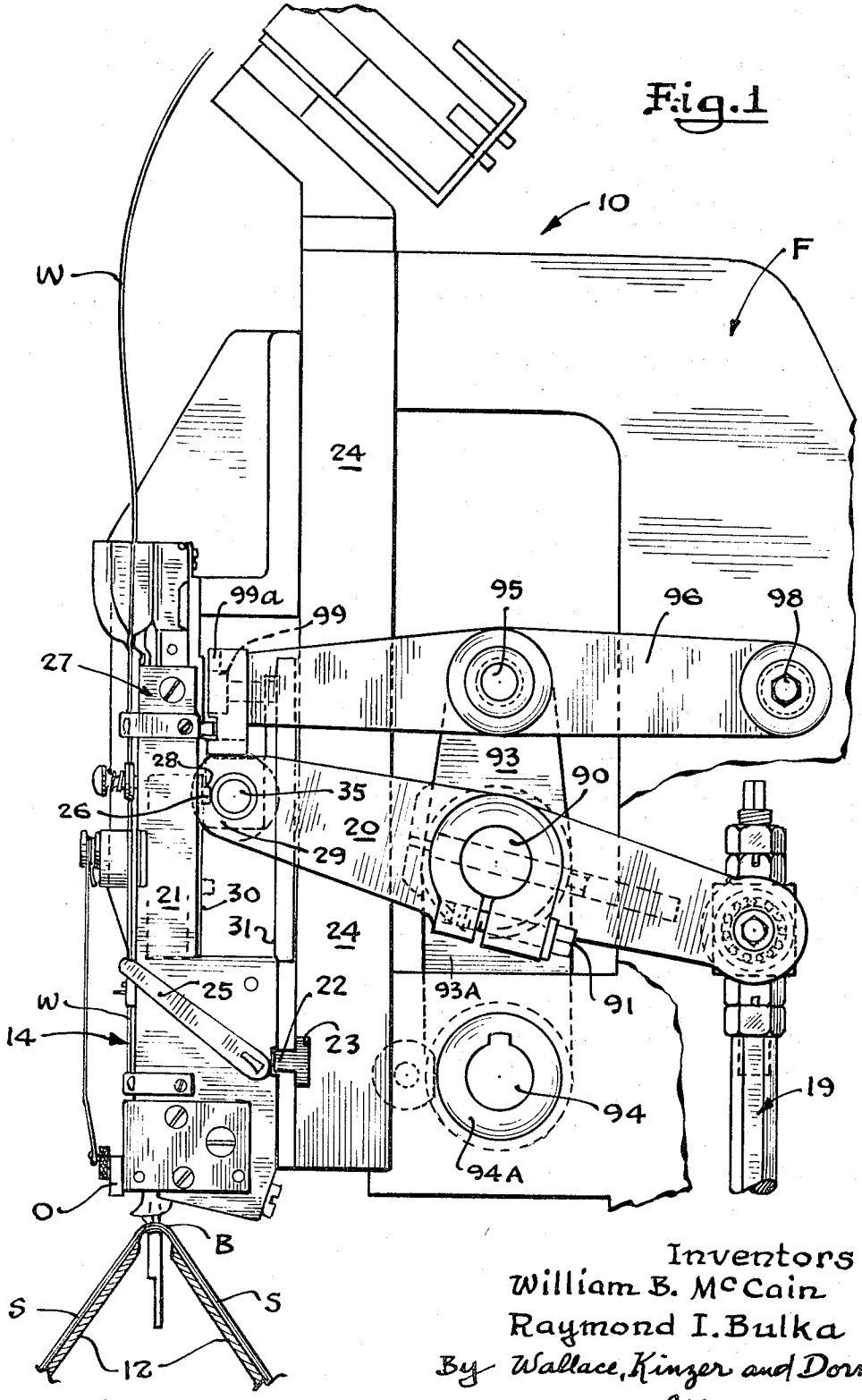
Feb. 21, 1967 W. B. McCAIN ETAL 3,305,154

SIGNATURE MACHINE

Filed May 24, 1965 4 Sheets-Sheet 1

Fig. 1



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SIGNATURE MACHINE

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Fig. 3

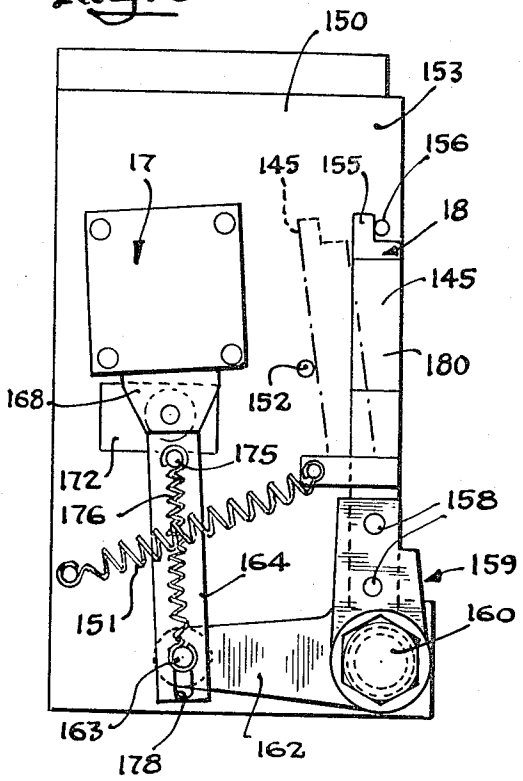


Fig. 2

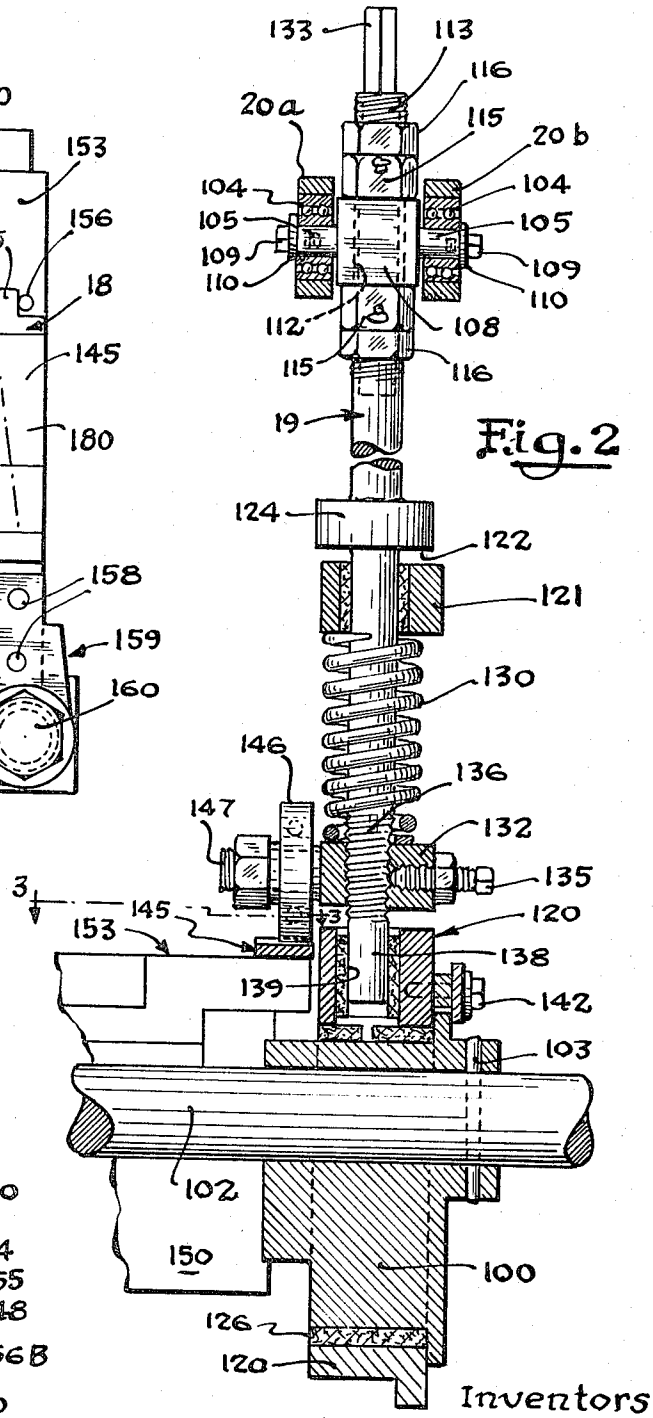
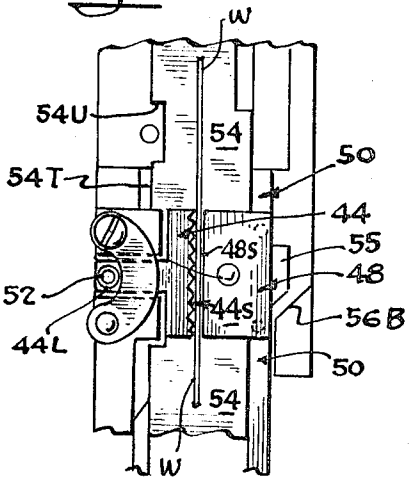


Fig. 8



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SIGNATURE MACHINE

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Fig.5

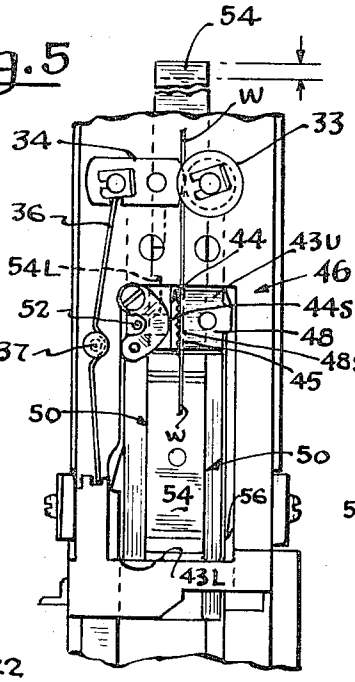


Fig.6

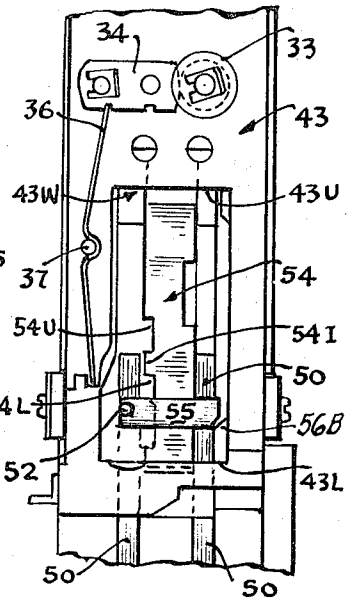


Fig.4

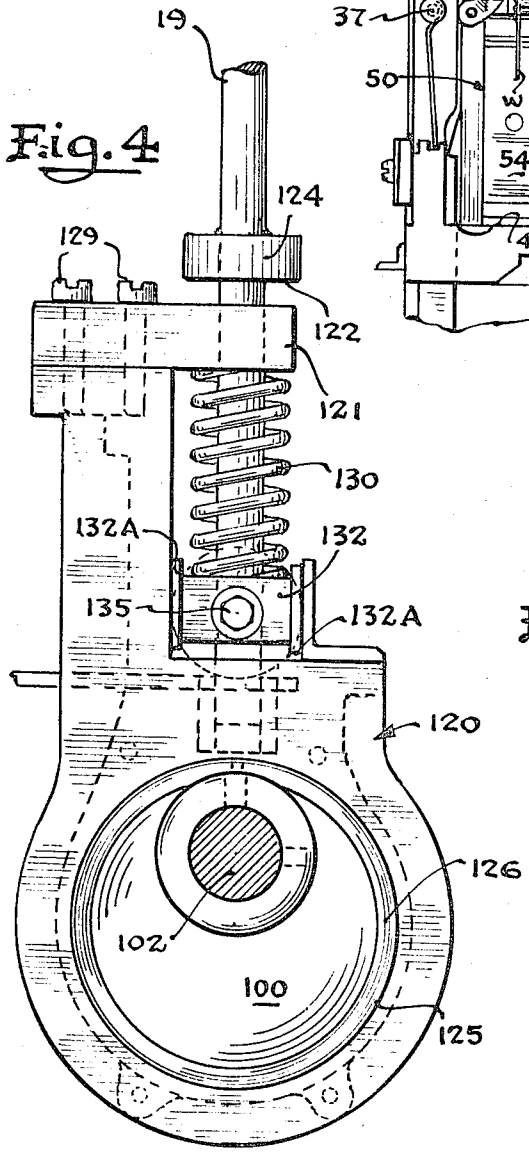
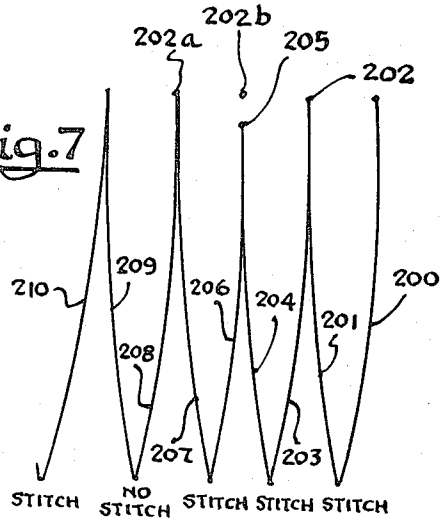


Fig.7



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SIGNATURE MACHINE

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Fig. 10

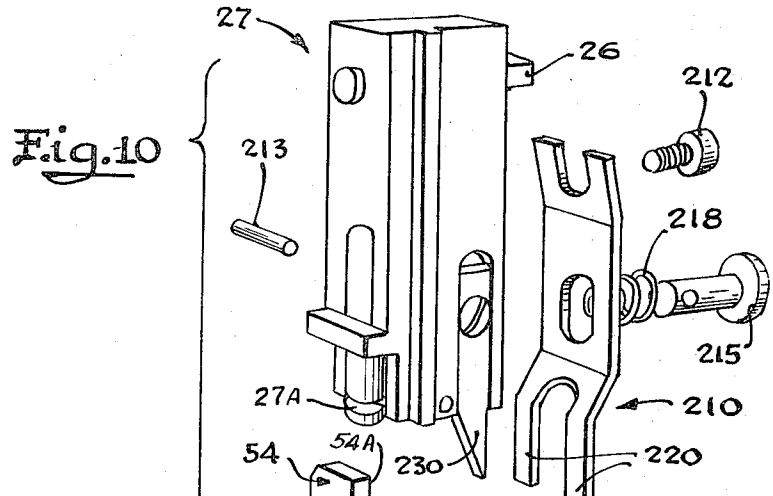
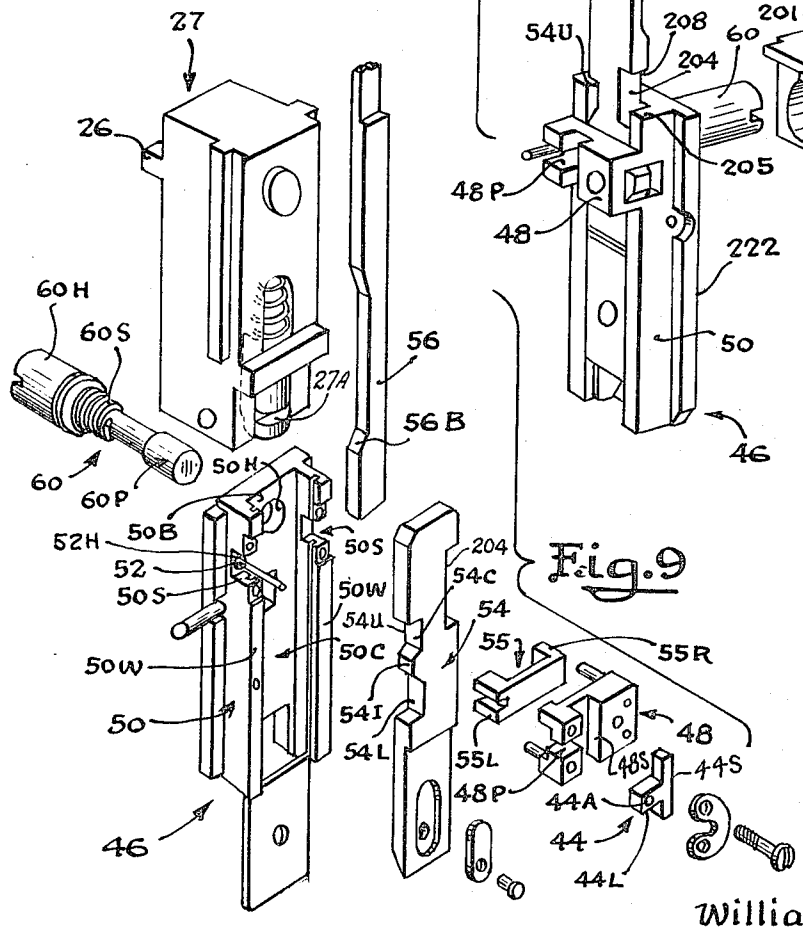


Fig. 9



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United States Patent Office 3,305,154 Patented Feb. 21, 1967

3,305,154

SIGNATURE MACHINE

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Filed May 24, 1965, Ser. No. 458,329
5 Claims. (Cl. 227—90)

This invention relates to a signature machine in which books are formed from individual juxtaposed signatures, and more particularly to apparatus for controlling the stitching or stapling operation of the signatures.

In a signature machine of the kind under consideration, individual signatures and folded forms are stapled at a stitching station to join the signatures to complete a book. Usually, it is not desired to stitch those groups of signatures departing from the correct measurements such as a too thick or a too thin group of signatures. Thus, it becomes necessary to prevent the forming and driving of the staple by the stitching head into the assembled signatures.

Heretofore, the preventing of a stitching operation was accomplished by operation of a clutch mechanism to disable the stitching head and wire staple feeding device from forming and driving the staple into the defective group of signatures. The stopping and starting of the driving and feeding mechanism in a wire stitching head, operating at high-speed, resulted in severe wear of the clutch mechanism and a high maintenance cost for the clutching mechanism. Also, the elements of the machine were subject to shock from the stopping of the momentum of the moving elements. The stopping operation was noisy. Accordingly, an object of the present invention is a new and improved apparatus for preventing a stitching operation of a defective book by limiting the stroke of the stitching head to keep the staple wire from being fed to form the staple necessary for securing the defective group of signatures.

Under a more specific object of the invention, the actuating means for the stitcher head is limited by an interposed member to limit the stroke of the stitcher head to thereby retain the wire clamping jaws of a wire fed mechanism in an open, non-clamping position during the following stroke of the stitching head.

Other objects of the invention are the elimination of a clutch operation to stop the drive for the stitcher head during the presence of a defective group of signatures; and preventing the forming of a staple by limiting that portion of the stroke of the stitcher head which closes the clamping jaws on the wire for the succeeding wire advancing stroke of the stitcher head. More specifically, under this object of the invention, an interposer member is selectively positioned to limit the stroke of the actuating means for the stitcher head and thereby the stroke of the stitcher head to prevent the clamping jaws from being moved to a wire clamping position so that during the next stroke the staple wire is not fed to form a staple.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

FIG. 1 is a perspective view of a stitching station of a signature machine according to the preferred embodiment of the invention;

FIG. 2 is a sectional view of an eccentric driving mechanism for a stitching head;

FIG. 3 is a plan view taken along the line 3—3 of FIG. 2 showing a solenoid and operating interposer for limiting the stroke of the driving mechanism of FIG. 2;

FIG. 4 is an enlarged side view showing the eccentric driving mechanism;

FIG. 5 is an enlarged front view of the wire feeding portion of a stitcher head;

FIG. 6 is a view of the wire grip closing mechanism of the stitcher head;

FIG. 7 is a diagrammatic illustration of a series of operating cycles of the wire feeding mechanism;

FIG. 8 is an enlarged front view of the gripper mechanism employed in the preferred embodiment of the invention;

FIG. 9 is an exploded view of the wire feeding portion of a stitcher head; and

FIG. 10 illustrates an improved wire feeding mechanism particularly adapted for use in the present invention.

Referring now to the drawings and more particularly to FIG. 1, there is illustrated the stitching station **10** of a signature machine of the general type which is fully disclosed in co-pending application Serial No. 245,322, filed December 17, 1962, now Patent No. 3,191,925. The stitching station **10**, illustrated in FIG. 1, is one of a plurality of stitching heads for forming staples and driving the staples into a plurality of gathered signatures S on a saddle **12** disposed beneath a stitching head **14**. The assembled group of signatures S have their backbones or folded signature portions B disposed immediately beneath the stitching head **14** at the stitching station **10** for receiving the staple formed from the wire W being fed downwardly through the stitching head **14**.

In the signature machine of the type disclosed in the aforesaid co-pending application, a plurality of groups of signatures S are advanced one by one along the saddle **12** and through the stitching station **10** and are stitched to complete a book or magazine unless the group of signatures is defective in some manner. For instance, the thickness of the group of signatures may be calipered at a prior station to determine whether or not each group of signatures has the correct thickness thereby assuring that each book being formed will have the correct number of sheets or signatures therein. When it is determined that the group of signatures is defective or improper, the stitching of the book is prevented. Heretofore, when it was desired to prevent the stitching operation, the driving mechanism for the stitcher head was unclutched, that is, disconnected from a driving mechanism by a clutch mechanism, to prevent the operation of the stitching head to drive the staple downwardly into the collected signatures in the stitching station **10**.

Since the stitcher head and driving mechanism have considerable mass and are operating at relatively high speeds, the starting and stopping of the driving mechanism and stitcher head cause considerable wear and tear on the clutch and is a noisy operation. The present invention is directed to the problem of preventing the stitching of the group of signatures without stopping the driving mechanism and stitcher head operation and accomplishes this by limiting the stroke of the stitcher head and driving mechanism therefor to prevent formation of a staple.

The stitching head **14**, described hereinafter, is disclosed in United States Patent Nos. 1,252,011 and 1,983,384, and hence the operation of stitching head is described only generally insofar as needed to explain the present invention. For detailed operation of the stitcher head, reference may be had to the above patents or to the commercially available stitching heads identified as

Model 26 and 26D stitching heads and sold under the trademark Bostitch. The present invention is not to be construed as limited to only this type of stitching head, as the present invention is readily employed with other stitching heads which have an operating cycle which can be limited to prevent the forming and driving of a staple by limiting the stroke of the stitcher head.

More specifically, for the purpose of preventing the stitching of a particular group of signatures S, a solenoid **17**, FIG. 3, is selectively actuated to move an interposer means **18** to limit the amount of movement of an actuating rod **19** and thereby the amount of movement of an actuating lever **20**, FIG. 1, for the stitching head **14**. The clockwise oscillation of the actuating lever **20** is limited to prevent completion of the upward stroke of a staple forming and wire feeding mechanism in the stitching head during which the wire W is gripped for a wire feeding operation during counterclockwise oscillation of the actuating lever **20**. That is, the wire feeding mechanism is normally open on the clockwise oscillation of the actuating lever **20** and normally closed on the counterclockwise oscillation of the actuating lever **20**. The wire clamping mechanism closes on the wire W slightly before the top or the very last increment of the clockwise and upward movement of the actuating lever **20**. In the present invention, the actuating lever **20** may be selectively limited to prevent this last increment of upward or counterclockwise stroke of the stitcher head wherein the wire feeding mechanism is moved to a wire clamping position within respect to the wire W. Thus, on the next downstroke and counterclockwise of the actuating lever **20**, the wire W is not fed to form a staple.

The actuating lever **20** is adapted to be connected to an internal staple forming and driving assembly within the outer cover plate **21** of the stitching head **14**. The staple forming and driving assembly is shown and described in detail in Patent No. 1,252,011, which is hereby incorporated by reference as if fully reproduced herein.

Referring now to the detailed construction illustrated in FIG. 1, the stitching head **14** is secured by a channel bar **22** disposed in a T-shaped groove **23** in the frame member **24** of the signature machine at the stitching station **10**. Operation of a handle **25** tightens the channel member **22** in the channel **23** to lock and rigidly secure in position the stitching head **14** relative to the upstanding frame F of the signature gathering machine.

For the purpose of actuating the staple forming and driving mechanism of the stitcher head by the actuating lever **20**, a flattened pin **26** is secured on a driving slide assembly **27**, FIGS. 1 and 9, and extends rearwardly into a groove **28**, FIG. 1, of a cross head **29** adapted to be reciprocated by the lever **20** along slideways **30** and **31** in the upstanding frame F of the signature machine. The cross head **29** is connected by a pin **35** to the lever **20** so that oscillation of the lever **20** reciprocates the cross head **29** vertically to actuate the driving and slide assembly **27**, FIGS. 1 and 9, in the stitching head **14**.

The wire W is guided downwardly and inserted between a rotary guide **33**, FIG. 5, and a spring biased pawl **34** which prevents the reverse or upward movement of the upper wire W relative to the stitching head **14**. The pawl **34** is biased by a spring **36** secured by a pin **37** to a face plate **43** of the stitching head **14**.

For the purpose of feeding the wire F, the wire W is directed into the bight of a gripper jaw **44**, FIG. 5, having a serrated jaw surface **44S** for clamping the wire W against surface **45** on a bender and driving bar assembly **46**, FIG. 5. When the wire W is clamped in the bight between the jaw **44** and the clamping surface **45**, feeding of the wire is accomplished by moving downwardly the bender and driving bar assembly **46** within a rectangular opening or window **43W** in the face plate **43**. As in U.S. Patent No. 1,252,011, the driving assembly **27** is connected to the bender and driving bar assembly **46**; and more specifically the driving assembly **27** has an opening **27A**, FIGS. 9 and 10, into which is fitted a shoulder **54A**, FIG. 10, on the upper and rearward side of a slide **54**, which will be described in greater detail hereinafter. The jaw **44** moves downwardly from a position adjacent an upper edge **43U**, FIG. 5, of the opening **43W** to adjacent a lower edge **43L** at the bottom of the window opening **43W**. The length of feeding movement between these positions adjacent the upper edge **43U** and lower edge **43L** is sufficient to form a staple from each wire feeding operation.

The manner of bending and forming the staple is not considered in detail in the present specification as the present invention is directed to the controlling of feeding or non-feeding of the staple wire rather than to the forming of the staple. The manner of operation of the clamping jaw **44** between its gripping position illustrated in FIG. 5 and its non-gripping or open position, illustrated in FIG. 8, can best be understood when considered in conjunction with the exploded views of FIGS. 9 and 10. The clamping jaw **44** is a generally T-shaped member, FIG. 9, having a leg portion **44L** adapted for sliding movement in a horizontal passageway **48P** formed in a block or block portion **48**, which may be a separate block **48**, as seen in FIG. 9, or an integral block portion **48** of the bender bar **50**, FIG. 10. In any event, whether the block **48** is separate of integral portion of the bender bar **50**, the block **48** is rigidly secured to the bender bar **50** for movement therewith. The bender bar **50** has a vertically oriented channel **50C** formed by a pair of opposing and upstanding side walls **50W** and a rear or bottom wall **50B**.

Secured to the bender bar **50** is a spring or flexible element **52**, FIG. 9, of generally cylindrical shape which is adapted to extend into the channel **50C** from a slot **50S**; and also, the spring **52** is sufficiently long to extend into and through an opening or aperture **44A** in the clamping jaw **44**. It will be observed in FIG. 9 that spring **52** extends through an enlarged hole **52H** formed in the bender bar **50**. The spring **52** biases the clamping jaw **44** rightwardly, as viewed in FIG. 5 and thereby biases the clamping jaw **44** into clamping engagement with the wire W. The spring rate of the spring **52** is sufficient to exert a strong frictional grip on the wire W to overcome any resistance to movement. The clamping jaw **44** is held open and from clamping engagement with the wire W on the upward movement of the bender and driver bar assembly **46**, as will be explained in greater detail hereinafter.

The means for disabling and enabling the clamping jaw **44** includes a driving slide **54** and a latch element **55** of generally U-shaped configuration. The slide **54** is adapted for sliding vertical movement within the channel **50C** in the bender bar **50** to bring either an upper slot **54U** or a lower slot **54L** into alignment with the spring **52** and latch member **55**.

The slots **54U** and **54L** are formed in the lefthand edge wall of the slide **54**, as seen in FIG. 9. The lower slot **54L** in the driving slide **54** extends deeper or further into the slide **54** than the upper slot **54U**, as best seen in FIG. 6. When the spring **52** is aligned with the slot **54L**, the spring **52** urges latch member **55** to move further into the slide **54** and rightwardly into the channel **50C**. The movement of latch element **55** and the spring **52** rightwardly carries the clamping jaw **44** rightwardly to engage and grip the wire W against the clamping surface **48S** on the clamping block **48**. Conversely, the clamping jaw **44** is disabled when the spring **52** and latch element **55** are driven leftwardly from the positions they occupy when aligned with the lower slot **54L** in the driving slide **54**. For instance, the clamping jaw **44** is in its open and more leftward position when the spring **52** and latch element **55** are aligned with upper slot **54U**, it is at this time that the jaw **44** is in non-clamping relationship to the wire W. The jaw **44** is open and not frictionally engaging the wire W in the latter described alignment with slot **54U** during

the return movement of the jaw 44 from its lowermost position adjacent the bottom edge 43L of the window 43 to the upper position adjacent the upper edge 43U of the window 43W.

The latch 55 is generally a U-shaped member and is disposed for horizontal sliding movement within a slot 50S formed by opposite openings in the side walls 50W of the bender bar 50. The latch 55 has a right leg 55R, FIG. 9, for camming engagement with the inclined surface 56B, FIG. 9, adjacent the lower end of the cam bar 56. The cam bar 56 corresponds to the bar L of Patent No. 1,252,011 and is supported with the stitcher head as shown and described in connection with FIG. 9 of Patent No. 1,252,011. An opposite leg 55L of the latch 55 has a vertical channel or groove therein in which seats the spring 52. The interior surface of the leftward leg 55L of the latch 55 is engaged by an intermediate cam portion 54I on the slide 54 as the slide 54 reciprocates vertically relative to the bender bar 50 and leg 55L of the latch 55. The cam portion 541 corresponds to the bevelled lug d^5 shown and described in connection with FIG. 8 of Patent No. 1,252,011.

The bender bar 50 and driving slide 54 are frictionally held to one another to move as a unit within the confines of the window 43W in the face plate 43. In the embodiment of the invention shown in FIG. 9, a friction pin means 60 frictionally serves to bind together the driving slide 54 and bender bar 50 for movement as a unit. The friction pin means 60 includes a friction pin 60P biased by a spring 60S within a spring holder 60H to urge the pin 60P through an aperture 50H in the bottom wall 50B of the bender bar 50 and against the bottom surface of the driving slide 54. The driving slide 54 is restrained from moving outwardly of the channel 50C by the latch element 55 and block 48 which bridge the channel 50C.

When the driving slide 54 and bender bar 50 are in their upper position illustrated in FIG. 5, with the block 48 against the upper edge 43U of the window 43W, the slide 54 is continued to be driven upwardly (by means not shown) to cause the inclined camming surface 54I, FIG. 9, between the upper and lower slots 54U and 54L, to cam leftwardly the leg 55L of the latch 55 and thereby move spring 52 and the clamping jaw 44 into a disabled or non-feeding position. During further upward movement of the driving slide 54 relative to the now-stationary bender bar 50, the slide 54 brings its lower slot 54L into alignment with the leftward leg 55L of the latch element 55 whereby the spring force exerted by the spring 52 moves the latch element 55 rightwardly and into the slot 54L and thereby the clamping jaw 44 moves into clamping engagement with the wire W. Approximately ⅛ inch of upward movement of the driving slide 54 relative to the stationary bender bar 50 at the upper edge 43U is required to permit the clamping jaw 44 to move into clamping engagement with the wire W.

On the succeeding downward stroke, the driving slide 54 and bender bar 50 move as a unit because of the frictional force provided by the friction pin means 60 with the now gripped wire W being fed downwardly into the swivel head or anvil O, FIG. 1. Near the extent of downward movement of the clamping jaw 44, the lower surface on the rightward leg 55R of the latch member 55 engages the inclined surface 56B on the cam bar 56 and the latch 55 is cammed leftwardly against the urging of the spring 52 thereby moving the clamping jaw 44 to its open or disabled position. This disabling action occurs adjacent the bottom of the window 43W, as generally illustrated in FIG. 6. The engagement of the mounting block 48 on the bender bar 50 with the lower edge of the window 43 prevents further downward movement of the bender bar 50 while the driving slide 54 moves further downwardly and overcomes the frictional coupling to the bender bar 50 afforded by the friction pin 60. The further downward movement of the slide 54 causes the inclined camming portion 541 to move past the left leg 55L of the latch member 55 and bring the upper slot 54U into position opposite the latch leg 55L.

When the operating means begins to move the bender bar 50 upwardly, the friction pin 60P frictionally holds the slide 54 and bender bar 50 for upward movement as a unit. Thus, the left leg 55L of the latch 55 remains in the upper slot 54U of the slide 54 holding the gripping jaw 44 open during the upward, return stroke of the combined driver and bender bar assembly 46.

A function of the anvil O, FIG. 1, is to rotate the newly fed piece of wire from a generally vertical position to a horizontal position and to hold the severed wire during the bending downwardly of the end portions of the wire to form the conventional U-shaped staple which is then driven into the book by the driving slide 54. For further reference, resort may be had to Patent No. 1,252,011. It suffices for the present invention to understand that a downward stroke of the drive and bender bar assembly causes the feeding of the proper length of wire by the gripper member 44 for a subsequent cut-off by a knife member (not shown herein). Subsequently, this piece of wire is formed into a staple and driven into the group of signatures S. The anvil O will have already therein a horizontally oriented piece of wire fed from the previous wire feeding operation and it is this severed wire which is formed into a staple and driven into the assembled signatures S during the present downward stroke of the bender bar 50 and driving slide 54.

Therefore, the feeding of the wire must be disabled one cycle prior to the arrival of the defective group of signatures S at the signature station so that the succeeding downward stroke of the drive slide 54 and bender bar 50 will not have a wire in the anvil for forming and driving into a group of signatures S. That is, since the anvil O already has a piece of severed wire therein, the downward operation of the driver and bender bar assembly causes this piece of wire to be driven into the assembled signatures and, after a non-feeding of wire, it is during the next following cycle that there is no wire horizontally oriented for forming and driving into the signatures at the signature station.

Thus, under the present invention the disabling of the wire feed operation takes place one cycle prior to the movement of the defective group of signatures S into the stitching station so that there is no wire present in the anvil O in the horizontal position when the bender and driver bar assembly moves through a cycle while the defective group of signatures is at the stitching station.

Referring now to FIG. 7, there is illustrated in the right hand portion of the drawing two cycles of normal operation wherein two staples are formed and driven into groups of signatures. With a severed wire in the anvil O from a preceding operation, an advancing or downward stroke 200 feeds a new length of wire and causes the driving of a staple. On the return or upstroke 201, the gripper jaw 44 is open until the slide 54 reaches the point 202, at which point the gripper jaw 44 moves to again grip the wire W. On the next downward stroke 203, the wire is again fed and a staple driven. On the upward stroke 204, the gripper 44 remains open.

However, with the solenoid 17 energized and interposer means 18 in position, the upward movement of the drive slide 54 is stopped at point 205. It is between the point 205 and point 202*b* that the gripper jaw 44 is rendered effective to grip the wire W. Thus, by stopping the drive slide 54 at point 205, the gripper jaw 44 is held open. Thus, on the next downstroke 206 the gripper jaw 44 remains open and no wire is fed into the anvil O. Because the wire fed on advancing stroke 203 is in the horizontal position at anvil O, a staple is formed and fed into the group of signatures S. On the next return stroke 207, the gripper jaw 44 remains open until the point 202*a* is reached whereupon the gripper jaw 44 again closes to grip the wire W.

However, on the next downward stroke 208 of the bender and driver bar assembly there will be no wire horizontally disposed in the anvil O for stitching into the defective group of signatures. The wire being fed on stroke 208 is available for the following downward stroke 210 and for the following group of signatures.

It will be remembered, that it was hereinbefore explained that the actuating lever 20 reciprocated cross head 29 to drive the driver and bender bar assembly during an oscillation of the actuating lever 20. The actuating lever 20 is clamped to a rock shaft 90 by a tightening screw 91. Rock shaft 90 has its ends journaled for oscillation in two pairs of spaced and generally vertically oriented arms 93 and 93A. The arms 93A are free to oscillate over adjustment shaft 94. Arms 93 support shaft 95 and adjusting arms 96. Each of the adjusting arms 96 pivots at its right end about pins 98 secured to frame F. The leftward ends of the arms 96 are secured to the head adjusting bar 99*a* by screws 99. The adjustment shaft 94 is keyed to a pair of eccentric bushings 94A mounted in frame F. Eccentric bushings 94A are rotated in frame F to provide vertical adjustment at cross head 29 and head adjusting bar 99*a*.

As best seen in FIG. 2, the lever 20 is composed of the two spaced arm portions 20*a* and 20*b* secured together and having aligned bearing seats in which are pressed ball bearing assemblies 104 for receiving the pinion ends 105 of a connecting block 108. Cap screws 109 are threaded into the pinion members 105 and the heads of the cap screws 109 bear washers 110 against the bearing assemblies 104. The connecting block 108 has a vertical bore 112 through which extends the upper end 113 of the actuating rod 19. The upper end 113 is threaded and has threaded thereon an upper castle nut 115 and a jam nut 116. A lower castle nut 115 and a jam nut 116 are threaded on the rod 119 beneath the block 108 to lock the block 108 on the rod 19. It is to be understood that the bore 112 is not threaded and is oversized relative to the threaded portion 113 of the rod 19. As the actuating rod 19 moves vertically, the connecting block 108 moves therewith and causes the actuating lever 20 to oscillate with its rock shaft 90.

The actuating rod 19 is adapted to be driven upwardly by an eccentric 100 rotating within an eccentric strap 120. The eccentric strap 120 has an upper plate 121 secured thereto by capscrews 129. The plate 121 may be moved upwardly to strike the bottom surface 122 of a collar 124 formed on the driving rod 19. The eccentric strap 120 has a circular bore 125 in which is fitted a bearing 126 for receiving the eccentric 100. The eccentric 100 is eccentrically mounted on the rotating shaft 102. Thus, in the familiar manner, rotation of the eccentric 100 through 180 degrees from the position illustrated in FIG. 4, causes the plate 121 to engage the collar 124 and to drive the driving rod 19 vertically upward. It will be appreciated that the drive upwardly is a positive type of drive due to the positive engagement of the eccentric strap plate 121 and the drive rod 19.

Conversely, the downward movement of the actuating rod 19 by the eccentric strap 120 is imposed through a resilient connection. More specifically, a compression spring 130 is held under compression between the plate 121 and a block 132 threadedly secured on the actuating rod 19 and locked in position by a set screw 135. As better seen in FIG. 2, the block 132 is internally threaded to receive a lower threaded portion 136 of the actuating rod 19. With the jam nuts 115 loosened at the top of rod 19 and the set screw 135 loosened at block 132 the square upper end 133 of the rod 19 can be turned by a wrench to rotate the rod 19 in the block 132, which is restrained from rotation by gibs 132*a*, FIG. 4, and thereby raise or lower block 132 and roller 146 relative to the eccentric strap 120. Tightening of the jam nuts 115 and set screw 135 in the block 132 maintains a fixed initial position of roller 146 relative to the eccentric strap 120.

The lower end 138 of the actuating rod 19 is unthreaded and is disposed to slide within a bushing 139 in the eccentric strap 120. Retainer 142 maintains axial position of eccentric strap 120 to the eccentric 100.

When the eccentric 100 is moving downwardly into the position shown in FIG. 4, the biasing spring 130 is being compressed by the plate 121 and the spring 130 acts on the block 132 secured to the rod 19 to push the rod 19 downwardly. Downward movement of the rod 19 rocks the lever 20 on the rock shaft 95 to lift the cross head 29 and thereby the driver slide 54 and bender bar 50 upwardly.

In a normal operation, the rod 19 is forced by the spring 130 to follow the full downward throw of the eccentric 100 and thereby move the actuating lever 20 through its full clockwise oscillation. When, however, a defective book is detected, and it is desired to stop the stitching operation on the next succeeding group of signatures S, an interposer cam 145 is moved into operative position to engage a roller 146 carried on a stub shaft 147 integrally formed on the block 132. The interposer cam 145 limits the downward movement of the actuating rod 19 by the thickness of the cam 145 and thereby limits the clockwise oscillation of the lever 20. With the cam 145 positioned beneath the roller 146, at shown in FIG. 2, continued rotation of the shaft 102 and eccentric 100 causes a relative sliding movement between the lower end 138 of the actuating rod 19 now held stationary and the eccentric strap 120 which continues to move downwardly. Thus, the plate 121 on the eccentric strap 120 compresses the spring 130 without a corresponding downward movement of the rod 19 which is being held by the interposer cam 145.

The interposer cam 145 is carried on a bracket 150 secured to a suitable portion of the frame of the signature machine, not shown. As can best be understood from FIG. 3, the interposer cam 145 is biased to the phantom line position in FIG. 3 by a contractile spring 151 and against a stop pin 152 secured on the upper horizontal surface 153 of the bracket 150. The contractile spring 151 is secured by a pin to the bracket 150 and to the interposer cam 145. In its phantom line position, the interposer cam 145 is ineffective to engage the roller 146 which is permitted to move downwardly to its fullest extent with the eccentric strap 120.

The interposer cam 145 has an outer finger 155 which engages a stop pin 156 to limit the rotation of the interposer cam 145 in the clockwise direction, as seen in FIG. 3. The interposer cam 145 is secured by fasteners 158 to a bell-crank 159 pivotally mounted by a pivot stud 160 to the upper surface of the bracket 150.

The bell-crank 159 has an arm 162 with a vertically extending pin 163 inserted in a slot 178 in the link 164 of the bell-crank 159. The link 164 is pinned to the plunger 168 of the solenoid 17. The end of the link 164 connected to the plunger 168 is adapted to slide on the upper surface of a guide or guide block 172. The link 164 has a pin 175 thereon to which is anchored a contractile spring 176. The opopsite end of the contractile spring 176 is secured to the pin 163 carried by the arm 162 of the bell-crank 159. The pin 163 is received in an elongated slot 178 extending longitudinally of the link 164 so that the inter-connection betwen the link 164 and arm 162 of the bell-crank 159 is through the contractile spring 176.

It should be noted that the upper surface of the interposer cam 145 is formed with an arcuate groove or cam surface 180 which affords a grooved surface for the roller 146 to roll along to prevent abrupt impact of the roller 146 with the cam 145. Since the end of the rod 19 and the roller 146 go through a generally elliptical movement because of their attachment to the eccentric 100, the cam surface 180 is extended for a considerable length to permit the roller 146 to also move through a generally elliptical path while holding the actuating rod 19 in its limited downward position.

The solenoid **17** is adapted to be controlled by an electrical circuit which may perform in a general manner of the electrical circuit illustrated in FIG. 15 of the copending application. With such a circuit, the solenoid **17** would be continuously energized for a series of consecutive defective signature groups S thereby avoiding a repetitive cycle of operation of the interposer cam **145** which would remain in its effective position until the next good group of signatures was detected. The next group of good signatures causes de-energization of the solenoid **17** and the return spring **151** would pivot the interposer cam **145** to its phantom line position and rotate the bell-crank **159** and pull the plunger **168** from the solenoid **17**.

While the operation of the present invention has been set forth in the description hereinbefore for the purpose of clarity, a brief description of operation of the present invention is set forth hereinafter. When a defective book is one station from the switching station **10** the solenoid **17** is energized to pull in its plunger **168** and rotate the bell crank **162** to position the interposer cam **145** beneath the roller **146**. Thus, as the rotating shaft **102** rotates the eccentric **100** to its downward throw position, shown in FIG. 4, the roller **146** engages the cam **145** to prevent the actuating rod **19** from moving further downwardly while the eccentric strap **121** compresses the spring **130** and forms a gap between the collar **124** and the strap plate **121**.

The downward movement of the actuating rod **19** is limited so that the clockwise rotation of the actuating lever **20**, as seen in FIG. 1, is limited from raising the cross head **29** and pin **26** through the last one-eighth of an inch of upward travel, which is illustrated as the position between the solid and dotted line positions of the driving slide **54** in FIG. 5.

It will be remembered that during the upward stroke of the driver and bender bar assembly, the actuating spring **52** for the gripper jaw **44** is in the upper latch slot **54U** of the drive slide **54** so that the gripper jaw **44** slides freely past the stationary wire W. When the block **48** engages the upper edge of the window **43W** in the face plate **43** the bender bar **50** is held against further upward movement. Thus, further upward movement of the driving slide **54** cams the latch **55** and the spring **52** to move the gripper jaw **44** leftwardly until the slot **54L** is aligned with the latch **55** whereupon the latch **55** and gripper jaw **44** move to the wire clamping position.

It is only the last one-eighth inch of travel of approximately two inches of travel of the driving slide **54** that the gripper spring **52** is permitted to move the gripper jaw **44** into clamping relationship with the wire W. To prevent clamping of the wire W, a solenoid **17** is energized to move its interposer cam **145** beneath the roller **146** secured to actuating rod **19**. Thus, as the eccentric **100** rotates through a position where its throw is its downward position, the actuating rod **19** is held against downward movement while the upper plate **121** of the eccentric strap **120** is compressing the spring **130** without a corresponding movement of the actuating rod **19**. Thus, the actuating rod **19** limits the clockwise rotation of the lever **20** and the last one-eighth inch of movement of the driver slide **54** in its upward direction. Thus, the gripper jaw **44** is retained in its leftward, non-clamping position since latch **55** remains in slot **54U** of driving slide **54**. As the eccentric **100** begins to drive the eccentric strap **120** upwardly, its plate **121** engages the collar **124** of actuating rod **19** and drives the actuating rod **19** upwardly to rotate the actuating lever **20** counterclockwise which in turn drives the driver and bender bar assembly downwardly without the wire W being fed downwardly therewith. Continued downward movement of this assembly causes the previously cut wire held by the anvil in the horizontal position to be formed and to be driven into the signatures S.

Since no wire was fed into the swivel during this downward stroke, there will be no wire present in the horizontal position for the staple forming and driving operation of the next downward cycle of the assembly. Thus, when the stitcher operating assembly moves upwardly and again begins to move downwardly, there will be no staple driven into the defective book now positioned in the stitching station.

As hereinbefore explained, if the operating signal indicates a good signature following the bad signature, the solenoid **17** will have been de-energized and the interposer cam **145** will have been returned by its return spring **151** to permit the full downward movement of the actuating rod **19** and thereby the full clockwise rotation of the actuating lever **20** and the gripping of the wire W by the clamping jaw **44**. Thus, during the downward stroke toward the defective book, a wire is moved into the anvil O and oriented into the horizontal position so that when the bad group of signatures moves out of the stitching station and is followed by the good group, there is a wire horizontally disposed for forming and driving as a staple into the next following book.

FIG. 10 illustrates a number of additional elements which are preferably added to the Bostitch 26D stitcher head, as hereinbefore described, to improve the coupling of the bender bar **50** to the driver slide **54**, particularly after the feeding of the wire W is disabled. A drive block **200**, FIG. 10, has a central bore for receiving the friction pin **60** and is fitted thereon for sliding movement. Drive block **200** has a forwardly extending lug or key **201** for insertion into an additional groove **204** provided on the right side of the driving slide **54**. The groove **204** is disposed laterally across from the upper slot **54U** on the right side of the driving slide **54**. The driving block **200** when moved forwardly, as viewed in FIG. 10, inserts its lug **201** between the top surface **205** on the bender bar **50** and shoulder **208** of the driving slide **54**. Thus, as the driving slide **54** moves downwardly, its shoulder **208** engages the top surface of the driving lug **201**, which in turn is in engagement with the top surface **205** of the bender bar **50** to mechanically and positively connect the bender bar **50** and drive slide **54** for downward driving movement.

The driving block **200** is urged leftwardly into this driving relationship by a spring lever **210**, FIG. 10, which is pivotally secured by an upper cap screw **212** to the rear side of the driving assembly. A spring retainer pin **215** is secured to the block assembly by a locking pin **213** to seat a compression spring **218** which urges the spring lever **210** in a clockwise direction on its pivotal mounting with cap screw **212**. The lower portion of the spring lever **210** is bifurcated to form a pair of legs **220** which are adapted to be disposed on opposite sides of the friction pin **60** while engaging the rear surface **222** of the driving block **200**. On the downward stroke of the driving slide **54** and bender bar **50**, the spring lever **210** is rendered effective to slide the driving block **200** into keying relationship between the driving slide **54** and bender bar **50**.

Before the bender bar **50** is driven through the complete extent of its downward movement, the driving block **200** is withdrawn to retract its lug **201** from the slot **204**. For this purpose, a cam surface **225** on the driving block engages a beveled surface **226** on a stationary cam plate **227** suitably secured inside the stitcher head bonnet. That is, the cam surface **226** engages the cam surface **225** and forces the block **200** rightwardly or rearwardly against the urging of the spring lever **210** when the bender bar **50** is adjacent the lower portion of the window **43W**.

As hereinbefore explained, a continued downward movement of the driving slide **54** permits the latch element **55** to move its left leg **55L** into the upper slot **54U** in the driving slide **54**. Thus, the clamping jaw **44** will be held in its open position. The driving block **200** is held against forward movement during the upstroke of the driving slide **54** and bender bar **50** by an interlock finger **230** which engages a shoulder **231** on the driv-

ing block **200** to hold the driving block in its rearward position against the urging of the spring lever **210** during the upstroke of the bender bar **50** and driving slide **54**. When the bender bar **50** is stopped from further upward movement by engaging the upper edge **43U** of the face plate **43**, the drive slide **54** continues its upward motion causing the interlock finger **230** to move upwardly from the shoulder **231** on the driving block **200**, whereupon the spring **210** again moves the drive block **200** to insert the driving lug **201** into the slot **204**. Thus, the driving slide **54** and bender bar **50** are positively interconnected on the next downward movement of the driving bar **54** and engagement of its shoulder **208** with the driving lug **201**.

From the foregoing, it will be seen that the present invention affords a novel manner of preventing the stitching of a defective book by limiting the movement of the stitcher driving assembly to prevent the gripping and feeding of the wire to form a staple for the defective book.

Hence, while preferred embodiments of the invention have been described and illustrated, it is to be understood that they are capable of variation and modification.

We claim:

1. In a machine wherein a wire staple is employed to join signatures or the like, a stitcher head through which a wire is advanced to a staple forming and staple driving position, a reciprocal carrier means, gripping means carried by said carrier means for gripping and feeding the wire during an advancing stroke of said carrier means, biasing means for biasing said gripping means to grip said wire, a reciprocable slide means movable to a first position to present a slot therein in alignment with said gripping means whereby said gripping means is biased to clamp said wire and movable to a second position to present another slot therein in alignment with said gripping means whereby said gripping means is retained in an open position against the bias of said biasing means, actuating means for reciprocating said carrier means and said slide means to cause clamping and feeding of said wire on an advancing stroke and to hold open said gripping means relative to said wire on a return stroke, and selectively operable means for preventing movement of said slide means to said first position and thereby preventing feeding of the wire during an advancing stroke of said slide means and said carrier means.

2. The machine of claim **1** wherein said actuating means includes a pivotally mounted lever, a drive rod connected to said lever and an eccentric for driving said drive rod, said eccentric being continuously rotating.

3. The machine of claim **2** wherein said actuating means has a spring interconnecting said drive rod and said eccentric and wherein said selectively operable means includes a solenoid and a movable element positionable by said solenoid to disrupt movement of said drive rod and to prevent said drive rod from following movement of said eccentric so that the movement of said drive rod is limited to prevent movement of said slide means to said first position.

4. In a stitcher head for feeding wire to a staple forming and staple driving position, a bender bar means reciprocal in said stitcher head, driving slide means reciprocal with said bender bar means, friction means normally frictionally coupling said driving slide means and said bender bar means for movement together, keying means for interlocking said driving slide means and said bender bar means to afford a positive drive of said bender bar means by said driving slide means during reciprocal movement in one direction, and means for disabling said keying means from interlocking said driving slide means and said bender bar means during reciprocal movement in the return direction.

5. In a machine wherein a wire staple is employed to join signatures or the like, a stitcher head through which wire is advanced to a staple forming and staple driving position, a vertically reciprocal bar and a slide reciprocal therewith and movable independently of the bar, a wire gripper jaw movable laterally of the bar, a spring carried by the bar and normally effective to urge the gripper jaw toward a wire gripping position, said slide having a slot therein which in one position of the slide is aligned with said spring and is so dimensioned that in such position the spring is free to urge the gripper jaw into wire gripping position to feed the wire during an advancing stroke of said bar, said slide having a second slot therein which in a second position of the slide is aligned with said spring and which is so dimensioned as to withhold the gripper jaw from the wire under the urging of said spring during a portion of the retracting movement of said slide, said first slot also being presented to said spring in the remaining portion of the retracting movement of said slide whereby the gripper jaw is then effective to grip the wire for the next advancing stroke, drive means to impart a reciprocal drive to said bar and slide, and means to disable the drive means from being effective to continue movement of the slide in that portion of its retracting movement where the second slot therein is presented to said spring, whereby the wire gripper jaw is ineffective to advance the wire in the next stroke.

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