L. E. TOPHAM.

DRIVING AND STOPPING MECHANISM.

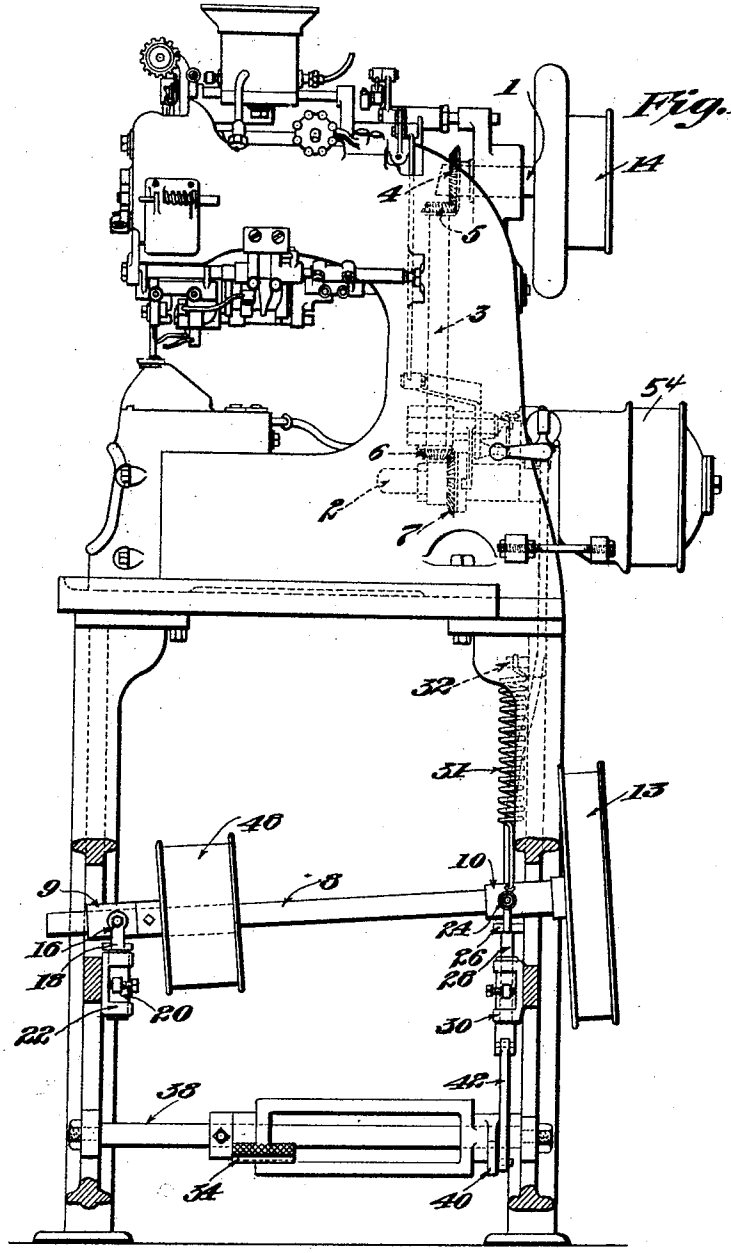
APPLICATION FILED OCT. 2, 1918.

1,404,072.

Patented Jan. 17, 1922.

6 SHEETS—SHEET 1.

Fig. 1



Witness:

M. G. Crozier

Inventor:

Lawrence E. Topham

by his attorneys

Van Everen Fish & Albritton

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6 SHEETS—SHEET 2.

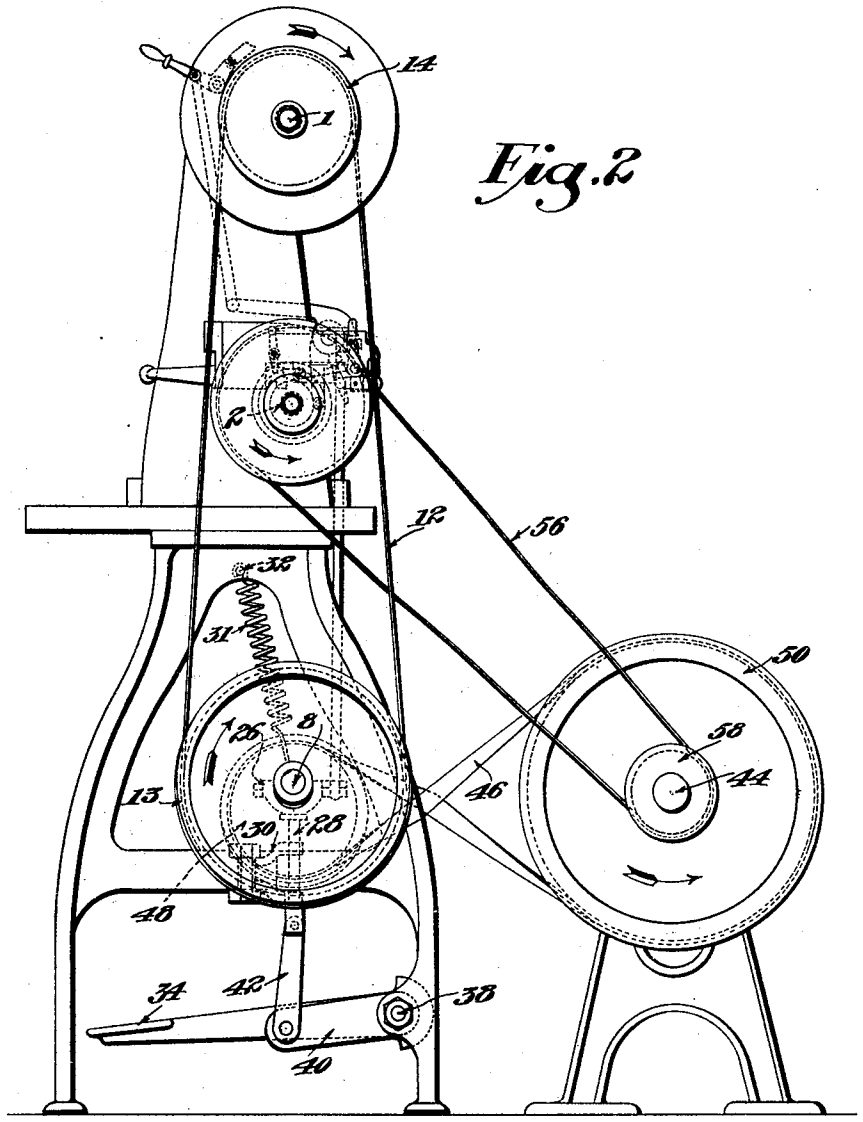


Fig. 2

Witness:

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6 SHEETS—SHEET 3.

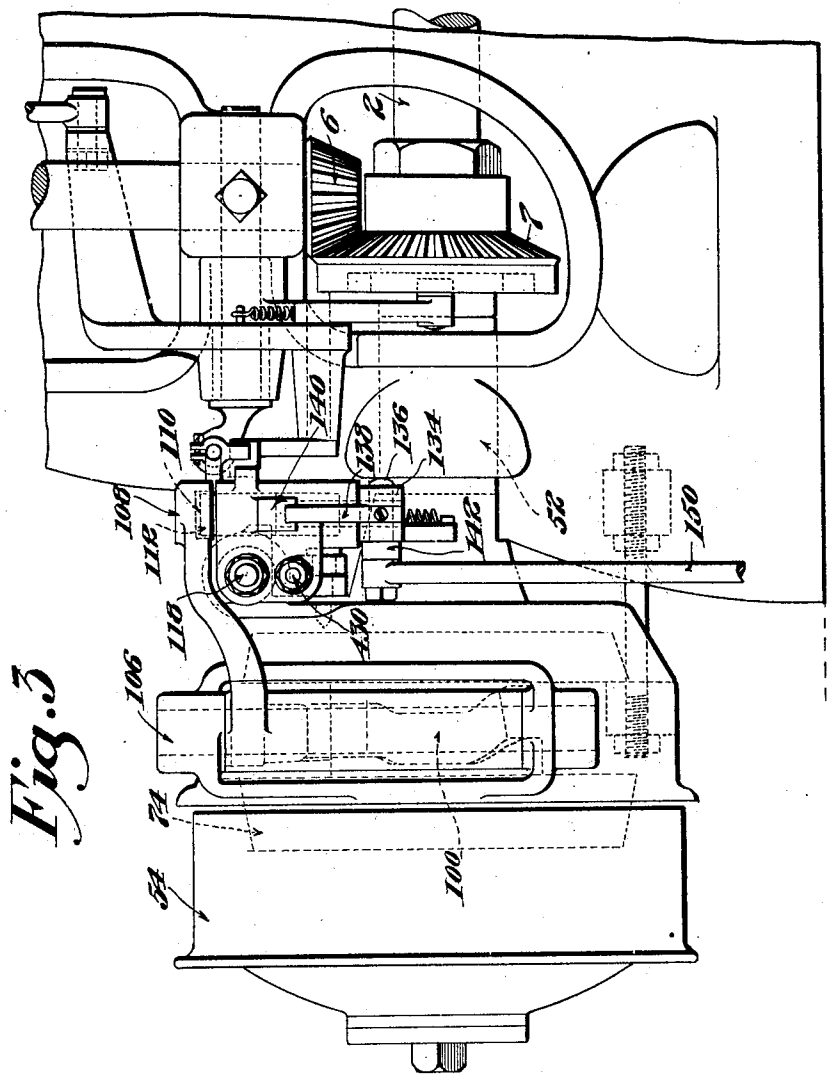


Fig. 3

Witness:

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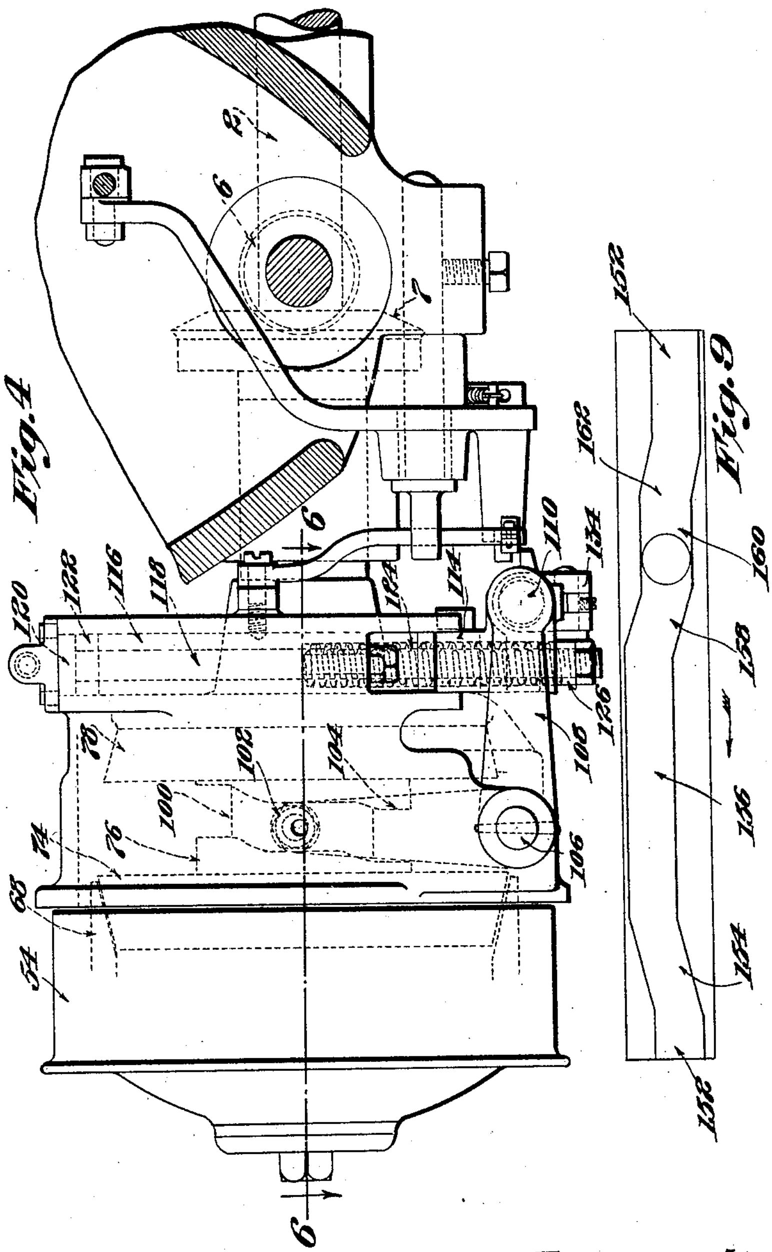
L. E. TOPHAM.

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APPLICATION FILED OCT. 2, 1918.

1,404,072. Patented Jan. 17, 1922.

6 SHEETS—SHEET 4.



Witness:

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DRIVING AND STOPPING MECHANISM.

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6 SHEETS—SHEET 5.

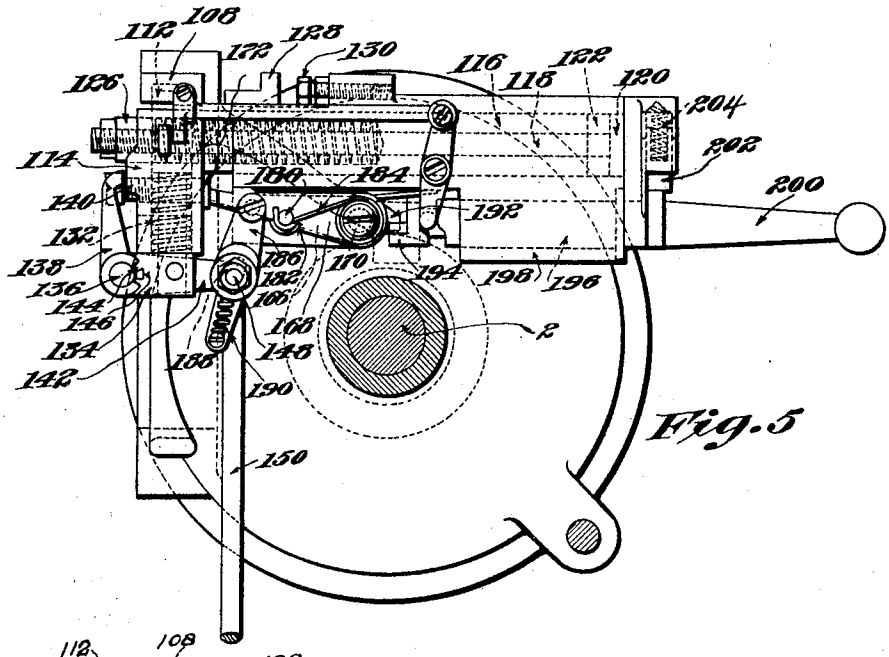


Fig. 5

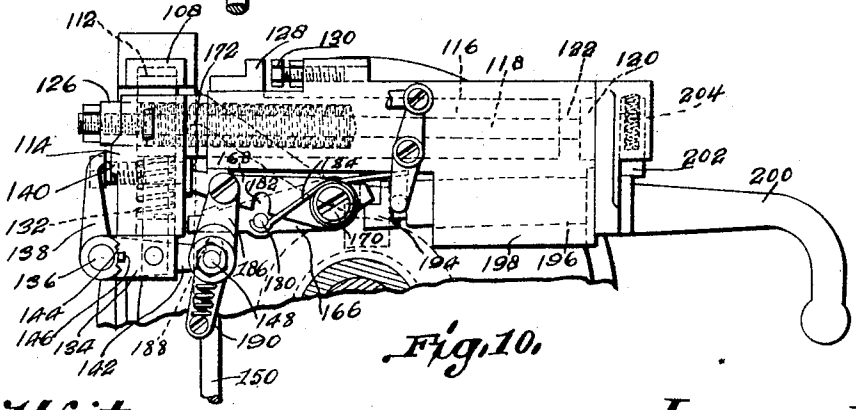


Fig. 10.

Witness:

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DRIVING AND STOPPING MECHANISM.

APPLICATION FILED OCT. 2, 1918.

1,404,072. Patented Jan. 17, 1922.

6 SHEETS—SHEET 6.

Fig. 6

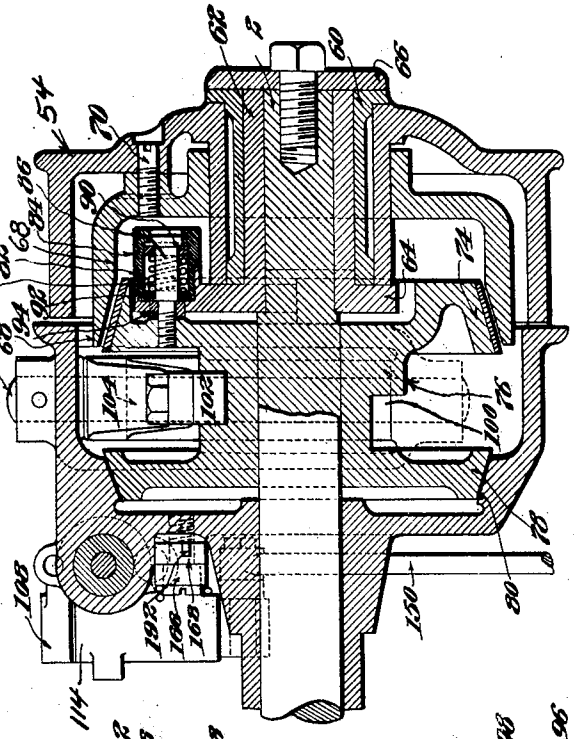


Fig. 8

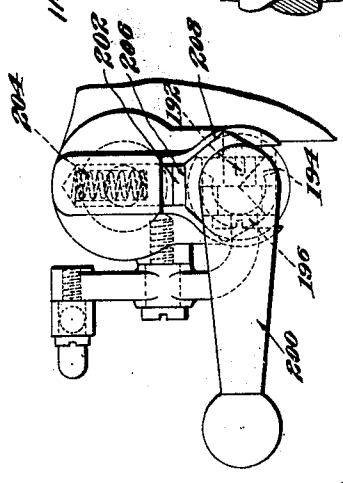
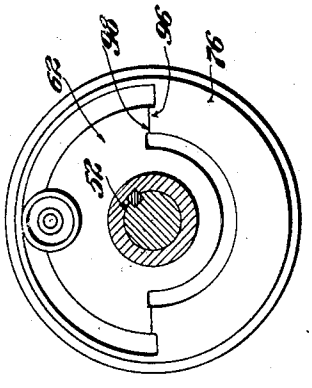


Fig. 7



Witness:

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UNITED STATES PATENT OFFICE.

LAURENCE E. TOPHAM, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DRIVING AND STOPPING MECHANISM.

1,404,072. Specification of Letters Patent. Patented Jan. 17, 1922.

Original application filed June 29, 1914, Serial No. 847,940. Divided and this application filed October 2, 1918. Serial No. 256,594.

To all whom it may concern:

Be it known that I, LAURENCE E. TOPHAM, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Driving and Stopping Mechanisms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to driving and stopping mechanisms.

In the operation of certain machines it is desirable that the operator should be able to stop the machine at any one of two or more predetermined points in a cycle of operations of the machine. For example, it is often desirable to stop a leather or wax thread sewing machine with the needle and awl out of the work and the presser foot in work-engaging position. This condition of the parts enables the operator either to form one or more stitches by turning the machine by hand, the work being held from displacement by the presser foot, or to lift the presser foot and remove the work from the machine. It is also often desirable to stop the machine with the awl in the work and with the presser foot lifted from the work so that the work may be turned about the awl as a fulcrum, as when the machine arrives at a point at which a sharp angle is to be formed in the line of the seam.

One object of the present invention is to provide an improved mechanism by which a machine may be stopped at any one of two or more predetermined points in a cycle of operations in a certain and reliable manner, without any particular effort on the part of the operator, and which may be easily and conveniently controlled.

With this object in view, the invention comprises stopping devices for stopping the machine at any one of two or more predetermined points in a cycle of operations, and a feature of the invention contemplates the provision of means for setting the stopping devices while the machine is running, or while it is at rest to cause said devices when subsequently thrown into operation to stop the machine at the desired one of the predetermined points in a cycle.

Another object of the invention is to provide an improved stopping mechanism for stopping a machine at either of two or more points in a cycle of operations, which is particularly applicable to high speed machines. With this object in view, a feature of the invention contemplates the provision in combination with stopping devices for stopping the machine at any one of two or more predetermined points in a cycle of operations and means for controlling the same, of mechanism acting to reduce the speed of the driving shaft of the machine before the machine is stopped at either of said points. The mechanism for reducing the speed of the driving shaft is preferably constructed and arranged to slow the machine down to a predetermined speed before the stopping devices act to stop the machine.

Another object of the invention is to provide an improved stopping mechanism which will act with certainty and reliability to stop a machine at a predetermined point in a cycle of operations without undue shock or excessive strain on the parts of the machine, even when the machine is running at a comparatively high speed.

In addition to the features above pointed out, the invention comprises certain novel and improved constructions, arrangements and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be understood and appreciated by those skilled in the art.

While the invention is illustrated in the present application as applied to a leather or wax thread sewing machine, it is to be understood that the invention is not limited to use in connection with sewing machines but that it may be applied with advantage to various classes of machines.

The features of the invention will be readily understood from the accompanying drawings illustrating the invention in its preferred form and the following detailed description of the constructions therein shown.

In the drawings, Figure 1 is a view in front elevation of a leather or wax thread sewing machine embodying the invention;

Fig. 2 is a view in side elevation of the machine looking from the right; Fig. 3 is a detail view in rear elevation illustrating particularly the stopping mechanism; Fig. 4 is a plan view partly in section illustrating particularly the stopping mechanism; Fig. 5 is a detail view in side elevation partly in section illustrating the stopping mechanism and looking from the left-hand side of the machine; Fig. 6 is a view in vertical section taken substantially on the line 6—6 of Fig. 4; Fig. 7 is a detail view in side elevation illustrating certain parts of the slow speed clutch and brake mechanism; Fig. 8 is a detail view in front elevation illustrating certain parts of the controlling mechanism for the stopping mechanism; Fig. 9 is a diagrammatic view showing a development of the cam groove which forms part of the stopping mechanism; and Fig. 10 is a detail view similar to Fig. 5 but showing the parts in a different position.

The invention is illustrated in the present application as applied to a wax thread sewing machine for sewing leather articles. The parts of this machine have the same construction, arrangement and mode of operation as the corresponding parts of the machine illustrated and described in applicant's application, upon which Patent No. 1,291,661, dated January 14, 1919, was granted and of which the present application constitutes a division.

The shaft indicated at 1 constitutes the main shaft of the machine from which all of the other parts of the machine are driven during the sewing operation. The shaft indicated at 2 consists of a countershaft which is driven from the main shaft 1 through an upright shaft 3, which in turn is driven from the main shaft 1 by means of a bevelled gear 4, fixed to the shaft 1, which meshes with a bevelled gear 5 fixed to the upper end of the shaft 3. The driving connection between the shaft 3 and the shaft 2 consists of a bevelled gear 6 fixed to the lower end of the shaft 3 and a bevelled gear 7 fixed to the shaft 2 and meshing with the bevelled gear 6. The driving connection between the shaft 1 and the shaft 2 drives the shaft 2 in the opposite direction from the direction of rotation of the shaft 1, and the gears are so proportioned that the shaft 2 is driven at substantially the same speed as the shaft 1.

During the sewing operation the machine is driven by means of the driving shaft 8 (see Figs. 1 and 2) mounted in bearings 9 and 10 in the base of the machine and belted to the shaft 1 by means of a belt 12 passing about a pulley 13 on the shaft 8 and the pulley 14 fixed to the end of the shaft 1. The shaft 8 is mounted so that it may be swung in a vertical plane about a horizontal axis located near the left hand end of the shaft to tighten and loosen the belt 12 about the pulleys 13 and 14 and thereby connect the shaft 1 with and disconnect it from the driving shaft 8. To this end the bearing 9 for the shaft 8 is mounted upon trunnions 16 carried by the arms of a yoke 18 formed at the upper end of a bar 20 secured in brackets 22 on the frame of the machine. The bearing 10 for the shaft 8 is also mounted upon bearing pins or trunnions 24 carried by the arms of a yoke 26 formed at the upper end of a slide 28 mounted to slide in guide brackets 30 on the frame of the machine. The right hand end of the shaft 8 is normally supported in position to maintain the belt 12 in loosened condition by a tension spring 31 attached to its upper end at 32 to the frame and at its lower end to the bearing 10. The right hand end of the shaft 8 is depressed to tighten the belt 12 and thereby establish a driving connection between the shaft 8 and the shaft 1 by means of a treadle 34 pivoted at 38 and having an arm 40 connected by a link 42 with the lower end of the slide 28. The numeral 44 indicates a power shaft from which the machine is driven by means of a belt 46 passing about a pulley 48 fixed to the shaft 8 and about a pulley 50 fixed to the shaft 44.

The mechanism for stopping the machine is applied to the countershaft 2 of the machine, the slow speed clutch by which the machine is slowed down to a predetermined speed, and then driven in a forward direction to stopping position, and the brake by which the machine is finally stopped, being carried by and acting directly upon said shaft. The slow speed clutch mechanism comprises a slow speed driving pulley 54 which is loosely mounted on the counter shaft 2 and is constantly driven at a definite slow speed in the same direction as the normal direction of rotation of the countershaft by means of a belt 56 passing about said pulley and about a pulley 58 mounted on the power shaft 44. In the construction illustrated, referring particularly to Fig. 6, the pulley 54 is mounted upon a bushing 60 which is driven tightly into the pulley and is journaled upon a sleeve 62 fixed to the shaft 2. The pulley is held from endwise movement on the shaft between a flange 64 on the sleeve 62 and a washer 66 secured to the end of the shaft 2 by a screw. The driving member 68 of the slow speed clutch is secured to the pulley 54 by screws 70. The driven member 74 of the slow speed clutch is formed upon a flange projecting from a sleeve 76 which is mounted to rotate with the shaft 2 but is movable longitudinally of the shaft to engage and disengage the members of the clutch. The sleeve 76 also carries a brake member 78 formed on a second flange projecting there-

from which is arranged to engage a fixed brake shoe 80 on the frame of the machine. The sleeve 76 during the normal operation of the machine is held in an intermediate position relative to the driving member 68 of the slow speed clutch and the brake shoe 80 so that both the clutch and the brake are disengaged. In the construction illustrated, the sleeve 62 is formed with a cylindrical hollow boss 82 in which is threaded a thimble 84. A pin or stud 86 secured at one end in the flange upon which the clutch member 74 is carried passes through registering openings in the ends of the chamber formed by the boss 82 and the thimble 84 and a coiled spring 88 is coiled about the pin 86 and interposed between washers 90 and 92 on the said pin. A collar 94 is mounted on the pin 86 between the washer 92 and the flange on the sleeve 76 in which the pin is secured. The outward movement of the washer 90 is limited by its engagement with the head of the pin 86 and the movement of the washer 92 is limited by its engagement with the collar 94. The parts are constructed and arranged so that when the sleeve 76 is in an intermediate position on the shaft with the slow speed clutch members and the brake members disengaged the washers 90 and 92 are in their limiting positions on the pin 86 in engagement respectively with the head of the pin and the collar 94 and also engage the ends of the chamber formed in the boss 82 and the thimble 84. With this construction the sleeve 76 is yieldingly held in position longitudinally of the shaft but the sleeve may be moved in either direction against the tension of the spring 88 to engage the clutch or to engage the brake.

As above stated, the sleeve 76 is mounted to rotate with the shaft 2 and to this end is secured to the sleeve 62 which is keyed to said shaft. In order to furnish a reliable driving action between the sleeve 76 and the sleeve 62 the sleeve 76 is formed with radially projecting shoulders 96 which engage corresponding shoulders 98 on the sleeve 62 as shown in Fig. 7.

When the stopping mechanism is rendered operative the sleeve 76 is shifted in one direction longitudinally of the shaft 2 at a definite point in the cycle of operations to engage the slow speed clutch, which first acts as a brake to slow down the speed of the shaft to the speed of the driving member of the clutch, and then drives the shaft forward at slow speed to stopping position. The sleeve 76 is shifted in the opposite direction to disengage the clutch and engage the brake to stop the shaft at either of two predetermined points in the rotation of the shaft, so that the machine may be stopped at either of two definite points in a cycle of operations.

The mechanism for controlling the engagement of the slow speed clutch and the engagement of the brake comprises a cam groove 100 formed in the sleeve 76 in which engages a cam roll 102 mounted at the end of the arm 104 of a bell crank lever which is pivoted upon the vertical shaft 106. The other arm 108 of the bell crank lever is formed with a recess 110 arranged to receive the upper end of a locking bolt 112 mounted to slide vertically in the rear end of a lock bolt carrier 114 having a cylindrical shank 116 which is arranged to slide horizontally in a suitable guide in the frame of the machine. A rod 118 having a head 120 passes through a perforation in a web 122 at the end of the guide bore in which the shank 116 of the lock bolt carrier is mounted and the lock bolt carrier is yieldingly held in its normal position in the frame by means of a spring 124 coiled about the rod 118 and engaging at one end the end of a chamber in the lock bolt carrier in which it is seated and at the other a collar 126 on the rod 118. The forward movement of the lock bolt carrier under the influence of the spring 124 is limited by the engagement of a lug 128 projecting upwardly from the carrier with an adjustable abutment screw 130 mounted in the frame of the machine.

During the normal operation of the machine the lock bolt is held down out of engagement with the recess 110 in the arm 108 of the bell crank lever so that the lever is normally oscillated idly by the cam. When the lock bolt is moved upwardly to engage the upper end thereof with the recess 110 in the arm of the bell crank lever, the bell crank lever is locked to the lock bolt carrier, and through the co-operative action of the cam groove 100 and the cam roll 102 the sleeve 76 is shifted longitudinally of the shaft 2 to engage and disengage the slow speed clutch.

The lock bolt 112 is mounted to slide vertically in the rear end of the lock bolt carrier and is moved upwardly to engage its upper end with the recess 110 in the arm 108 of the bell crank lever by means of a coiled spring 132. The lock bolt is held down during the normal operation of the machine through a connection with the treadle and is released and moved upwardly by the spring when the treadle is released to disconnect the main shaft of the machine from the main driving mechanism. In the illustrated construction a block 134 is fixed to the lower end of the lock bolt and carries a shaft 136 on which is pivoted a latch 138 arranged to engage beneath the shoulder 140 upon the rear end of the lock bolt carrier. An arm 142 is pivoted upon the shaft 136 and is provided with a hub having a recess 144 in which engages a projection 146 upon the hub of the arm 138. The recess 144 is somewhat

wider than the projection 146 so that there is considerable lost motion between the arm 142 and the latch 138. The arm 142 is pivotally connected by means of a pin or bolt 148 with the upper end of a rod 150 which at its lower end is connected with the yoke 26. When the treadle is depressed to start the machine the end of the latch 138 brings up against the outer face of the shoulder 140 and slides downwardly along said face until the locking pin is released from the recess in the arm of the bell crank lever when the latch 138 snaps in beneath the shoulder 140. When the treadle is released the arm 142 swings upwardly some distance before the latch 138 is disengaged from beneath the shoulder 140 and the locking pin thereby released so as to insure that the main driving mechanism shall be disconnected from the machine before the locking pin is moved upwardly into engagement with the recess 110 in the arm 108 of the bell crank lever.

The machine is illustrated in the drawings with the parts in the positions which they assume when the machine has been stopped by the stopping devices at a point in a cycle of operations when the needle and awl are out of the work and the presser-foot is normally in work engaging position. The stopping mechanism is arranged to stop the machine at this point in a cycle of operations, or at a point about 70° later in a cycle of operations when the awl is in the work and the presser-foot is lifted.

Fig. 9 shows the formation of the cam groove 100 as constructed in the present embodiment of the invention. As will be noted from an inspection of this figure the cam groove is formed with a portion 152 substantially parallel with the plane of rotation of the sleeve 76 and located adjacent the right hand end of the sleeve looking from the front of the machine. Leading from the portion 152 of the groove is an incline 154 which connects the portion 152 of the cam groove with the portion 156 thereof. The portion 156 of the cam groove also is formed substantially parallel with the plane of rotation of the sleeve 76, but is located adjacent the left hand end of the sleeve. From the portion 156 of the cam groove extends a relatively short incline 158 the direction of inclination of which is opposite to that of the incline 154 and which leads into a position 160 of the groove formed parallel with the plane of rotation of the sleeve. The portion 160 of the groove is connected with the portion 152 thereof by a second relatively short incline 162 similar to the incline 158. The locking pin is engaged with the recess in the arm 108 of the bell crank lever at a point in the rotation of the shaft 2 while the roll 102 is passing through the portion 152 of the cam groove 100. When the bell crank lever is locked to the lock bolt carrier by the lock bolt and the roll 102 arrives at the incline 154 in the cam groove 100, the sleeve 76 is moved longitudinally of the shaft 2 to engage the slow speed clutch and the clutch remains engaged while the roll 102 is passing through the portion 156 of the cam groove. During this period of engagement of the clutch the shaft 2 is slowed down to the speed of the driving member of the clutch and is then driven forward at slow speed by the driving member. The sleeve 76 is moved in the opposite direction longitudinally of the shaft to disengage the slow speed clutch and engage the brake while the roll 102 is passing from the portion 156 to the portion 152 of the cam groove.

When the cam roll 102 is passing through the incline 154 in the cam groove 100, the sleeve 76 is moved longitudinally of the shaft 2 to engage the members of the slow speed clutch during the first part of the movement of the roll through the incline, and then during the remainder of the movement of the roll through the incline the bell crank 104–108 is swung on its pivot, moving the lock bolt carrier toward the rear of the machine against the tension of the spring 124. To enable the sleeve 76 to be shifted in the opposite direction a distance sufficient to disengage the slow speed clutch and engage the brake at some point during the passage of the roll 102 from the portion 156 of the cam groove to the portion 152 thereof, devices are provided for preventing the return of the lock bolt carrier to its initial or normal position while the roll 102 is passing from the portion 156 of the cam groove to the portion 152. The inclines 158 and 162 in the cam groove 100 are arranged at definite points in the periphery of the sleeve 76, and the devices for preventing the return of the lock bolt carrier to its initial position are arranged to stop the lock bolt carrier in substantially its rearmost position, or in a position intermediate its rearmost and its initial position, so as to render either of the inclines 158 and 162 alternatively effective to shift the sleeve 76 to disengage the slow speed clutch and engage the brake to stop the machine in either of two definite positions. The devices for preventing the return of the lock bolt carrier consists of the latches or pawls 166 and 168 pivoted side by side upon the stud 170 and arranged to engage the head of an abutment or contact stud 172 adjustably mounted in the lock bolt carrier. It will be noted from an inspection of Fig. 5 that the pawl 166 is considerably longer than the pawl 168. These pawls are arranged to be rendered operative alternatively to control the point in a cycle of operation at which the machine is stopped, as will be presently described. During the

normal operation of the machine the pawls are swung downwardly from the position in which they are shown in the drawings, their left-hand ends (Fig. 5) resting beneath a portion of the lock bolt carrier below the contact stud 172. When, after the stopping mechanism has been thrown into operation, the lock bolt carrier is moved toward the rear of the machine by the action of the incline 154 on the roll 102 subsequent to the engagement of the slow speed clutch, one or both of the pawls are swung upwardly into operating position in front of the contact stud 172. The pawl 166 is provided with a laterally extending stud 180 which rests in a recess 182 in the lower side of the pawl 168, and is engaged by the rearwardly projecting end of a spring 184 coiled about the stud 170, the other end of which is engaged beneath a portion of the frame, this spring tending to swing the long pawl upwardly into operating position. This construction enables the long pawl to be controlled by the short pawl and allow the short pawl to be swung upwardly into operating position independently of the long pawl. The short pawl 168 is connected with the rod 150 by a link 186 having a slot 188 in which engages the pin or bolt 148 which connects the rod 150 with the arm 142. This connection between the link 186 and the rod 150 allows the rod to move upwardly to release the locking pin while the pawls lie beneath the lock bolt carrier. The short pawl is swung upwardly into operating position by means of a tension spring 190 attached at one end to the pin 148 and at the other to an extension on the link 186. When the treadle is depressed to start the machine, both pawls are swung downwardly from the positions in which they are shown in the drawings through their connection with the rod 150, and the lock bolt carrier is then moved forwardly to its normal position by the spring 124. When the machine is to be stopped at a point in a cycle of operations when the needle and awl are both out of the work and the presser-foot is in work engaging position, both pawls are allowed to rise in front of the stud 172 upon the rearward movement of the lock bolt carrier. The carrier, however, is caught by the long pawl 166, the end of which projects some distance to the rear of the short pawl. The long pawl is preferably constructed to stop the lock bolt carrier in substantially its rearmost position. When the long pawl is acting to hold the lock bolt carrier from forward movement in the frame, and the roll 102 engages the incline 158 in the cam groove 100, the sleeve 76 is shifted on the shaft 2 to disengage the slow speed clutch and engage the brake to stop the machine. The parts are arranged and timed so that the roll 102 engages the incline 158 just before the machine arrives at stopping position with the needle and awl out of the work, and that the machine is stopped preferably just after the roll 102 reaches the portion 160 of the cam groove when the machine has arrived at the desired point in the cycle. When the machine is to be stopped at a point in a cycle of operations when the awl is in the work and the presser-foot is lifted, the long pawl is held down out of operative position upon the rearward movement of the lock bolt carrier. When the long pawl is inoperative, the lock bolt carrier is caught by the short pawl after it has moved forward some distance from its normal position. The short pawl is arranged to stop the forward movement of the lock bolt carrier after said carrier has moved forwardly during the passage of the roll 102 through the incline 158 of the cam groove 100, but before the roll arrives at the incline 162 in said groove. When the short pawl only is operative, the incline 158 in the cam groove 100 will therefore not be effective to shift the sleeve 76 to disengage the slow speed clutch and engage the brake. During the passage of the roll 102 through the incline 162 in the cam groove, the lock bolt carrier then being held by the short pawl from further forward movement, the sleeve 76 will be shifted to disengage the slow speed clutch and engage the brake to stop the machine. The parts are timed so that the roll 102 engages the incline in the cam groove 100 just before the machine arrives at stopping position at a point in a cycle of operations when the awl is in the work and the presser-foot is lifted, and the machine is stopped preferably just after the roll 102 reaches the portion 152 of the cam groove, which occurs when the machine has arrived at the desired point in the cycle.

The long pawl is provided with a forwardly projecting lug or tail 192, and is prevented from rising into operative position when the machine is to be stopped at a point in a cycle of operations when the awl is in the work and the presser-foot is lifted, by the engagement of the sector-shaped projection 194 formed on a shaft 196 mounted in a bearing 198 in the frame with the under side of the tail 192. The shaft 196 is provided with a handle 200 by which the shaft may be turned in its bearings to adjust the sector-shaped projection 194 in different positions. When the machine is to be stopped at a point in a cycle of operations when the needle and awl are out of the work and the presser-foot is in work engaging position, the handle 200 is adjusted in a horizontal position, as shown in the drawings. This adjustment of the shaft 196 locates the sector-shaped projection 194 in the position shown in Fig. 8, so that it does not interfere with the rising of the long pawl into operat-

ing position when the stopping mechanism is thrown into operation. With this adjustment of the sector-shaped projection 194, both pawls swing upwardly together when, after the stopping mechanism is thrown into operation, the lock bolt carrier moves toward the rear. The lock bolt carrier is stopped, however, by the long pawl in substantially its rearmost position, and the sleeve 76 is shifted on the shaft 2 to disengage the slow speed clutch and engage the brake to stop the machine at the desired point in the cycle. When the machine is to be stopped at a point in the cycle of operations when the awl is in the work and the presser-foot is lifted, the handle 200 is swung downwardly substantially 45° from the position shown in Fig. 5 to that shown in Fig. 10. This adjustment of the handle 200 locates the sector-shaped projection 194 in a position such that its right-hand face (Fig. 8) lies substantially in a horizontal plane. When the projection is thus adjusted, and the stopping mechanism is thrown into operation, the long pawl is prevented from rising when the lock bolt carrier is moved to the rear by the engagement of the tail 192 of the pawl with the projection 194, and the short pawl rises alone into operating position in front of the abutment stud 172. The lock bolt carrier is then stopped by the short pawl in its intermediate position, and the sleeve 76 is shifted upon the shaft 2 to disengage the slow speed clutch and engage the brake to stop the machine at the desired point in the cycle with the awl in the work and the presser foot lifted.

To hold the shaft 196 securely in the position in which it is adjusted by the operator, a plunger 202 mounted to slide in guides in the frame, and actuated by a compression spring 204 is arranged to engage either of the flat faces 206 and 208 formed on a flange projecting from the shaft 196.

Having explained the nature and object of the invention, and having specifically described a machine embodying the same in its preferred form, what is claimed is:—

1. A stopping mechanism, having, in combination, devices for stopping a machine at either of two predetermined points in a cycle of operations, and means for setting the stopping devices while the machine is running so that when thrown into operation they will act to stop the machine at the desired point in a cycle.

2. A driving and stopping mechanism, having, in combination, a shaft, high speed driving mechanism therefor, means for reducing the speed of the shaft and for driving it at slow speed to stopping position, stopping devices for stopping the shaft while it is rotating at slow speed under the influence of the slow speed driving mechanism in either of two predetermined positions of the shaft, and means for controlling the action of the stopping devices.

3. A driving and stopping mechanism, having, in combination, a shaft, high and low speed driving mechanism therefor, means for disconnecting the shaft from the high speed mechanism and connecting it with the low speed mechanism, stopping devices arranged to stop the rotation of the shaft while it is rotating under the influence of the low speed mechanism in either of two predetermined positions of the shaft, and means for controlling the action of said devices.

4. A driving and stopping mechanism, having, in combination, a shaft, high speed driving mechanism therefor, a slow speed driving clutch comprising driving and driven members, a sleeve upon which the driven member of the clutch is mounted, a brake member mounted on said sleeve, a brake shoe, means for disconnecting the shaft from the high speed driving mechanism and shifting the sleeve in one direction to engage the slow speed clutch, and means for shifting the sleeve in the opposite direction to disengage the slow speed clutch and engage the brake.

5. A driving and stopping mechanism, having, in combination, a shaft, a driving clutch member, a driven clutch member, a sleeve upon which the driven member of the clutch is mounted, a brake member mounted on the sleeve, a brake shoe, a timing cam and mechanism cooperating therewith to cause the shifting of the sleeve to engage the clutch and to disengage the clutch and engage the brake at predetermined points in the rotation of the shaft.

6. A driving and stopping mechanism, having, in combination, a shaft, high speed driving mechanism therefor, a slow speed driving clutch comprising driving and driven members, a sleeve upon which the driven member of the clutch is mounted, a brake member mounted on the sleeve, a brake shoe, means including a timing cam for shifting the sleeve to engage the slow speed clutch upon disconnecting the shaft from the high speed driving mechanism and to disengage the slow speed clutch and engage the brake to stop the machine.

7. A driving and stopping mechanism, having, in combination, a shaft, driving mechanism therefor, devices including a timing cam to disengage the shaft from the driving mechanism and to stop the rotation thereof with the shaft in either of two predetermined positions, and means for controlling said devices.

8. A driving and stopping mechanism, having, in combination, a shaft, driving mechanism therefor, devices including two cams for disconnecting the shaft from the driving mechanism and stopping its rotation at either of two predetermined points, and

means for rendering either of said cams effective.

9. A stopping mechanism, having, in combination, a shaft, devices for stopping the shaft arranged to stop the shaft at either of two predetermined points, means for slowing down the shaft to a predetermined speed before it is stopped at either of said points, and means for controlling the stopping devices.

10. A stopping mechanism, having, in combination, devices for stopping a machine at either of two predetermined points in a cycle of operations, and means for reducing the speed of the machine to a predetermined speed before the stopping devices are rendered active.

11. A stopping mechanism having, in combination, devices for stopping a machine at either of two predetermined points in a cycle of operations, and means for setting the stopping devices either while the machine is running or while it is at rest so that when thrown into operation they will act to stop the machine at the desired point in a cycle.

12. A driving and stopping mechanism having, in combination, a shaft, driving mechanism for the shaft, means for disconnecting the driving mechanism from the shaft, devices for stopping positively the rotation of the shaft upon the disconnection of the driving mechanism therefrom with the shaft in any one of two or more definite positions, and means for setting said devices so that when thrown into operation they will act to stop the rotation of the shaft with the shaft in a predetermined one of said positions.

13. A driving and stopping mechanism having, in combination, a shaft, driving mechanism therefor, means for disconnecting the driving mechanism from the shaft, mechanism for reducing the speed of the shaft after the disconnection of the driving mechanism therefrom, stopping devices for finally bringing the shaft to rest in either of two predetermined positions, and means for controlling the action of the stopping devices.

14. A driving and stopping mechanism having, in combination, a shaft, driving mechanism for the shaft, means for disconnecting the driving mechanism from the shaft, devices for stopping positively the shaft at either of two predetermined points in a rotation of the shaft upon the disconnection of the driving mechanism from the shaft, and mechanism for rendering said devices inactive until the speed of the machine has been reduced to a predetermined speed, and for then throwing said devices into operation.

15. A driving and stopping mechanism having, in combination, a shaft, driving mechanism for the shaft, means for disconnecting the driving mechanism from the shaft, means for stopping the shaft when the driving mechanism is thrown out comprising a normally inactive cam, a lever normally oscillated idly by the cam, a lock bolt carrier, a lock bolt for locking the carrier to the lever and causing the carrier to be actuated first in one direction and then in the reverse direction by the lever, a pawl engaged by the lock bolt carrier during its reverse movement, and means rendered active by the engagement of the pawl with the carrier for stopping the rotation of the shaft.

16. A driving and stopping mechanism having, in combination, a shaft, a sleeve mounted on the shaft, a driving clutch member, a cooperating driven clutch member carried by the sleeve, a cam carried by the sleeve, a lever normally oscillated idly by the cam, a lock bolt carrier, a lock bolt operating to lock the carrier to the lever, thereby rendering the cam active to shift the sleeve to disengage the driven clutch member from the driving clutch member and also causing the carrier to be moved first in one direction and then in the reverse direction by the lever, a pawl engaged by the carrier during its reverse movement, a brake, and mechanism rendered operative by the engagement of the pawl with the carrier for engaging the brake.

17. A driving and stopping mechanism having, in combination, a shaft, a sleeve mounted on the shaft, a clutch comprising a driving clutch member, a cooperating driven clutch member mounted on the sleeve, a brake comprising a brake member carried by the sleeve, a fixed brake shoe, and means for shifting the sleeve to disengage the clutch and engage the brake comprising a cam carried by the sleeve, a lever normally oscillated idly by the cam, a lock bolt carrier, a lock bolt operating to lock the carrier to the lever and causing the carrier to be shifted first in one direction and then in the reverse direction by the lever, and a pawl for stopping the reverse movement of the carrier before it reaches its initial position, thereby rendering the cam active to shift the sleeve in a direction to disengage the clutch and engage the brake.

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