June 17, 1952 A. R. GILLIAM 2,601,113

ATTACHMENT FOR BOOK SEWING MACHINES

Filed May 6, 1948 2 SHEETS—SHEET 1

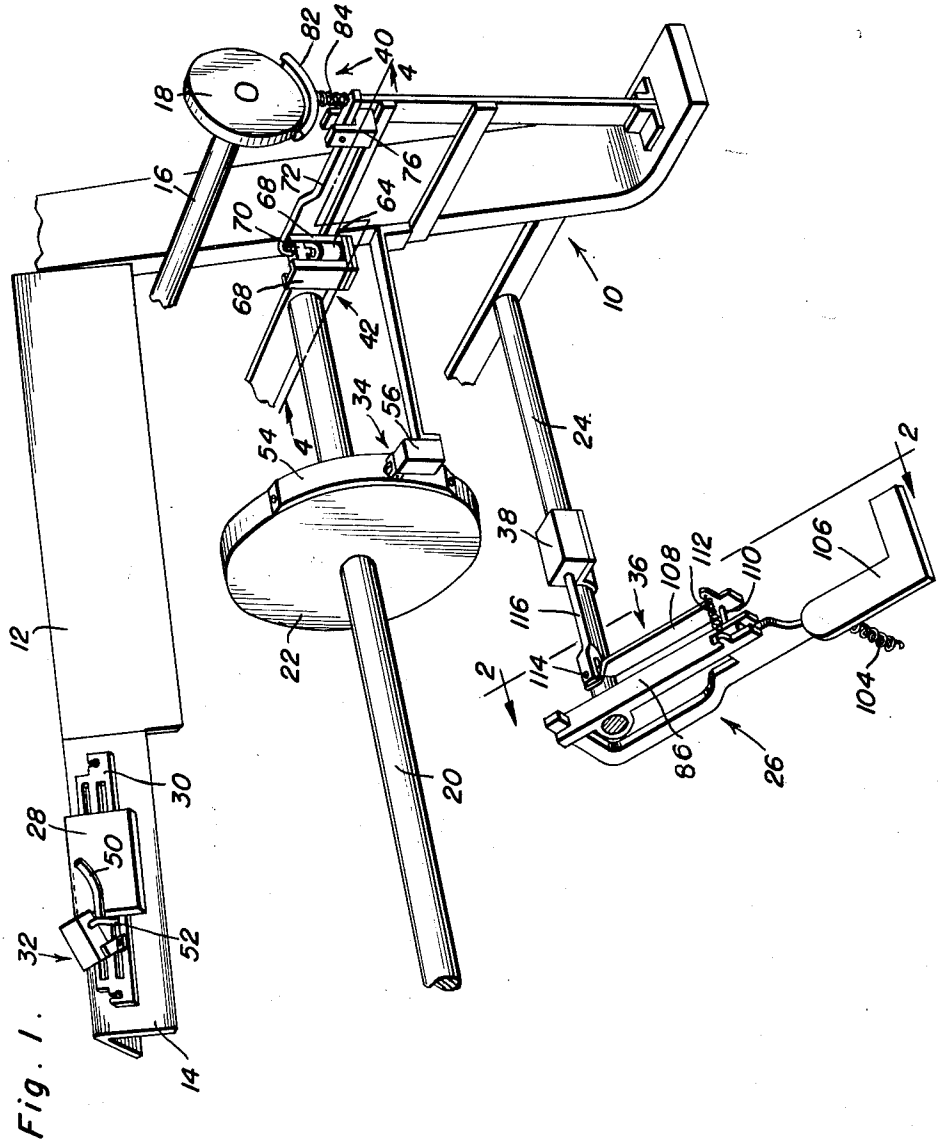


Fig. 1.

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ATTACHMENT FOR BOOK SEWING MACHINES

Filed May 6, 1948 2 SHEETS—SHEET 2

Fig. 2.

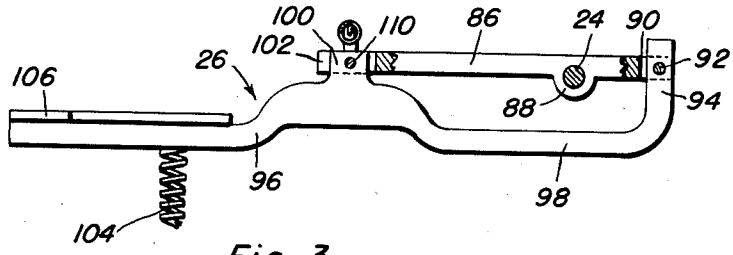


Fig. 3.

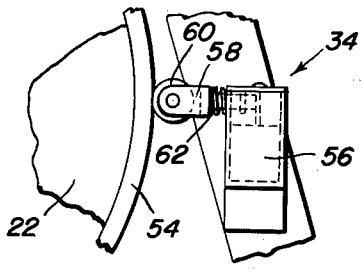


Fig. 4.

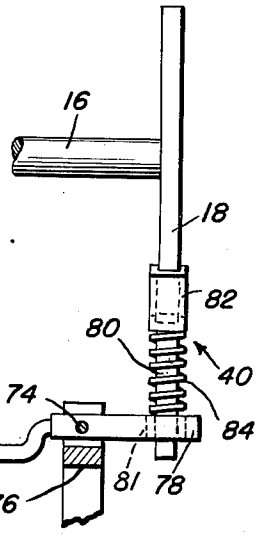
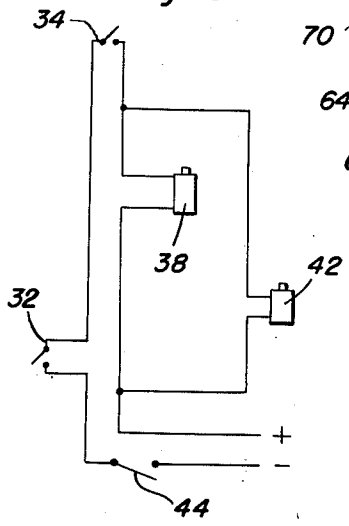


Fig. 6.



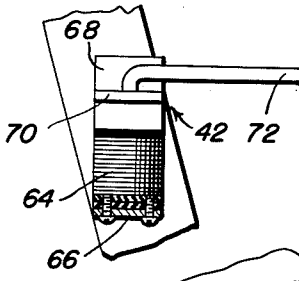
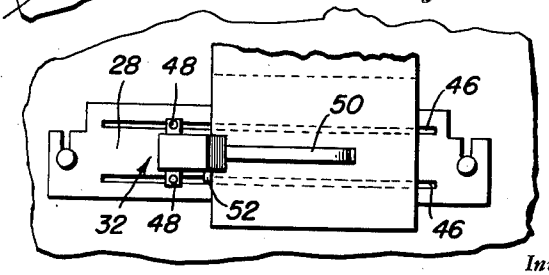


Fig. 5.



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ATTACHMENT FOR BOOK SEWING MACHINES

Arley R. Gilliam, Kingsport, Tenn.

Application May 6, 1948, Serial No. 25,476

7 Claims. (Cl. 112—219)

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This invention relates to novel and useful improvements in an attachment for book sewing machines and more specifically pertains to a safety device attachment for application to a book sewing machine for preventing the sewing of signatures and the operation of the machine when the signature is improperly positioned upon the movable saddle of the machine.

The primary object of this invention is to provide an attachment for preventing operation of a book sewing machine when the signature to be sewed is improperly positioned upon the movable saddle of the machine.

An important feature of the invention resides in the provision of a safety device in the form of an apparatus or attachment which may be readily applied to a conventional type of sewing machine such as for example, the well-known Smyth No. 12 book sewing machine, and which is operable to detect the improper positioning of a signature upon the movable saddle of such a machine and in response thereto to actuate an electric circuit for simultaneously disrupting the driving connection between the power shaft and the cam shaft of the machine and applying a brake to the power shaft of the machine when a timing switch is closed at a predetermined phase in the cycle of operation of the book sewing machine.

A further feature of the invention resides in mounting a signature position responsive normally closed switch, which is moved to its open position by proper positioning of the signature upon the saddle of the machine, which switch is carried by and mounted upon the movable saddle of the machine, for rendering an electric control circuit selectively operable for causing cessation of operation of the machine.

Yet another important feature of the invention resides in the provision of an apparatus as set forth hereinbefore, including an actuating lever operatively connected to a control rod for controlling the application of power from a power shaft to the cam shaft of the machine, together with latching means for selectively rendering said control lever operative and inoperative, which latching means is actuated by an electromagnet under the control of the signature operated switch.

A further important feature of the invention resides in the provision of a device as set forth in the preceding objects and features, wherein a brake mechanism is provided for preventing rotation of one of the vital rotating shafts of the machine such as the power shaft, and which

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mechanism is operable by a solenoid under the control of the signature operated switch.

And a final important feature and object of the invention to be specifically enumerated herein, resides in the provision of a normally opened switch which is operably connected or associated with a moving shaft of the machine for periodic actuation into its switch closed position at predetermined times in the cycle of operation of the machine.

These, together with various ancillary objects and features of the invention which will later become apparent as the following description proceeds, are attained by the present device, a preferred embodiment of which has been illustrated by way of example only of the principles of the invention in the accompanying drawings, wherein:

Figure 1 is a perspective view, indicating diagrammatically the essential parts of a conventional type of book sewing machine to which the apparatus of the present invention is applicable;

Figure 2 is a vertical longitudinal sectional view substantially taken on the plane 2—2 of Figure 1, through the novel actuating lever construction forming a part of the invention;

Figure 3 is a fragmentary side elevational view showing the mounting and some of the operating parts of the cam operated switch forming a part of the invention;

Figure 4 is a fragmentary horizontal sectional view, taken substantially on the plane 4—4 of Figure 1, parts being broken away and shown in section, of the brake, its operating mechanism and the solenoid controlling the same forming a part of the invention;

Figure 5 is a fragmentary top plan view showing the arrangement of the signature operating switch and the signature operatively associated therewith; and,

Figure 6 is a diagrammatic view illustrating the electrical circuit of the invention.

In a known type of book sewing machine to which the principles of this invention are applicable and are particularly intended, such as the Smyth No. 12 book sewing machine, the operation of sewing signatures is very rapidly effected as at the rate of from seventy to eighty-five signatures per minute, thereby requiring the constant and unremitting attention of the operator in feeding signatures to the movable saddle of the machine for automatic transportation to the sewing instrumentalities and subsequent sewing of the signatures and removal of the same from the movable saddle. In view of the con-

tinuous and rapid speed of operation of which this machine is capable, it is physically impossible for the operator to detect the improper positioning of a signature upon a movable saddle in time to stop the operation of the machine before a signature has been conveyed and operated upon by the sewing instrumentalities. Such improper positioning of the signature gives rise to the very serious disadvantages of breaking needles, needle plates, hooks and hook plates; and quickly results in damage to or misalignment of the saddles, the signature pusher bars and other associated elements of the machine. Further undesirable results are the inevitable loss of time and expense in repairing the machine as well as the damage done to the signatures which are improperly handled in this manner.

It is therefore the underlying and fundamental intention of this invention to provide an attachment which may be readily applied to such a machine which will avoid the above mentioned difficulties by preventing operation of the machine when a signature is improperly placed upon the movable saddle.

In order to better understand the invention, attention is now directed first to Figure 1 for an understanding of the manner in which the safety device is applied to the machine. Indicated generally at 10 is a portion of the framework of a Smyth No. 12 book sewing machine, upon which framework is suitably mounted a generally wedged or V-shaped fixed saddle 12, and which machine is further provided with a movable saddle 14. In the operation of this machine, signatures placed upon the fixed saddle 12 by the operator are automatically fed upon the movable saddle 14 when the latter is registered with and aligned with the fixed saddle 12, the movable saddle with the signature placed and positioned thereon being then conveyed to the sewing instrumentalities, not shown, where the signature is stitched, removed from the saddle and the latter again returned to the position shown in Figure 1 in readiness for receiving the next signature. This conventional type of machine further includes a power shaft 16, having a flywheel 18 thereon, and a cam shaft 20 provided with a plurality of cams for operating the various mechanisms of the machine such as the sewing instrumentalities, the movable saddle operating means, and the like, one such cam being shown at 22. The machine is further provided with a control rod 24 oscillatably mounted thereon, which control rod by a mechanism whose construction need not be shown and which forms no part of the mechanism necessary to understand this invention, serves to transmit power between the power shaft 16 and the cam shaft 20, as by means of a clutch or other power control agency. The oscillatable control rod 24 has operatively connected thereto an actuating lever assembly indicated generally by the numeral 26 whereby the operator by depressing the lever can establish a driving connection between the power shaft 16 and the cam shaft 20, to thereby cause operation of the various elements of the machine, in properly timed relation to each other.

A signature is indicated at 28 properly positioned upon the movable saddle in readiness for conveyance to the sewing instrumentalities, this signature being shown as positioned upon the cover plate 30 with which this machine is equipped.

As so far described, the conventional parts of this machine have been set forth. In accordance with this invention, there is attached to the machine a signature responsive switch indicated generally at 32, a shaft operated switch 34 for actuating the control circuit at predetermined times in the cycle of operation of the machine, a latching mechanism 36 for selectively connecting and disconnecting the actuating lever from the control rod, this latching mechanism being operated by an electro-magnet indicated at 38, a brake mechanism indicated at 40 for stopping the operation of one of the shafts of the machine such as the power shaft 16, which brake mechanism is controlled by a solenoid indicated generally at 42.

The electrical circuit for connecting these various attachments in accordance with this invention, is indicated in Figure 6, it being noted that a master control switch 44 may be conveniently provided for rendering the control safety circuit operative or inoperative at will.

Attention is now directed more specifically to Figures 1 and 5 for a better understanding of the construction and arrangement of the signature switch 32. The signature responsive switch 32 is preferably removably mounted upon and secured to the above mentioned cover plate 30 of the movable saddle 14 as by engagement with the needle slots 46 by fastening screws 48. The switch 32 is provided with the resilient, spring metal finger 50 which is disposed in proper position to resiliently urge and press the signature 28 down upon the saddle 14 and hold the signature thereon during the subsequent operation of the apparatus. The switch 32 is of any conventional and known design, and its construction in itself forms no part of this invention. However, the switch is provided with a control lever 52, which switch lever is so positioned as to be engaged and actuated by the edge of the signature when the latter is in proper position upon the saddle 14. The switch itself is wired into the electrical circuit, as shown in Figure 6, and is normally in its closed position, but is moved to its inoperative or circuit opening position when the switch lever 52 is engaged by the signature 28. In other words, when the signature is so positioned as not to engage the switch lever 52, the switch is closed whereby the circuit is energized under the control of the rotary switch 34 as set forth hereinafter; and this condition occurs whenever the signature 28 is not properly placed upon the saddle 14. However, when the signature is properly placed, the switch lever 52 is biased into position to de-energize the switch 32, and thereby disrupt the electrical circuit, whereby the same is rendered ineffective.

Attention is next directed to the rotary switch shown in Figures 1 and 3. In accordance with this invention, a cam lobe 54 is applied to any suitable portion of the periphery of the cam 22, it being understood that this lobe is applied in such a position as to cause energization of the switch and of the electrical circuit controlled thereby at any desired time in the cycle of operation of the machine. Mounted upon any suitable part of the framework 10 of the machine is a normally open or inoperative switch 56 of any suitable construction, which is provided with an operating plunger 58 having at its extremity a cam engaging roller 60 journalled thereon, and provided with a spring 62 for biasing the plunger into its cam engaging or inoperative position. As the cam 22 rotates, the cam surface 54 will at the properly timed portions of the cycle of operation of the machine, contact the roller 60 and thereby actuate the switch 34 to close the same, whereby if the switch 32 is closed, the electrical

circuit will be energized to operate the electrically responsive means 38 and 42.

Attention is next directed to the brake operating mechanism shown in Figures 1 and 4. This mechanism includes a suitable solenoid coil 64 mounted upon the middle portion 66 of a U-shaped support of magnetic material, having parallel side members 68, which constitute guideways for slidingly receiving the electro-magnetically operated armature or plunger 70, which plunger is secured in any desired manner to the end of a brake lever 72, pivoted as at 74 in a supporting bracket 76 carried by the frame 10. The outer extremity of the lever 72, indicated at 78, is provided with an upwardly extending preferably slidable pin 80 slidable in bore 81 and which is attached in any desired manner to and supports at its upper end an arcuately shaped brake shoe 82 which is engageable with the flywheel 18 when the lever is oscillated or rotated in a counter-clockwise direction by energization of the solenoid 64. A spring means indicated generally at 84 preferably surrounds the pin 80, and rests upon one end of the lever 78, and has its other end resting on the brake shoe 82, to yieldingly urge the brake shoe 82 into contact with the flywheel 18, when the solenoid 64 actuates the lever 78. It will thus be seen that when the solenoid is energized, the lever 72 urges the brake 82 against the flywheel 18, thereby stopping the power shaft 16; and when the solenoid is de-energized, the brake shoe is released and the lever is restored to its idle position.

Attention is next directed to Figures 1 and 2 for a consideration of the actuating lever construction, the latch mechanism therefor and the associated operating structure. This actuating lever construction indicated generally at 26 consists of a fixed lever 86 which is intermediately attached to the control rod 24 as by means of a hub portion 88, and constitutes means for oscillating the control rod. At one end, the lever 86 is provided with a slot or notch 90 in which is pivotally mounted as by a pivot pin 92, the upturned end 94 of a movable arm 96 which has an offset portion 98 for straddling and providing clearance with the hub 88 and the control rod 24.

Intermediate its ends, the movable arm 96 is provided with an upwardly extending lug or projection 100 which is receivable in a notch or slot 102 formed in or adjacent the other end of the fixed arm 86, for selective latching engagement with the fixed arm.

A spring 104 is secured to the arm 96, for urging the latter upwardly, and the actuating lever is provided with a treadle portion 106 for actuation by the foot of the machine operator. By depressing this treadle, against the opposition of the spring 104, the control shaft 24 is rocked in a position to disengage the clutch or other coupling means between the power shaft and the cam shaft 20.

The latching mechanism indicated generally at 36 for selectively securing the fixed arm to the movable arm of the actuating lever 26, includes the latch bar 108 provided with a laterally extending latch pin 110 adjacent one end thereof, which pin may be selectively inserted in and withdrawn from aligned apertures extending through the lug 100 and the sides of the notch 102, whereby the fixed and movable arms may be rigidly secured together as a rigid unit or disconnected to render the movable arm 96 ineffective and incapable of actuating the fixed arm 86 and the control rod 24 thereby. The latch bar 108 and the fixed arm 86 are provided with upwardly extending lugs by means of which a coil spring 112 is secured, which spring urges the latch end into its latching position. The latch bar and latch pin are withdrawn from their latching engagement by means of a connection as at 114 with a rod 116 secured to the operating means (not shown) within the electro-magnet indicate dgenerally at 38. Obviously, when the magnet 38 is operated, the latching pin is withdrawn, thereby disconnecting the operative engagement of the movable arm 96 with the fixed arm 86, while when the magnet is de-energized, the spring 112 will re-establish this connection when the apertures are properly aligned.

The operation of this attachment will be readily understood from the foregoing description, and is as follows:

With the latching mechanism 36 engaged to render the actuating lever 26 operative, the machine operator depresses the treadle 106, thereby causing the control rod 24 to establish driving connection between the continuously rotating power shaft 16 and the cam shaft 20, which latter operates the various elements of the machine in properly timed relation, causing feeding of the signatures from the fixed saddle 12 to the movable saddle 14, when the signatures are positioned in proper operative position with respect to the signature switch 32, and thereafter operating the mechanism for moving the movable saddle 14 to the position adjacent the sewing instrumentalities, and thereafter returning the saddle for the next signature. This operation continues as long as the treadle 106 is depressed, provided each signature is properly positioned upon the movable saddle 14, so that the switch 32 is rendered inoperative by the engagement of the signature with the switch lever 52. It will be here noted that in each revolution of the cam shaft 20, the rotary switch 34 is closed, and the electrical circuit would be rendered operative to apply the brake and operate the latching mechanism except for the continued inoperativeness of the switch 32.

When now through some mishap, one of the signatures 28 is improperly positioned upon the saddle 14, so that the switch lever 52 is not actuated thereby, the switch 32 remains closed, so that when the rotary switch 34 is also closed at the appropriate time in the cycle of operation of the machine, the electric circuit is thereby energized and the electro-magnet 38 and the solenoid 42 are simultaneously operated. The latter applies the brake to the power shaft 16, stopping the same substantially immediately, while the electro-magnet 38 disengages the latching pin 110 and disconnects the two arms 86 and 98, whereupon the pressure of the operator's foot holding down the treadle 106 is no longer effective to hold the control rod 24 in its operative position. The latter therefore is returned to its inoperative position by the customary spring means associated with the clutch or other coupling mechanism actuated by the control rod, whereby this coupling mechanism returns to its inoperative position thereby breaking the operative connection between the power shaft 16 and the cam shaft 20, and thus causing a stoppage of all of the operating parts of the machine.

When it is desired to restore the machine to operation, it is merely necessary for the operator to properly position a signature in the switch 32, whereby the signature will operate the switch

lever 52 and thereby open that switch to render the electric circuit of the safety device inoperative. The treadle 106 is now allowed to rise upward, so that the apertures in the lug 100 will align with the apertures in the notch 102, any suitable stop means being provided to insure this alignment under the upward bias of the spring 104 on the arm 96, whereby the resiliently urged latching pin 110 will engage these apertures and thus lock the two arms of the lever into a rigid assembly. The lever may now be depressed, whereupon the clutch or coupling means is again engaged, and the machine will resume its normal operation.

Since numerous modifications will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not intended to limit the invention to the exact apparatus described and illustrated and accordingly, all suitable modifications and equivalents may be resorted to falling within the scope of the appended claims.

Having described the invention what is claimed as new is:

1. In a book sewing machine having a movable saddle for receiving, positioning and conveying signatures to sewing instrumentalities, a power shaft, a cam shaft for actuating in timed relation said movable saddle and said sewing instrumentalities, an oscillatable control rod for controlling the transmission of power from said power shaft to said cam shaft and an actuating lever operatively connected to said control rod; a safety device for preventing operation of said machine upon improper positioning of a signature on said movable saddle comprising a normally closed signature switch having a switch lever positioned for actuation to switch opening position by a signature when properly positioned on said movable saddle, a normally open switch operatively connected to one of said shafts for periodic actuation thereby to closed position, a latch mechanism for maintaining said actuating lever in operative connection with said control rod and an electromagnet for moving said latch mechanism into lever disengaging position, a brake engageable with one of said shafts, and a solenoid for applying said brake, and an electric circuit connecting said switches, said electro-magnet and said solenoid for simultaneously releasing the actuating lever and applying the brake when both said switches are closed.

2. The combination of claim 1, wherein said normally open switch is operably connected to said cam shaft.

3. The combination of claim 1 wherein said latch mechanism includes a latch pin, said actuating lever including a fixed arm on said control rod and a pivoted arm on said fixed arm, said latch pin releasably securing said pivoted arm to said fixed arm, and spring means urging said pin into latching engagement with both said arms.

4. In a book sewing machine having a movable saddle for receiving, positioning and conveying signatures to sewing instrumentalities, driving means for said machine, operating means operatively connected to said driving means for actuating in timed relation said saddle and said sewing instrumentalities, control means for disengaging said driving means from said operating means; a safety device for preventing the operation of said machine upon improper positioning of a signature on said movable saddle comprising a signature switch positioned for actuation by a signature properly longitudinally positioned on said movable saddle, a second switch operatively connected to said operating means for periodic actuation thereby, a brake engageable with said operating means, electrically responsive brake control means and an electric circuit connecting said switches and said brake control means for applying the brake upon the energization of said circuit by said switches.

5. In a book sewing machine having a movable saddle for receiving, positioning and conveying signatures to sewing instrumentalities, driving means for said machine, operating means operatively connected to said driving means for actuating in timed relation said saddle and said sewing instrumentalities, control means for disengaging said driving means from said operating means; a safety device for preventing the operation of said machine upon improper positioning of a signature on said movable saddle comprising a signature switch positioned for actuation by a signature properly longitudinally positioned on said movable saddle, a second switch operatively connected to said operating means for periodic actuation thereby, a latch mechanism for maintaining said operating means in engagement with said driving means and electrically actuating means in an electric circuit with said switches for disconnecting said latch mechanism from engagement with said operating means.

6. In a book sewing machine having a movable saddle for receiving, positioning and conveying signatures to sewing instrumentalities, a power shaft, a cam shaft for actuating in timed relation said movable saddle and said sewing instrumentalities, an oscillatable control rod for controlling the transmission of power from said power shaft to said cam shaft and an actuating lever operatively connected to said control rod; a safety device for preventing operation of said machine upon improper positioning of a signature on said movable saddle comprising a normally closed signature switch having a switch lever positioned for actuation to switch opened position by a signature when properly positioned on said movable saddle, a normally opened switch operatively connected to one of said shafts for periodic actuation thereby to closed position, a solenoid, a brake associated with said power shaft, an electric circuit connecting said switches and said solenoid for applying the brake when both the switches are closed, said signature switch lever being mounted on said movable saddle and being longitudinally adjustable relative thereto, said switch lever being positioned so as to engage the edge of a signature properly longitudinally positioned on said saddle.

7. In a book sewing machine having a movable saddle for receiving, positioning and conveying signatures to sewing instrumentalities, a power shaft, a cam shaft for actuating in timed relation said movable saddle and said sewing instrumentalities, an oscillatable control rod for controlling the transmission of power from said power shaft to said cam shaft and an actuating lever operatively connected to said control rod; a safety device for preventing operation of said machine upon improper positioning of a signature on said movable saddle comprising a normally closed signature switch having a switch lever positioned for actuation to switch opened position by a signature when properly positioned on said movable saddle, a normally opened switch operatively connected to one of said shafts for periodic actuation thereby to closed position, a latch mechanism for maintaining said actuating lever in operative

connection with said control rod and an electromagnet for moving said latch mechanism into lever disengaging position, said latch mechanism including a latch pin, said actuating lever including a fixed arm on said control rod and a pivoted arm on said fixed arm, said latch pin releasably securing said pivoted arm to said fixed arm, and spring means urging said pin into latching engagement with both said arms.

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