feeding mechanism.

2. In a machine of the class described the combination with a railway and a wheeled carriage mounted thereon, of a sewing machine mounted on said carriage and including stitch-forming

mechanism and variable stitch-length work-feeding mechanism, an electric motor mounted on said carriage for driving said sewing machine and variable speed driving connections between said motor and carriage for propelling said carriage on said railway, and interconnected governing devices for automatically and synchronously changing the rate of travel of said carriage and the work-feeding movements of the feeding mechanism without stopping the stitch-forming mechanism.

3. In a travelling sewing machine outfit, a railway, a wheeled carriage on said railway, a sewing machine mounted on said carriage and including stitch-forming mechanism and variable stitch-length work-feeding mechanism, variable speed means independent of said work-feeding mechanism to propel said carriage along said railway, and automatically governed interconnected devices to concomitantly and commensurately change the length of feed of the sewing machine work-feeding mechanism and the speed of travel of said carriage, at one or more predetermined stations of the latter along said railway.

4. In a machine of the class described the combination with a railway and a wheeled carriage mounted thereon, of a sewing machine mounted on said carriage comprising stitch-forming mechanism and variable stitch-length work feeding mechanism including a feed-dog for advancing the work, an electric motor mounted on said carriage for driving said sewing machine, variable speed driving connections with said motor for propelling said carriage on said railway, and interconnected governing means for automatically and synchronously changing the rate of travel of said carriage and the amplitude of the work-advancing movements of said feed-dog without stopping said stitch-forming mechanism.

5. In a travelling sewing machine outfit, a railway, a wheeled carriage on said railway, a sewing machine on said carriage, said sewing machine having stitch-forming and work-feeding mechanisms, carriage-propelling mechanism independent of said work-feeding mechanism, means to drive said sewing machine and said carriage propelling mechanism, a tripping device adjustable on and lengthwise of said railway, and means governed by said tripping device to concomitantly and commensurately vary the rate of feed of the sewing machine work-feeding mechanism and the rate of travel of said carriage.

6. In a travelling sewing machine outfit, a railway, a wheeled carriage on said railway, a sewing machine mounted on said carriage and including stitch-forming mechanism, work-feeding mechanism and feed-regulating means, variable speed driving mechanism independent of said work-feeding mechanism to propel said carriage along said railway, governing means for said variable speed driving mechanism to vary the rate of travel of said carriage, and a connection between said last mentioned means and said feed-regulating means whereby they are caused to function concomitantly.

7. A travelling sewing machine having stitch-forming mechanism, a feed-dog, feeding mechanism to cause the feed-dog to intermittently engage the work and feed it a stitch-length, feed-regulating means, a railway, variable speed driving means independent of said feeding means to propel said sewing machine along said

railway, governing means for said variable speed driving means to change the rate of travel of the sewing machine, and a connection between said last mentioned means and said feed-regulating means to effect a change in stitch-length commensurate with the change in the rate of travel of the sewing machine.

8. In a travelling sewing machine, a railway, a wheeled carriage thereon, a sewing machine on said carriage, a motor to drive said sewing machine, and carriage propelling means driven by said motor and including a gear-train having two pairs of differential epicycloidal gears for driving said carriage at different speeds, the slower driving pair of which gears are connected to slip relatively to each other in one direction only, and means to uncouple the faster driving pair of gears.

9. In a travelling sewing machine, a railway, a wheeled carriage thereon, a sewing machine on said carriage, a means driven by said motor and including a gear-train having two pairs of differential epicycloidal gears for driving said carriage at different speeds, the slower driving pair of which gears are connected to slip relatively to each other in one direction only, and means governed by a device on said railway to uncouple the faster driving pair of gears.

10. A travelling sewing machine outfit having,

in combination, a railway, a sewing machine mounted to travel along said railway and including stitch-forming and work-feeding mechanisms, feed-regulating means, a one-way slow speed drive to propel said sewing machine along said railway at a slow speed, a higher speed drive to propel the sewing machine along said railway at a higher speed without throwing out the slow speed drive, means to throw in and throw out the higher speed drive, and a feed-regulating connection between said last mentioned means and said feed-regulating means.

11. In a machine of the class described the combination with a railway and a wheeled carriage mounted thereon, of a sewing machine mounted on said carriage and including stitch-forming and work-feeding mechanisms, said work-feeding mechanism including a feed-regulator, an electric motor mounted on said carriage for driving said sewing machine, variable speed mechanism driven by said motor for propelling said carriage on said railway, a rock-shaft, an actuator mounted thereon, means mounted on said railway for engaging said actuator and operative connections between said rock-shaft, said feed-regulator and variable speed mechanism.

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