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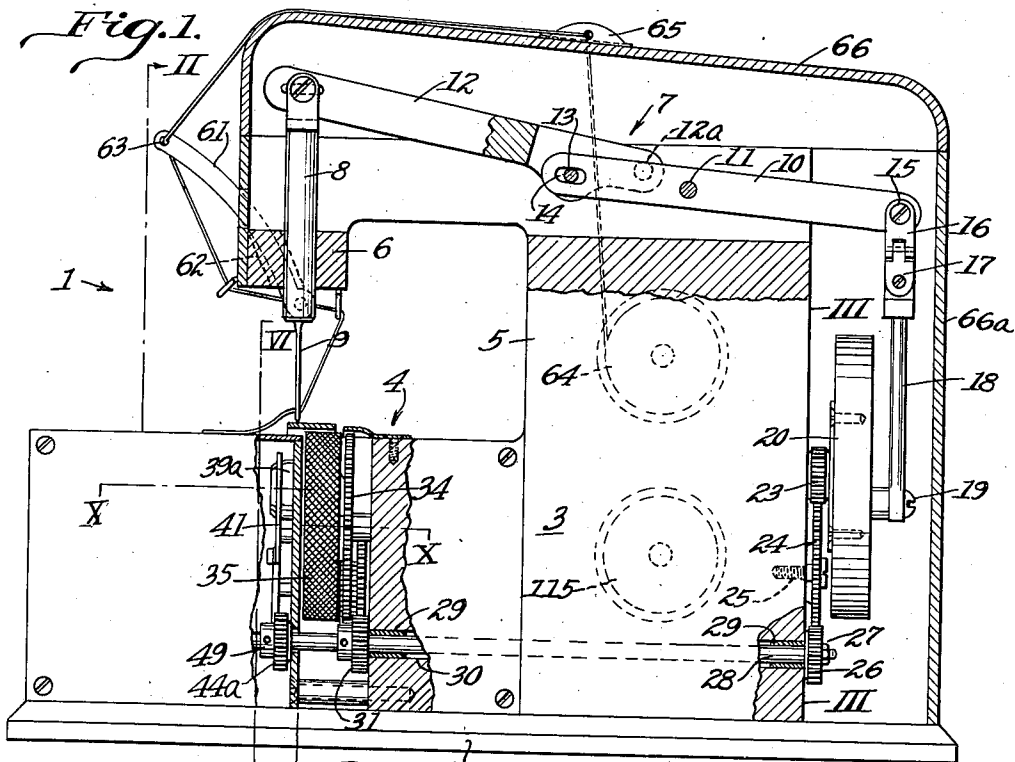
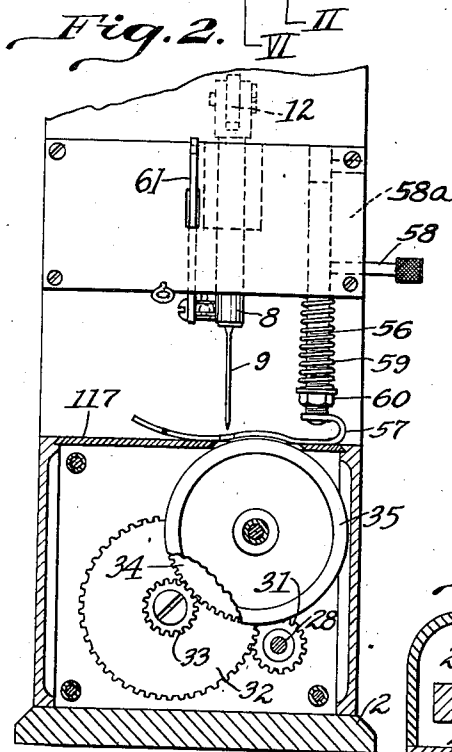
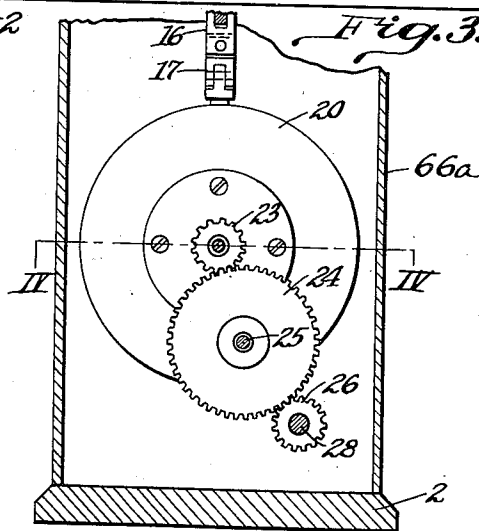
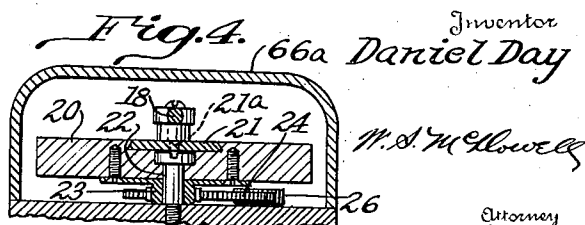
D. DAY

2,225,370

AUTOMATIC SEWING MACHINE

Filed July 29, 1937

5 Sheets-Sheet 1



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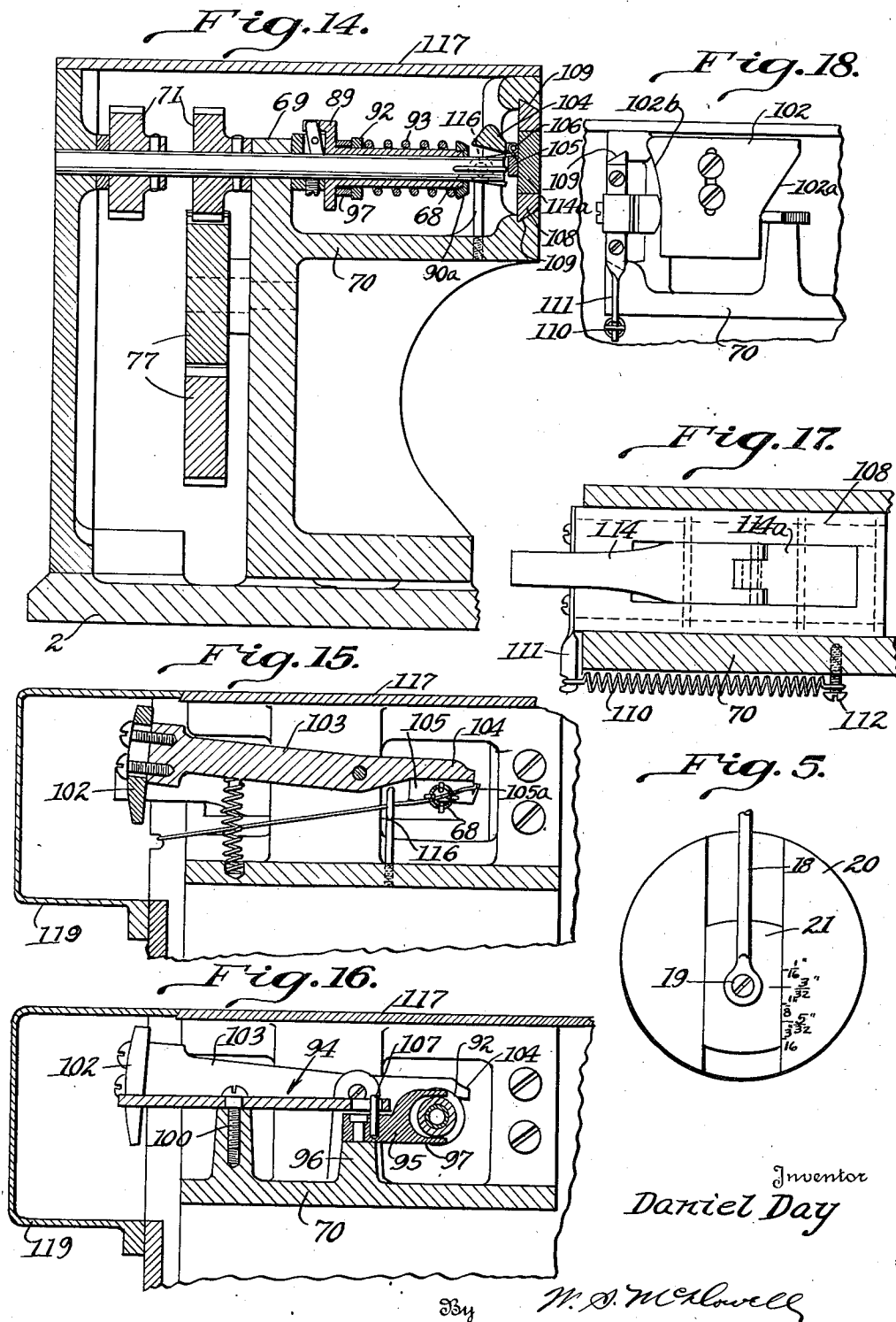
D. DAY

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AUTOMATIC SEWING MACHINE

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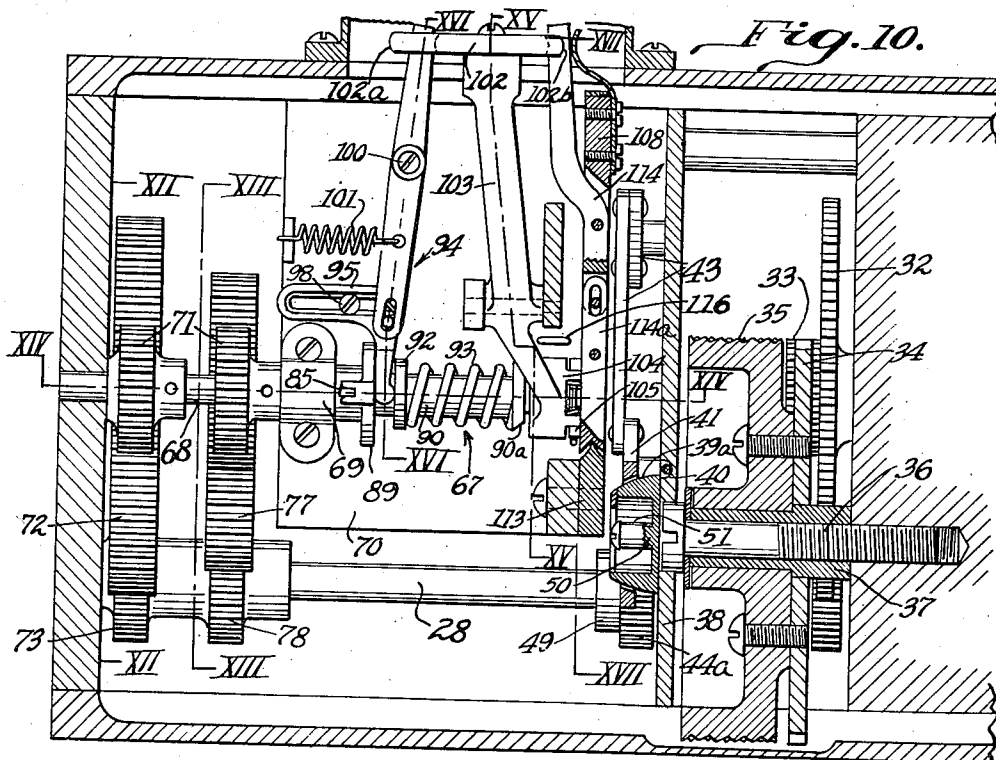
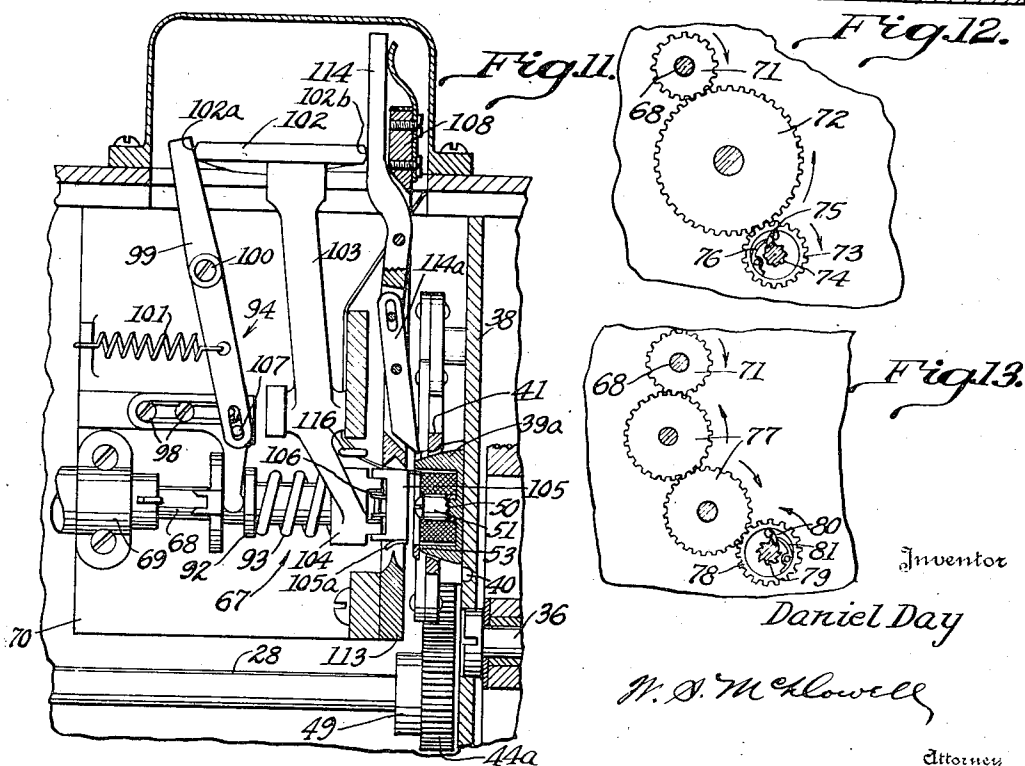
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AUTOMATIC SEWING MACHINE

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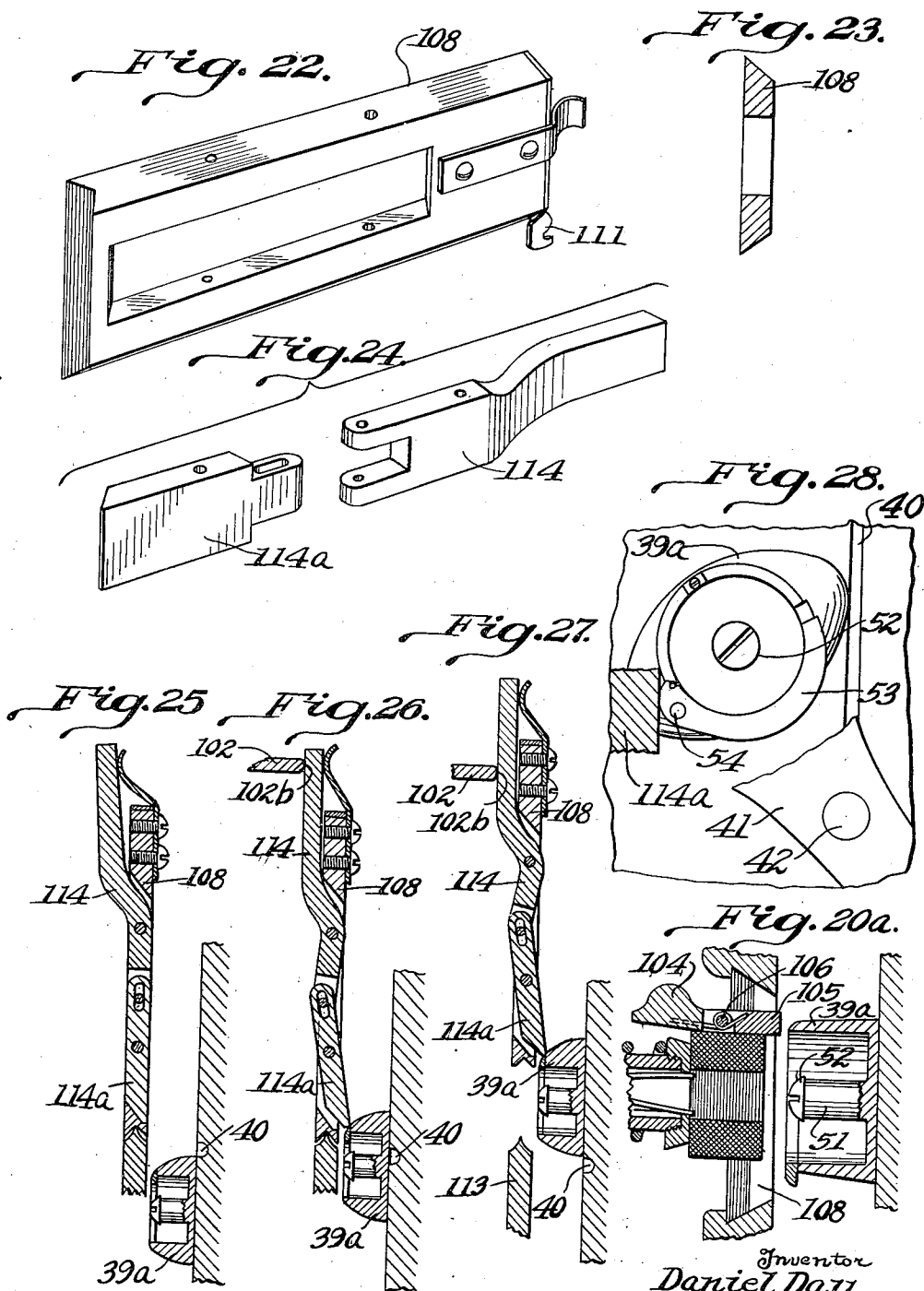
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AUTOMATIC SEWING MACHINE

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2,225,370

AUTOMATIC SEWING MACHINE

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Application July 29, 1937, Serial No. 156,379

8 Claims. (Cl. 112—186)

This invention relates to sewing machines and is particularly directed to improvements in automatic sewing machines of the type shown in my copending application Serial No. 74,039 filed April 13, 1936, of which this application is a continuation-in-part.

The primary object of this invention resides in the provision of an automatic sewing machine which can be operated by relatively unskilled labor and will yet produce neat and efficient work.

It is also an object of the invention to provide a sewing machine which will perform accurate sewing operations regardless of the direction of movement of the work through the machine. A shuttle and drive mechanism is provided with mechanism to time the operation thereof upon the reversal of direction of movement of the work.

It is a further object to provide a sewing machine having means to automatically wind and insert new bobbins in the shuttle whereby the length of a continuous sewing operation will be limited only by the size of the original spool of thread.

It is also an object of the invention to provide a drive mechanism for the bobbin winding and replenishing device which will operate continuously regardless of the direction of movement of the goods or work through the machine.

Another object of the invention rests in the provision of means to control the size of the stitches made by the machine and means to indicate the size of the stitches to be made.

With these and other objects in view, the invention resides in the combination of elements and their arrangement as will be more particularly pointed out in the following description and the accompanying drawings, in which:

Fig. 1 is a side elevation of a sewing machine formed in accordance with the present invention, parts being broken away to show the internal mechanism;

Fig. 2 is a vertical transverse sectional view taken on the line II—II of Fig. 1 and shows the work engaging wheel and train of gears used to transmit driving power to the main shaft;

Fig. 3 is a similar view taken on a plane indicated by the line III—III of Fig. 1 and shows the fly or balance wheel and gear train connecting the same with the main shaft in rear elevation;

Fig. 4 is a horizontal sectional view taken on the line IV—IV of Fig. 3;

Fig. 5 is a front elevation of the fly or balance

wheel with pitman which transmits power to a walking beam employed in the machine;

Fig. 6 is a vertical transverse sectional view on the line VI—VI of Fig. 1 and shows a front elevation of the shuttle and the mechanism used to operate the same;

Fig. 7 is a detail sectional view taken on the plane indicated by the line VII—VII of Fig. 6;

Fig. 8 is a similar view on the plane indicated by the line VIII—VIII of Fig. 6;

Fig. 9 is a detail horizontal sectional view taken on the plane indicated by the line IX—IX of Fig. 6;

Fig. 10 is a horizontal sectional view of the forward end of the base of the machine, the plane of the section being indicated by the line X—X of Fig. 1. This section illustrates the bobbin winding and inserting mechanism.

Fig. 11 is a similar view illustrating the same mechanism at the precise instant a freshly wound bobbin has been positioned in the shuttle;

Fig. 12 is a vertical sectional view taken on the plane indicated by the line XII—XII of Fig. 10;

Fig. 13 is a similar view on the plane indicated by the line XIII—XIII of Fig. 10;

Fig. 14 is a vertical longitudinal sectional view on the line XIV—XIV of Fig. 10;

Fig. 15 is a vertical transverse sectional view on the plane indicated by the line XV—XV of Fig. 10;

Fig. 16 is a similar view on the plane indicated by the line XVI—XVI of Fig. 10;

Fig. 17 is also a similar view taken on the plane indicated by the line XVII—XVII of Fig. 10;

Fig. 18 is a front elevational view of an adjustable wedge-shaped timing plate forming a part of the bobbin inserting mechanism;

Fig. 19 is an enlarged detail longitudinal sectional view of the bobbin winding mandrel together with associated mechanism;

Fig. 20 is a similar view of the same mechanism with a fully wound bobbin thereon.

Fig. 20a is a detail vertical longitudinal sectional view of the front end of the winding mandrel and shows the thread retaining gate member after it has been moved to an open position by a fully wound coil of thread in the act of passing from the mandrel to the shuttle.

Fig. 21 is a detail sectional view taken on the plane indicated by the line XXI—XXI of Fig. 7 and showing mechanism for producing tension on the bobbin thread.

Fig. 22 is a perspective view of a slidably

mounted member used to sever a coil of thread from its source of supply.

Fig. 23 is a vertical transverse sectional view taken through the member shown in Fig. 22.

Fig. 24 is a composite perspective view illustrating a pair of jackknife levers which are carried by the slidably mounted thread severing member and are used to transfer motion from the shuttle mechanism to the thread severing member.

Fig. 25 is a horizontal sectional view taken through the thread-severing member, the pair of jackknife levers carried thereby and the shuttle in their operative positions.

Fig. 26 is a view similar to Fig. 25 with the levers in position to transfer motion from the shuttle to the thread severing member.

Fig. 27 is also a similar view showing the thread severing member moved to a fully retracted position and the shuttle in position to receive a fresh coil of bobbin thread.

Fig. 28 is a front elevation of the shuttle in the same position as in Fig. 27, the bobbin cover plate on the shuttle being in an open position.

Referring more particularly to the drawings, the numeral 1 designates the entire machine forming the present invention. This machine is formed to include a base plate 2 on which is mounted a cast body frame 3 having a work supporting end 4 and an upright column 5 provided with an overhanging head 6 at its forward portion. The body frame is formed with a longitudinally extending slot in its upper portion to receive a walking beam 7 used to transfer motion from one part of the machine to another. The overhanging head 6 is formed to include a vertical bore in which is mounted for sliding movement a needle supporting bar 8 carrying the usual sewing machine needle 9 at its lower end. The upper end of the needle supporting bar is pivotally united with the forward end of the walking beam 7 which is made in two sections, namely, a primary section 10 pivoted intermediately of its ends as at 11, and, a secondary section 12 fulcrumed at one end as at 12a.

The forward end of the primary section 10 is connected with the intermediate portion of the secondary section 12 by means of a connecting pin 13. The rear portion of the secondary section 12 is bifurcated to receive the forward portion of the primary section 10. The opening in the primary section 10 to receive the connecting pin 13 is slotted as at 14 to compensate for relative movement between the two levers resulting from differences in the distances from the fulcrum points of the two levers to the connecting pin. The rear portion of the primary section is connected by means of a screw 15 to a clevis member 16 forming a part of a universal coupling 17 which is connected with the upper end of a pitman 18 used to transfer movement from a crank pin 19, eccentrically mounted on a flywheel 20, to the walking beam. The degree of eccentricity of the crank pin may be varied by moving a dovetail plate 21 in a similarly formed slot in the flywheel as shown in Fig. 4. The screw 21a used to secure the crank pin to the plate also serves to lock the dovetail plate 21 in its various positions of adjustment.

The flywheel 20 is rotatably carried by a shouldered screw 22 threaded into the rear portion of the body frame 3. Secured to the back of the flywheel is an enlarged flange forming a part of a pinion 23 which is in constant meshing engagement with an enlarged idler gear 24 secured to

the body frame by a screw 25. The idler gear 24 is arranged to mesh with a driving pinion 26 secured by means of a nut 27 to one end of a main shaft 28 rotatably supported by bearings 29 positioned in a longitudinally extending bore 30 formed in the lower portion of the body frame 3. At the forward portion of the body frame, as shown in Figs. 1 and 2, the main shaft carries a driving spur gear 31 in constant meshing engagement with an enlarged idler gear 32 fixed to a speed multiplying pinion 33 driven by a main driving gear 34 secured to one face of a knurled, work engaged driving wheel 35.

The wheel 35 is so positioned that a small chord thereof will project above the upper surface of the work supporting end of the machine and will be engaged by the work as it is moved through the machine during sewing operations. The work engaging wheel 35 is rotatably supported by a screw 36 about which is positioned a shouldered bearing bushing 37 (see Fig. 10). The headed end of the screw 36 is received within an opening formed in a partition wall 38 carried by the body frame and separating the chamber, in which the driving wheel is positioned, from the rest of the work supporting end of the frame 3. The partition wall 38 also forms the support for the shuttle mechanism 39. This mechanism, as shown in Figs. 6, 7 and 8, includes a shuttle 39a in which is formed a bore for the reception of the coiled bobbin thread. The partition wall is formed with a slot 40 to receive the needle on its downward stroke. The shuttle 39a is positioned for sliding movement against the side of the partition wall adjacent the slot 40 and is loosely held in this position by the shuttle supporting plate 41. The shuttle is somewhat oval in shape and the shuttle supporting plate is formed with an opening 41a similar in shape to prevent the shuttle from changing its position in relation to the needle slot 40.

To provide for reciprocatory movement on the part of the supporting plate and the shuttle, the plate is fulcrumed to the partition wall as at 42. The lower end of the plate is connected by means of a link and lever system 43 to a shuttle drive pinion 44 pivoted to the lower portion of the partition wall by a shouldered screw 45 shown in Fig. 9. One link 43a of the lever system 43 is connected with a crank pin 46 carried by the shuttle drive pinion 44. As the pinion 44 revolves, the crank pin 46 will move in a circular path and this movement will be transmitted by the system 43 to the shuttle support plate to cause the shuttle to move backward and forward across the needle slot. The pinion 44 is driven by a timing pinion 44a with which it is in constant engagement. The pinion 44a is keyed for rotation with the main shaft by means of the key 47 carried by the main shaft and extending into a key-way 48 formed in the pinion 44a. This key-way extends concentrically a portion of the distance about the bore formed to receive the main shaft as illustrated in Fig. 6. The purpose of this form of key-way will be set forth hereinafter. To prevent the timing pinion from moving longitudinally of the main shaft, the latter is provided adjacent the pinion with a retaining collar 49.

The bore in the shuttle is provided with a centering boss 50 about which is positioned a sleeve 51 held on the boss by means of a screw 52. This sleeve is provided for the purpose of reducing friction between the bobbin and the boss so that the thread will leave the bobbin case

more readily. To prevent the dislodgment of the bobbin, the shuttle is provided with a cover 53 pivoted to the shuttle as at 54 in Fig. 6. Adjacent the pivot 54, the shuttle is also provided with a needle type spring 55 which engages the cover and holds the same in a closed position. While the bobbin is being moved into the shuttle, the cover will be swung to an open position by means hereinafter described and after being positioned therein, the spring will move the cover to a position to prevent the bobbin from moving out.

With the mechanism thus far described, the sewing operation may be performed. For example, the work is moved across the work supporting end of the machine in engagement with the driving wheel. This will cause the driving wheel to rotate and by means of the train of gears, rotary movement will be imparted to the main shaft. This rotary movement will cause corresponding rotation of the flywheel and motion will be transmitted by means of the pitman from the flywheel to the walking beam and thence to the needle bar. Movement of the needle bar will cause the needle to be reciprocated vertically into and out of the slot in the partition wall. The particular jointed arrangement of the walking beam will provide multiplied or increased movement on the part of the needle bar with respect to the movement of the wrist pin on the flywheel. This arrangement is provided to give increased momentum to the needle in order that it will quickly move into and out of the work.

To prevent slippage between the work and the driving wheel, the overhanging head, as shown in Fig. 2, is provided with a second vertical bore to receive a presser foot supporting rod 56 which carries the presser foot 57 at its lower end and is provided with an operating pin 58 extending through a bayonet slot 58a formed in the overhanging head. As the operating pin is moved upwardly in the slot 58a, the presser foot will be raised against the action of a spring 59 which provides the force necessary to hold the work in secure engagement with the driving wheel. The force of the spring can be varied according to the needs by means of an adjusting nut 60 threadedly received on the supporting rod 56.

An arcuate arm 61 is secured at its lower end to the needle supporting bar and extends through a guide slot 62 formed in the overhanging head of the frame. As the needle bar moves up, the outer end of the arm will be moved away from the head to take up the slack in the thread. The outer end of the arm 61 is provided with an opening 63 through which the thread leading from a spool holder 64 is passed. Between the arm 61 and the spool holder 64, the thread passes through a thread guide 65 made adjustable to provide tension on the thread leading from the spool holder so that the needle loop may be drawn tight to lock the same about the bobbin thread.

After the needle has moved to its lowermost position and has started on its upward stroke, a loop will be formed in the thread and the shuttle will move through this loop to position the bobbin thread therein. The shuttle may also be provided with an adjustable thread tension device 65a, illustrated in Fig. 21, to provide the bobbin thread with a resisting force substantially equivalent to the tension applied by the adjustable guide 65 for the needle thread. The top of the body frame as well as the back portion are pro-

vided with cover members 66 and 66a to hide the working parts of the machine.

Adjacent the shuttle mechanism, the work supporting end of the machine is provided with a chamber in which is housed the bobbin winding and inserting mechanism 67. This mechanism, shown in detail in Figs. 10 and 11, includes a winding mandrel 68 rotatably supported by the frame of the machine and an intermediate bearing 69 formed on a bracket 70. The mandrel 68 is provided adjacent one end with twin pinions 71-71, one of which is in engagement with a large idler gear 72 which in turn engages a forward driving pinion 73. The pinion 73 is connected to the forward end of the main shaft by means of a ratchet and pawl 74 and 75, respectively (see Fig. 12). The pawl is resiliently held in engagement with the ratchet by means of a spring 76. This mechanism permits the main shaft to drive the pinion 73 when rotating in one direction only. As shown in Fig. 13, the other pinion 71, carried by the mandrel, engages with one of a pair of idler gears 77-77, identical in size, in order to introduce no variation in speed of rotation. The other of the pair of gears 77 is in engagement with a reverse driving pinion 78, also secured to the main shaft through the use of a ratchet and pawl 79 and 80, respectively.

The pawl 80 is held in engagement with the ratchet by means of a spring 81. This mechanism is similar to the pawl and ratchet mechanism above described but the ratchet is reversed in order that the gears will be driven when the main shaft rotates in the reverse direction which will be caused when the work is moved rearwardly through the machine. Two idler gears are provided in order that the reverse rotation of the main shaft will not be transmitted to the winding mandrel, but rather the latter will be rotated in the same direction as when rotated by the driving pinion 73. This arrangement is necessary to cause a continuous movement of the winding mandrel regardless of the direction of movement of the work through the machine.

The forward end of the mandrel is made tubular to receive pick-up wires 82, shown in Figs. 19 and 20, secured at their inner ends to a carrier block 83 slidably positioned in the mandrel. A wire 84 connects the carrier block with the inner end of a lever 85 pivoted as at 86 to a collar 87 non-rotatably secured to the mandrel. The lower end of the lever 85 is also connected to one end of a spring 88, the opposite end of the spring being connected to a pin 88a. The tension of the spring 88 serves to draw the carrier block and pick-up wires into the mandrel. This movement is counteracted by means of a flange 89 engaging the upper end of the lever 85.

The flange 89 is formed on a sleeve member 90 slidably positioned on the mandrel 68. This sleeve forms a part of the bobbin moving mechanism 91 and includes a ring 90a at its forward end. A second ring 92 is slidably carried by the sleeve and between these rings, there is positioned a coil spring 93 which serves to move the sleeve member longitudinally of the mandrel for the purpose of moving a bobbin, after it has been wound, into the bore of the shuttle.

The spring 93 is of the compression type and normally is in its extended state. To compress the spring to provide power necessary to move the sleeve, there is provided a spring compression mechanism 94, shown in Figs. 10, 11 and 16, which includes a slotted block 95 slidably mounted on a boss 96 formed in connection with

the bracket 70. The block 95 has formed therewith a fork member 97 which straddles the rear end of the sleeve between the flange and the ring 92. Screws 98 hold the block in place on the boss so that the latter may move in response to forces applied by a lever 99 pivoted about a vertically extending pin 100. A tension type spring 101 is provided to move the lever to its normal position.

10 To cause the lever to move in a direction to compress the spring 93, a wedge-shaped timing plate 102 (see Figs. 10, 11, 15 and 18) is carried by one end of a second pivoted lever 103. The opposite end of the lever 103 has rigidly secured thereto a rider plate 104 which is positioned in vertical registration with the portion of the mandrel used to wind the bobbin. To the forward edge of the rider plate, there is hinged a gate member 105 resiliently held in a closed position by a spring 106 illustrated in Figs. 19 and 20.

15 As the thread accumulates on the mandrel, the rider plate will be raised and the opposite end of its supporting lever will lower, bearing with it the wedge plate 102.

20 The inclined edge 102a of the wedge plate engages the outer end of the lever 99 and moves it in opposition to the spring 101. This motion imparts sliding movement to the block 95 through a pin 107 carried by the block and positioned in a slot in the lever 99. Movement of the block will compress the spring 93 between the ring members as shown in Fig. 20. When the gate 105 is released, the power of the compressed spring will cause movement of the sleeve which will in turn move the accumulation of bobbin thread longitudinally of the mandrel. At the instant the sleeve begins to move, the flange will be moved from engagement with the upper end of the lever 85 permitting the spring 88 to draw the pick-up wires into the end of the mandrel.

25 This movement will completely release the bobbin from the mandrel, permitting it to slide freely from its position on the mandrel toward the shuttle.

30 The gate member 105 is moved to an open position by the movement of the bobbin but is normally held in a closed position by an anvil member 108 which is slidably carried in the dovetail guides 109 formed in connection with the bracket 70. The movable anvil is normally held in the path of movement of the gate 105 by a spring 110 connected to the anvil through the use of a connecting plate 111 secured to the outer end of the anvil as shown in Fig. 17. The opposite end of the spring is connected to the bracket by means of a screw 112. The inner end of the anvil member engages a stationary hollow ground knife member 113 and when moved into engagement therewith by the action of the spring after the bobbin has moved into the shuttle, will sever the wound bobbin from its source of supply.

35 To move the anvil member against the action of the spring, the former is provided with a set of jack knife levers 114 and 114a shown in Figs. 10, 11 and 17. The lever 114 is provided with an elongated portion to engage the edge 102b of the timing plate. As the timing plate is moved downward, movement will be imparted to the lever 114 and through its connection with the lever 114a, the free end of the latter lever will be moved into the path of the shuttle. When the shuttle reaches the lever 114a, a protruding edge of the bobbin cover plate, above the pivot 54, will engage the lever and the hinged cover on the shuttle will be swung to an open position.

Continued movement of the shuttle will then move the anvil member 108 away from the stationary knife. When the anvil member has moved a required distance, the gate 105 will open in response to pressure of the spring 93 and release the wound bobbin. The compressed spring 93 will instantly move the bobbin from the winding mandrel into the opening provided therefor in the shuttle. When the bobbin is moved from its position on the mandrel, the rider plate will drop in response to force applied to the lever 103 by the spring 103a illustrated in Fig. 15. This movement will raise the timing plate and permit the spring compression lever to be drawn to a normal position by its tension spring. The sleeve on the mandrel will follow and be moved to its retracted position. The gate will then move to a closed position in response to the force of spring 106 out of the path of movement of the anvil.

When the timing plate is raised, the jack knife levers will also be released and this action will permit the anvil member to move in response to the spring connected with the outer end thereof. When the anvil engages the stationary knife, the thread leading to the bobbin will be severed. Due to the fact that the knife is hollow ground, a slight space between the V-shaped end of the anvil and the knife will be provided and the severed ends of the thread will be lightly held therein. As the next stitch is made by the machine, the needle loop will engage the end of the bobbin thread and grip the same, drawing it away from its position between the knife and the anvil.

The bobbin inserting operation is so timed, by adjusting the wedge-shaped timing plate relative to the lever 103, that a new bobbin will be inserted immediately prior to the withdrawal of the last bit of the previous bobbin thread. This will cause a splicing of the two bobbin threads and prevent the stitching from being ripped because of the lack of a bobbin thread. After the fresh bobbin has been moved into the shuttle, the bobbin winding mechanism will immediately commence to wind a fresh bobbin. The end of the thread leading from the spool 115 will be held by the anvil and, due to the position of a thread guide 116 (see Fig. 15), the thread will be positioned directly across the end of the winding mandrel. As the sleeve returns to its normal position, the flange on the rear end will engage the lever 85, causing an outward movement of the pick-up wires. As these wires straddle the thread, rotary movement on the part of the mandrel will cause the thread to be twisted around the pick-up wires and a new bobbin will thus be started. When this bobbin reaches a predetermined size, the above operations will be repeated.

When a new spool of bobbin thread is started, the free end of the thread is passed through an opening in the casing of the machine, through the guide 116 and across the end of the mandrel. The end is then slipped into a hook 105a, also shown in Fig. 15, carried by the side edge of the gate 105. If desired, the pick-up wires may be moved into the mandrel by pressing down on the lever which carries the rider plate. When this lever is released, the pick-up wires will move out to engage the thread. When the machine is started, the wires will twist the thread around the mandrel to start a new bobbin.

To perform this threading operation, access may be had to the winding mechanism chamber by moving rearwardly a cover 117 slidably car-

ried by the work supporting end of the machine. During the sewing operation, if it is desired to reverse the direction of movement of the work through the machine, this can be done without danger of tangling the threads. Due to the shape of the keyway in the timing pinion 44a, the shuttle will remain at rest until the needle loop is in the proper position to receive the shuttle thread. By changing the position of the shuttle drive pinion relative to the timing pinion, the movement of the shuttle relative to the needle loop can be regulated.

From the foregoing description and the accompanying drawings, it will be apparent that I have provided a sewing machine which will sew either forward or backward, and will automatically wind and insert new supplies of bobbin thread whenever necessary. This machine may be operated by relatively unskilled labor and will require a minimum amount of service and attention.

While I have shown and described the invention in but one of its many forms, it is my desire to include all variations thereof as may be said to fall fairly within the scope of the appended claims.

What is claimed is:

1. In a sewing machine, a rotatable main shaft, a shuttle mechanism comprising a partition wall provided with a slot to receive the needle of said machine, a carrier plate pivoted to said wall in registration with said slot, an oval-shaped shuttle member loosely held against said wall by said plate, a pinion rotatably mounted on said partition wall, a crank pin eccentrically mounted on said pinion, motion transmitting mechanism connecting said crank pin and said carrier plate, a second pinion in meshing engagement with said first pinion and mounted on said main shaft, said second pinion being formed with a keyway extending concentrically of said pinion a portion of the distance around the bore for said main shaft, and a key carried by said main shaft and extending into said keyway, the width of said key being less than that of the keyway to provide a predetermined amount of relative rotary movement between said main shaft and said second gear upon a change in direction of rotation of the former whereby the movement of the shuttle will be timed in relation to the movement of the needle.

2. In a sewing machine having a drive shaft and a reciprocating needle, a shuttle formed to receive a coiled thread, a pivoted carrier for loosely supporting said shuttle and moving the same in timed relation to said needle, a rotatable gear member, a crank extension provided on said gear member, motion transmitting mechanism connecting said carrier and said crank extension, a gear provided on said drive shaft in meshing engagement with said crank supporting gear, and means for securing said second-mentioned gear to said shaft, said means providing limited relative rotary movement between its said gear and shaft to vary the timing of said shuttle relative to said needle when the direction of rotation of said shaft is reversed.

3. In a sewing machine having a shuttle formed for the reception of a coil of thread, means for automatically winding and inserting a coil of thread in said shuttle, said means comprising a rotatable mandrel, driving means for said mandrel, a sleeve member surrounding said mandrel and slidable thereon, said sleeve member being provided with an annular flange, a ring

member slidably positioned on said sleeve, a coil spring disposed between said ring and said flange, lever means engaging said ring to move the same to compress said spring, gate means in registration with said mandrel and retaining the coil of thread thereon during the winding operation, means moved by said shuttle for effecting the release of said gate means and said coil of thread, and pivoted means actuated by the variation in size of the coil of thread for moving said spring compressing lever and controlling the actuation of said gate releasing means.

4. In a sewing machine having a rotatable drive shaft and a reciprocating needle, a shuttle formed for the reception of a wound coil of thread, means operated by said drive shaft for moving said shuttle in timed relation to said needle, means disposed between said drive shaft and said shuttle moving means for varying the time of movement of said shuttle with respect to said needle when the direction of rotation of the drive shaft is reversed, automatic means for winding and positioning a new coil of thread in said shuttle, said means including a winding mandrel substantially in registration with said shuttle, gear means connecting said mandrel and said drive shaft and operating to rotate the former in a single direction irrespective of the direction of rotation of said main shaft, a sleeve movable longitudinally on said mandrel, a flange formed on said sleeve, a ring slidably carried by said sleeve, a coil spring disposed between said flange and ring, lever means for moving said ring to compress said coil spring, gate means disposed in registration with said mandrel and operating to retain the coil of thread thereon during the winding operation, release means for said gate, said release means being operated by the shuttle, and movable means actuated by the variation in size of the coil of thread for moving said spring compressing lever and controlling the actuation of said gate releasing means.

5. In a sewing machine having a rotatable drive shaft and a reciprocating needle, a shuttle formed for the reception of a coil of thread, means operated by said drive shaft for moving said shuttle in timed relation to said needle, means operative upon change of direction of rotation of said drive shaft for varying the time of movement of said shuttle with respect to said needle, automatic means for winding and positioning a new coil of thread in said shuttle including a winding mandrel substantially in registration with said shuttle, means for moving the coil of thread from the mandrel into said shuttle, gate means between the mandrel and shuttle for retaining the coil of thread in position on said mandrel during the winding operation, and means engaged by the shuttle operated by the movement thereof for effecting the release of said gate means.

6. In a sewing machine having a shuttle formed for the reception of a coil of thread, automatic means for winding and positioning a coil of thread in said shuttle including a winding mandrel, means for moving the coil of thread from said mandrel to said shuttle, gate means between the shuttle and mandrel for retaining the coil of thread in position on said mandrel during the winding operation, spring-pressed slidable means positioned adjacent the shuttle and operated by the movement thereof for effecting the release of said gate means, and stationary knife means engaged by said slidable means on the latter's return to a normal position to sever

the coiled thread from the source of supply.

7. In a sewing machine having a main shaft, a shuttle mechanism comprising a supporting wall having a recess to receive the needle of said machine, a carrier plate movably supported by said wall, an oval-shaped shuttle member having an opening formed therein, said shuttle being loosely held against said wall by said plate, a crank pin movable backward and forward by said main shaft, motion transmitting mechanism connecting said crank pin with said carrier plate, means driven by said main shaft during sewing operations for winding a coil of thread and means driven by the main shaft during sewing operation for moving the coil of thread into the opening in said shuttle.

8. In a sewing machine having a shuttle formed with an opening therein, means provided

adjacent said shuttle for automatically winding and inserting a coil of thread in the opening therein, said means comprising a rotatable mandrel, means connected with and rotating said mandrel, a sleeve member slidably carried by said mandrel, resilient means for imparting sliding movement to said sleeve member, lever means for compressing said resilient means, gate means disposed between said mandrel and said shuttle for governing the release of the wound coil of thread, mechanism engaging said gate means for controlling the operation thereof, and pivoted lever means operated by the accumulation of thread on said mandrel to control the action of said compressing lever and said gate controlling means.

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