

Nov. 16, 1943.

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2,334,265

CONTROL FOR BOOK SEWING MACHINES

Filed Aug. 8, 1942

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 3.

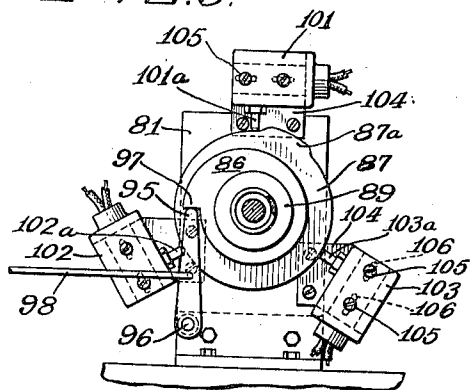


FIG. 4.

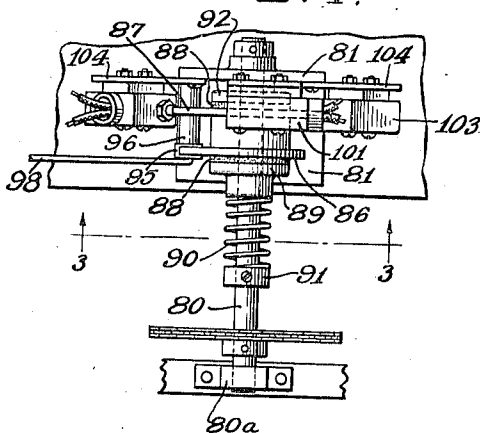


FIG. 5.

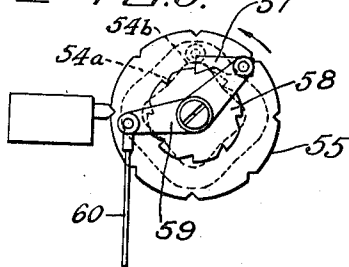


FIG. 6.

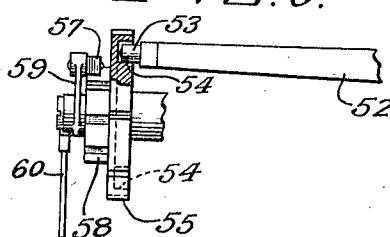
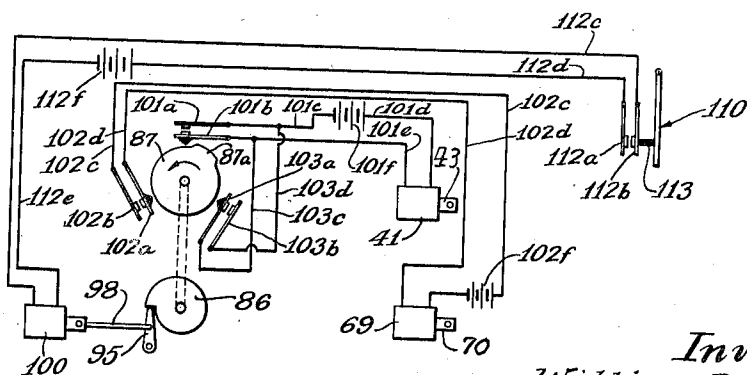


FIG. 7.



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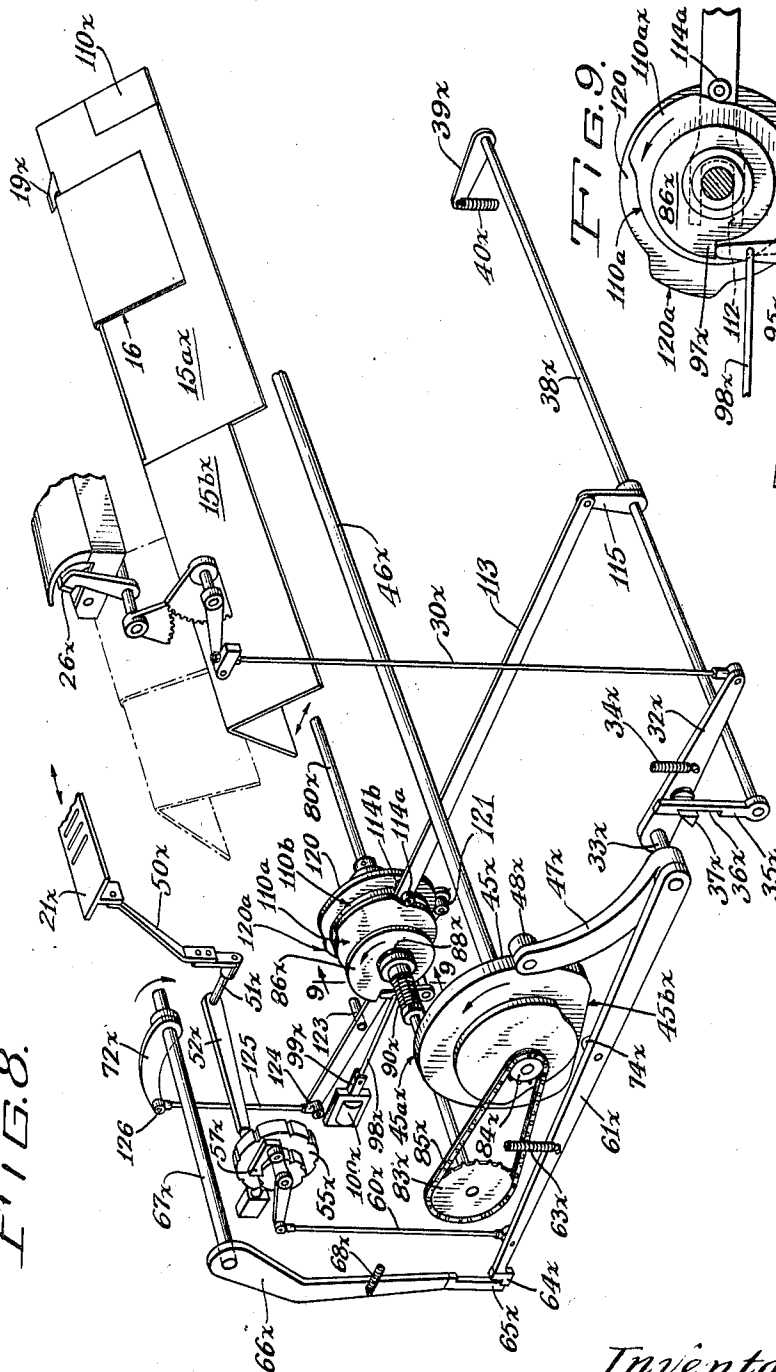
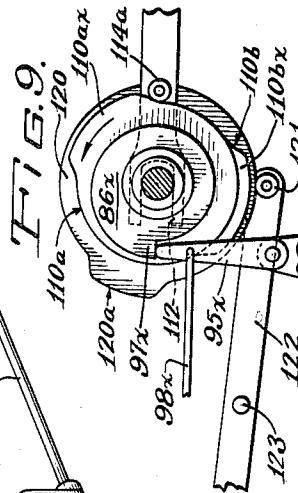
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CONTROL FOR BOOK SEWING MACHINES

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FIG. 8.



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CONTROL FOR BOOK-SEWING MACHINES

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Application August 8, 1942, Serial No. 454,160

20 Claims. (Cl. 112—21)

This invention pertains to the bookbinding arts, and more particularly to book or signature sewing machines.

One of the principal objects of the invention is the provision of automatic control means for a known type of book sewing machine wherein there is a known means for performing certain cutting and pasting operations on book signatures or the like, the invention having to do with the provision of unitary control means and actuating mechanism for the cutting and pasting means of such nature that these operations will be accurately timed with respect to each other and to certain feeding operations performed by the attendant.

A further object is to provide improved control means which will eliminate certain previously necessary pedal controls in a machine of the class described, whereby to simplify the operator's duties, relieve fatigue and increase occupational accuracy with consequent increase in production output and decrease in defective or rejected book forms.

Still more particularly, it is an object to provide automatic control means for a machine of the class described arranged and constructed to be engaged by the attendant's hand as a natural continuation of motions involved in the manual feeding routine customarily employed in the use of this type of machine, whereby to eliminate relatively complicated pedal operations as well as visual estimations in the timing of certain feed means with respect to said pedal operations.

Other objects are to provide both electrical and electromechanical control means especially adapted for coaction with the known construction of machines of the class specified, such that the invention may be applied to existing machines or built-in as standard equipment therefor; to provide a touch-responsive control which forms part of the signature feeding means in such manner as to facilitate accurate operation of the novel control by a continuing movement of the hand in the usual feeding technique; to provide a simple, adjustable timing control unit adapted to be actuated directly from the main drive shaft of the machine; to provide cutter and paster actuating controls adapted for direct cooperation with existing control elements in such a machine; to provide control means for effecting timed plural operation in alternation of certain cutting and pasting means.

Other objects, advantages, and aspects of novelty relate to details of construction, operation, and functional combination of the several parts

of the preferred embodiments hereinafter described in view of the annexed drawings in which:

Fig. 1 is a skeletonized perspective layout of the novel control means disposed for cooperation with parts of a known type of book sewing machine;

Fig. 2 is an enlarged sectional detail along lines 2—2 of Fig. 1 showing the master control or touch-responsive actuating means of the invention;

Fig. 3 is an elevational detail of the timing switch means;

Fig. 4 is a top plan view of the timing means of Fig. 3;

Fig. 5 is a side elevational detail of the cutter regulating means and actuating cam;

Fig. 6 is a front elevational view, partly in section, of the cutter regulating and drive means shown in Fig. 5;

Fig. 7 is a circuit diagram;

Fig. 8 is a skeletonized perspective layout of a modified form of the novel control means;

Fig. 9 is an elevational detail of the control cam as viewed in the direction of lines 9—9 of Fig. 8.

Referring to Fig. 1, there is shown a wedge-shaped saddle or signature feed plate 15 such as employed in a known type of book sewing machine, and this feed plate includes a stationary section 15a upon which the attendant places a group of gathered and printed signatures or book leaves 16 which have been opened up at the middle fold 17 of the group so that said middle fold will rest on the edge of the wedge feed plate, with the bottom edge 18 of the signatures opposite a feed pawl or finger 19.

When the attendant has fed a signature 16 into the position shown, she will customarily actuate a pedal control (not shown) commonly employed in such machines, which sets the latter into operation to cause, among other things, the feed pawl or finger 19 to shift toward the left and transport the book signatures 16 onto a movable plate section 15b of the feeding wedge, whereupon section 15b moves forward, as indicated by the directional arrow at the left of the latter, toward certain sewing means (not shown) including a plurality of needles which reciprocate vertically in slots 20 formed along a needle plate 21.

Following the feeding of a desired number of signatures as aforesaid so as to form a book, the machine will have sewn the binding edges 17 of the several signatures in a known manner, and

the threads in the several needles which work in the slots 20 is then automatically cut by the expediency of shifting the needle plate 21 either to the left or right, as indicated by the directional arrows, whereby to cause the thread to be urged against stationary shear edges (not shown) and cut free of the book. The feeding of the signatures for the next form will cause the preceding book to be pushed toward the discharge end of the machine.

The feeding pawl 19 moves in timed relation to the sewing and pasting means of the machine, all being driven from a common source, namely the main drive shaft 46, which rotates a compound cam structure including cams 45, 73, and a large internal cam 150. A long lever 151 is pivoted at one end, as at 152, and at its other end it connects to a ball and socket lever 153, which in turn rocks a bell crank lever 154 connecting through a long drive rod 155 to feed pawl 19.

The lever 151 has a cam roller (not seen) which rides in the cam track of cam 150 in a known manner, such that lever 151 oscillates up and down so long as shaft 46 rotates, causing lever 154 to oscillate from left to right with a corresponding reciprocation of the long driving arm 155, thus causing pawl 19 to move back and forth on the signature receiving saddle 15a.

It will be understood that the structural and functional details of the signature-feeding, sewing, and cutting mechanisms of this machine constitute part of the known art and are not per se claimed as my invention, by reason of which the said mechanisms are described only in such detail herein as may be calculated to afford an understanding of the general operation of such a book-sewing machine in so far as it relates to the improvements herein disclosed and claimed.

In connection with the sewing operations, it is pointed out that the thread cutting operation merely requires the shifting of the slotted plate 21 in one or the other indicated direction from whatever position it happens to be in at the time the sewing operation is completed.

As a further incident to the book-forming operations performed by such a machine, the end sections (i. e. the first and last signatures) are tipped close to the binding edge 47 with paste so as to secure each of these signatures additionally to the adjoining one.

In Fig. 1, there is shown one end portion of a paste trough 25, which ordinarily extends across the front of the machine a distance equal to the length of the feed-plate sections 15a or 15b, the needle plate 21 being of similar length.

A paste tipping bail or applicator 26 is rockably mounted on a shaft 27 for movement from its normal position (shown in full lines) in the paste trough, to the dotted line position against one of the signatures, first or last, as the case may be, it being necessary usually to actuate the paster twice for each book.

The paste-tipping or applying movements of the bail are effected by oscillation of coaxing gear segments 28 and 29 responsive to the vertical reciprocation of rod 30 connecting with lever means 31 at its upper end and with an actuating lever 32 at its lower end. Lever 32 is pivoted at 33 and is normally pulled upwardly by spring means 34 to shift rod 30 upwardly and effect a lowering of the paste-applying bail.

However, upward movement of actuating lever 32 is prevented by a lock-out lever 35 having a notch 36 into which fits a stud 37 on lever 32

restraining the latter from pivotal movement upwardly so long as the lock-out lever 35 remains in the normal position shown. A rock shaft 38 extends across the lower front of the machine and connects at the opposite side thereof with an operating lever 39, which is normally urged by spring means 40 in an anticlockwise direction so as to hold lock-out lever 35 in engagement with the stud 37, thereby preventing actuation of the paster mechanism, particularly the rod 30, lever 31, and gear segments 28—29.

The foregoing paster mechanism is old in the art, and prior to the present invention, was actuated by pedal means (not illustrated) connected with the long rock shaft 38 at the bottom of the machine in a manner to effect pivotal movement of the lock-out lever 35 for the purposes aforesaid.

The present invention dispenses with such pedal control means, among other things, and provides automatic timing and actuating mechanism including electromagnetic means such as the solenoid 41 connecting with lever 39 through a relatively yieldable but stiff coil spring 42, in such manner that upon energization of the solenoid its armature 43 will be attracted and raised with a consequent clockwise rocking of shaft 38, resulting in release of the lock-out lever means 35—36—37, so that spring 34 may elevate rod 30 and actuate the paste tipping bail means 26.

The lock-out lever system is restored quickly to locked condition as the paster means 26 is rocked back toward normal position in the paste trough, and this is accomplished by action of a cam 45 driven constantly by the main power shaft 46. When the actuating lever 32 rocks upwardly as aforesaid, a coaxing cam rocker arm 47 is permitted to rock counterclockwise so that its cam roller 48, normally riding the periphery of cam 45, can move from the dwell 45a of the cam to a low point or land 45b thereon. As the dwell portion of the cam comes around again cam rocker 47 and actuating lever 32 are rocked clockwise, and spring 40 causes the lock-out lever to re-engage locking stud 37. The aforesaid lever and cam mechanism is part of the known machine and does not constitute part of the invention per se excepting only insofar as it is actuated by the novel control means of the invention, and functions in combination with the latter.

Means is provided in the known machine for shifting the needle plate 21 alternately in the direction of its length, as indicated by the directional arrows, this being done to effect a cutting of the several leads of thread utilized in sewing the signatures together. The shear means for actually cutting the threads does not constitute part of this invention and therefore need not be shown in detail. However, the purpose of shifting the needle plate alternately as aforesaid is to cause the threads to engage stationary shear edges as the group of sewn signatures is pushed forward toward the discharge side of the machine.

A plate-shifting lever 50 is arranged to be moved back and forth as aforesaid by a crank 51 adapted to be rocked by lever means 52 (see also Fig. 6) having an end roller 53 which works in a cam track 54 in the face of a cam 55 (Fig. 5 also), it being pointed out that the cam track 54 has a plurality of alternate low and high points 54a and 54b, respectively, so that as the cam rotates in one direction, the lever arm 52 is rocked up and down with consequent alternate shifting of the needle plate 21.

The cutter cam 55 is stepped rotatively in a counterclockwise direction by a stepping pawl 57 (Figs. 5 and 6) engaging in a toothed ratchet member 58 by rocking movement of a bell crank 59 as a result of vertical reciprocation of a connecting rod or shipper 60 pivotally connected as at 61 to a long lock-out lever arm 62 mounted on the same pivot 33 as the paster restoring cam means 47 and actuating lever 32.

A coil spring 63 normally pulls the lock-out lever 61 upwardly so as to effect movement of the shipper rod 60, but the stepped end 64 of the lever arm is also normally engaged with the stepped end 65 of a dog-leg lock-out lever 66 rockably mounted on a shaft 67, spring means 68 being employed to urge the dog-leg lever so as to hold its stepped locking end 65 in locking engagement with end 64 of the long lock-out lever, thereby normally preventing rod 60 from being pulled up by spring 63.

The foregoing shifting mechanism is part of the prior art, and heretofore it has been actuated by pedal means (not illustrated) arranged to rock the shaft 67 so as to withdraw lock-out parts 64-65, said pedal means having been arranged closely adjacent the pedal means heretofore described for rocking the paster shaft 38.

According to the present invention, such additional pedal means is eliminated, and electromagnetic means such as a solenoid 69, having an armature 70 connected through pin and slot means 71 to a lever arm 72, rocks the shaft 67 and releases the cutter lock-out means as aforesaid when the solenoid is energized.

The paster lock-out means is restored to locking condition by a cam 73 rotating in step with the cam 45, and which is engaged by a cam roller 74 on the lock-out arm 62, said roller being elevated by the arm to a position where it will be engaged by the high part or dwell 73a of the cam as a result of raising of lever arm 62 by spring 63 each time the lock-out lever is released, whereupon the lever arm is depressed by cam 73, so that the lock-out 64-65 is restored.

In the manufacture of sewn books, the first and last signatures, or end sections, are usually pasted to the adjoining signatures for added strength at the ends of the book, and the pasting operation must therefore be performed twice during each sewing operation, whereas, the cutting operation occurs only once.

Heretofore on machines of the type described, the operator was obliged to estimate or guess at the timing of the operation of certain foot pedals for actuating the paster and cutter means, and this was usually done by watching the return of the signature feeding pawl 19 after the first and last signatures in each book had been fed, it being the custom to operate either a paster or cutter pedal at a time when the pawl 19 had nearly returned to its starting position shown in Fig. 1.

Thus, prior to the present invention, the operator was obliged to feed the first signature by depressing the conventional master control pedal (not shown), and then, as the pawl 19 was nearing home position, depress another paster control pedal to effect an operation of the paste bail 26; and still another cutter control pedal had to be depressed at the proper instant with relation to an operation of the paster pedal prior to starting another book. The timing of these numerous pedal operations was based entirely on the movements of the feeding pawl, and in actual practice defective books resulted from poorly judged tim-

ing in the rapid manipulation of three pedals while the operator was also employing both hands in feeding signatures. Signatures were frequently pasted or cut in the wrong places or not at all, so that apart from the nervous strain upon the operator, production losses were frequent.

The present invention obviates the necessity for guesswork in timing, as well as complicated pedal operation, and provides a manually operated combination cutter and paster master control especially contrived to bring about two operations of the paster means and one operation of the cutter means for each single operation of said master control, and to cause actuation of the paster and cutter means in accurately timed relation to each other, with a consequent elimination of defective books.

As viewed in Fig. 1, the control means of the invention comprises a timer shaft 80 journaled at one end in a simple bearing block 80a (Fig. 4) fixed on the main frame of the machine, and at the opposite end in a heavy bracket plate 81, likewise mounted on the machine frame, so that the timer shaft is mounted for rotation in parallelism with the main drive shaft 46. A sprocket 82 is fixed on the timer shaft and is driven by a sprocket chain 84 from a smaller sprocket 85 fixed on the end of the main drive shaft.

It will be recalled that a complete revolution of the cams 45 and 73 (and hence of the main shaft 46) suffices to restore the paster and cutter lock-outs to locked condition, thereby fixing the limits for each cycle of operation of these mechanisms, the cycle being started by the master control as will hereinafter appear. For reasons to appear, the timer shaft 80 is calculated to make only one-third of a revolution for each complete revolution of the main drive shaft in order to adjust the operation of the paster and cutter means to the average rhythm of signature feeding; hence, the ratio of sprockets 82 and 85 is 3:1.

Floating freely on the timer shaft 80 is a clutch disc 86 which is fixed to a timer disc or cam 87 movable therewith (see also Figs. 3 and 4). The clutch disc is adapted to be rotated in an anticlockwise direction by slip-clutch means including a clutch washer (Fig. 4) 88 of felt or other suitable facing pressed against the clutch disc by a face collar 89 urged by a spring 90 against the washer, a stop collar 91 adjustably secured on the shaft being used to provide for tensioning the spring. Another of the clutch washers 88 is also pressed against the back side of the timer disc by a second face collar 92 fixed on shaft 80.

Ordinarily, the aforesaid clutch means tends to carry the clutch disc around with shaft 80, but such rotation is prevented by a holding pawl 95 (Fig. 3) rockably mounted by means 96 on the bracket plate 81 to pivot in the plane of the clutch disc, the upper or free end of this pawl being disposed to lie in the path of a relieved stop projection 97 on the clutch disc, so that the latter is held against the driving effort of the clutch washers, which slip until such time as the holding pawl 95 is withdrawn, whereupon they exert sufficient frictional bearing against the clutch disc to carry the latter around with them.

Withdrawal or release of the clutch holding pawl 95 is effected through the agency of a connecting rod 98 pivotally attached at one end to the holding pawl (Figs. 3 and 4), and at its opposite end to the armature 99 of an electromagnetic tripping solenoid 100. Spring means (not seen) is arranged interiorly of the solenoid nor-

manually urging the armature outwardly thereof into the position shown in Fig. 1, and this in turn urges the holding pawl 95 into stopping relation with the clutch disc.

Means for effecting energization of the several actuating solenoids includes a plurality of switches 101, 102, and 103 (Figs. 3 and 4) arranged at equal distances around the periphery of the timer disc, and each adjustably attached to bracket 81 by individual bracket 104 to which the switches are secured by means of screws 105 extending through elongated slots 106 in their respective casings.

Each of the switches has an operating plunger 101a, 102a, and 103a, respectively, and positioned in the path of a cam rise 87a on the timer cam, such that as the latter rotates, the switch-operating plungers will be successively depressed and the several switches actuated to close control circuits shown in Fig. 7, shortly to be described.

In order to energize the main control solenoid 100 so as to release the holding pawl 95 and cause rotation of the timer cam, there is provided a master touch-responsive control in the form of a plate member 110 attached by hinge means 111 to lie normally in the plane of the front face of the feeding saddle or wedge portion 15a, as illustrated in Figs. 1 and 2.

Mounted behind the touch plate 110 is a sensitive switch 112 having an operating plunger 113 disposed behind the touch plate and pressing against the same near its hinge connection so as normally to urge the latter into approximately flush relation with the front face of the feeding saddle or wedge. When the operator wishes to actuate this master control member, she merely touches plate 110 and pivots the same a slight amount, as illustrated by the dotted line position thereof in Fig. 2, thereby depressing plunger 113 sufficiently to operate switch 112.

Referring now to the circuit diagram of Fig. 7, operation of switch 112 closes contacts 112a—112b thereof to complete a power circuit via conductors 112c, 112d, 112e, and power source 112f (here shown conventionally as a battery, but contemplating any suitable source of electrical energy) whereby to energize the tripping solenoid 100 thereby effecting withdrawal of the clutch holding pawl 95 to free the clutch disc 96 and effect rotation of the timer disc 87 in the manner heretofore explained.

The cam rise or nose 87a on the timer disc first engages and depresses plunger 101a on the first control switch 101, closing contacts 101a—101b thereof to complete a power circuit via conductors 101c, 101d, 101e, and power source or battery 101f to energize the paster solenoid 41.

Further rotation of the timer cam causes the cam rise 87a thereof to close contacts 102a—102b of switch 102 whereby to complete a power circuit via conductors 102c, 102d, 102e, and power source or battery 102f to energize the cutter solenoid 69.

Still further rotation of the timer cam 87 causes the rise 87a to actuate switch 103 and close its contacts 103a—103b and again complete a power circuit via conductors 103c, 103d and power source or battery 101f, conductors 101d, 101e, to the paster solenoid 41, switch contacts 103a—103b being in parallel or shunt with the contacts 101a—101b of the first paster switch.

The foregoing circuit means therefore contemplate the operation of the touch plate 110 to trip the clutch solenoid and free the timer disc for one revolution, such that the paster solenoid 41

will be operated twice at intervals, and the cutter solenoid 69 will be operated once, for each cycle. It may be observed here that the actual starting position of the timer is shown in Fig. 3, from which it will appear that in each cycle the order of operation is: paste, cut, paste, stop. The reason for this order is that the last signature of a book is pasted, then the thread is cut, and then the beginning of the next book (actually the second signature thereof to be fed) is pasted in the interval afforded by the three-to-one timing ratio, heretofore mentioned, between the actuation of the cutter switch 102 and the second paster switch 103, before the timer comes to rest.

In Fig. 8 there is shown a modified form of the invention in which the power for actuating the paster and cutter means is taken from the main drive shaft 46x through the agency of sprocket means 83x—84x—85x analogous to that described in view of Fig. 1, the ratio likewise being 3:1, so that the main shaft 46x makes three revolutions to one of the timer shaft 80x.

Slip-clutch means, substantially identical to that employed in the embodiment of Fig. 1, is arranged on timer shaft 80x and includes a clutch disc 86x (see also Fig. 9) floating on said shaft and adapted to be rotated therewith by slip-clutch washer 88x urged thereagainst by spring means 92x as in the arrangement of Fig. 4.

A stop holding pawl 95x (Fig. 9) normally lies in the path of a stop notch or nose 97x on the disc thereby preventing rotation of the latter. A connecting rod 98x connects the pawl 95x with the plunger or armature 99x of a tripping solenoid 100x, such that the latter, when energized, will draw the rod 98x toward the left and pull the pawl 95x out of engagement with the clutch disc so that the clutch assembly may rotate with shaft 80x.

Mechanically driven means for actuation of the paster means includes a double or compound cam consisting of two discs 110a, 110b (Fig. 9) each having a cam rise or high point 110ax and 110bx respectively, displaced from the other by approximately 150° (to centers of rise).

A yoke 112 at the left end of an arm 113 floats on the clutch shafting in between the two cam discs 110a—110b, and is provided with twin cam rollers 114a, 114b (Fig. 8) disposed to be engaged by the cam rises 110ax, 110bx. The right-hand end of arm 113 is connected to a crank arm 115 fixed on paster shaft 38x.

Thus, when the clutch unit is free to rotate, the compound paster cam will shift the arm 113 toward the left twice for each complete revolution, and this in turn rocks the paster shaft 38x to withdraw the lock-out lever 35x so that spring 34x may raise the paster actuating lever 32x and rod 30x to rock the paster bail 26x down and back again in the manner described in view of Fig. 1. Spring means 40x restores the lock-out, cooperatively with the restorative action of the main cam means 45x—48x—47x in the manner heretofore described.

Means for mechanically actuating the cutter means in timed relation to the paster means includes a cutter cam 120 also floating on the timer shaft 80x as a part of the clutch unit to rotate jointly with the compound paster cams 110a—110b when the clutch pawl 95x is released.

The cutter cam includes a rise 120a for engagement with a cam roller 121 (Fig. 9) at one end of a long rocker arm 122 pivoted as at 123 on the machine frame, with its opposite end portion

124 pivotally connected to a vertical rod 125, which is in turn pivotally connected at 126 to a rocker arm 72x fixed on the cutter rock shaft 67x along with the cutter dog-leg lock-out lever 66x.

Thus, when the clutch unit is freed to rotate for one revolution as aforesaid, the cam rise 120a on the cutter cam engages roller 121 and rocks the arm 122 clockwise so as to elevate the rod 125 and rock the cutter rock shaft 67x clockwise, thereby effecting withdrawal of the dog-leg lock-out means 64x—65x so that spring means 63x may elevate the cutter actuating arm 61x and the connecting rod 60x to effect a stepping of the pawl and ratchet means 55x—51x and thereby shift the needle plate 21x through the agency of the crank and lever means 52x—51x—50x, exactly in the manner set forth in describing the operation of the embodiment of Figs. 1, 5, and 6.

The master control for the embodiment of Fig. 8 is identical to that of Fig. 1, namely, a touch plate 110x arranged to actuate a sensitive switch means (not seen in Fig. 1, but see Fig. 2) identical to that shown in Fig. 2 and connected as in Fig. 7 to actuate the tripping solenoid 100x of Fig. 8, exactly in the manner of its counterpart, the solenoid 100 in Figs. 1 and 7.

Operation

Referring to Fig. 1, the operator or attendant is seated before the feeding saddle or wedge 15 and proceeds to remove the prepared signatures from a stock table (not shown) and open them at the middle fold and then place them on the saddle in the position occupied by the signature 16, with the right-hand end of the fold portion against the feeding pawl 19.

It may be observed here that the book signatures are usually sewn backwards, i. e. the last signature of a book is fed first and the first signature comes last in order of feeding. Feeding is effected by the reciprocation of pawl 19, which the operator may keep in motion by holding down a main control pedal (not shown) and maintaining a feeding rhythm in step with the movements of pawl 19. Reciprocation of the feed pawl as aforesaid transfers the signatures onto the movable saddle or wedge section 15b.

When the last (actually the first of the book) signature is fed, the operator must actuate the paste-tipping means, and in the embodiment of both Figs. 1 and 8, this is done by a light movement or brushing of the fingers over the touch plate 110 or 110x, it being understood that both embodiments aforesaid are operated in the same manner, so far as the attendant is concerned. Such actuation of the touch plate effects energization of the tripping solenoid 100 (or 100x), causing release of clutch pawl 95 (or 95x) to free the timer means for a cycle of operation, namely, one revolution.

In the embodiment of Figs. 1, 3, and 7, switch 101 (contacts 101a—101b) close momentarily and energize the paster solenoid 41, causing the paste-tipping bail 26 to descend and tip the last signature at a time when it has been fed onto the movable wedge section but before the latter has moved forward beneath the needle plate.

Immediately following, the second switch 102 (contacts 102a—102b) closes to effect a cutting of the threads, thus finishing the sewing of the book.

Meanwhile, unless the operator has released the master control pedal to stop the machine, the timer cam 87 continues to rotate past the cutter switch 102 and will again operate the

paster switch 103, and during the interval between operation of the cutter switch 102 and the second paster switch 103, the operator must feed the first two sections of the next book.

The operator times the feeding so as to place the second signature (actually the next-to-last of the next book) on the saddle just before paster switch 103 is operated by the timer cam, whereupon the paste bail 26 will descend as before, and the timer cam will come to rest in the starting position shown in Fig. 3.

As the last signature of the book is fed, the operator again depresses the touch plate 110 and paster switch 101 operates to effect a tipping of this last signature; and this action is followed at once by operation of the cutter switch 102, it being necessary that the first two signatures of the next book are fed before the timer cam finishes its cycle of movement and actuation of the last paster switch 103.

It will be understood that if the feeding rhythm is interrupted for any reason at this juncture, the machine may be stopped by releasing the master control pedal heretofore mentioned and constituting part of the previously known machine.

Because of the foregoing cycling of the novel control means, the operator usually causes the machine to perform a blank pasting and cutting operation without signatures, and stops the machine by means of the master control pedal after the timer cam has operated switches 101 and 102 but not the last paster switch 103, this being done so that a new book may conveniently be started by feeding two signatures so that the second one (being the next-to-last of the new book) will be pasted as the timer resumes and completes its interrupted cycle by operating paster switch 103 and stopping. When this book is finished the touch plate 110 will be operated and the necessary pasting and cutting operation will be effected by movement of the timer cam through the first two-thirds cycle; and the next book will be started so that the second signature thereof to be fed will be pasted by the operation of switch 103 as the timer cam completes its cycle, and so on.

The modified form of the invention shown in Fig. 8 is operated in the same manner as the device of Fig. 1, the mechanics involved in each instance differing by the use of especially contrived cam means, in place of the electromagnetic actuating means for the paster and cutter controls of the embodiment of Fig. 1.

In the case of the device of Fig. 8, upon reaching the last signature of a book (or after effecting a blank operation to facilitate starting a new book as aforesaid) the tripping solenoid 100x is energized to release the clutch by effecting withdrawal of stopping pawl 95x as described in detail hereinbefore.

Assuming the usual case where one book is being completed and another started, the timing cams will be in the initial positions shown in Fig. 9, and the first thing to occur will be engagement of cam rise 110bx with cam roller 114a to shift the paster connecting rod 113 to the right, rocking the lockout arm 35x so that the paster actuating lever 32x may elevate rod 30x and lower the paste tipping bail 26x.

Following shortly after the first operation of the paster cam as aforesaid, cam rise 120a on the cutter cam will engage cam roller 121 on cutter actuating lever 122, breaking the lock-out 64x—65x so that the ratchet means 55x—51x

will be stepped by elevation of rod 60x, thus rocking lever arm 52x to cause a shifting of the needle plate 21x to loop the thread leads for cutting in the well known manner.

Following operation of the cutter cam means 120a—121 as aforesaid, the operator feeds the first two sections of a new book by the time the second paster cam rise 110ax engages cam roller 114a to shift the paster rod a second time as aforesaid, whereupon the timer cam cycle is completed and the cam and clutch unit comes to rest in the position shown in Fig. 9.

The objects and advantages of the invention and discovery may be realized by modified forms of the arrangements hereinbefore described in detail for purposes of illustration, and such detailed description is therefore not to be construed as limiting the invention except as may be provided in the appended claims, which are intended to include all equivalent constructions and combinations of parts fairly coming within their call.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States is:

1. In a book sewing machine, the combination with pasting and cutting means of control mechanism comprising separate actuating means for said pasting and cutting means, timing means for operating said actuating means severally in a predetermined timed relation, and master control means for operating said timing means to effectuate timed operation of the pasting and cutting means for the purposes and in the manner set forth.

2. In a book sewing machine, the combination with pasting and cutting mechanisms of control means comprising a timer operable in cycles, attendant-controlled means for initiating a cycle of operation of said timer, and means under control of said timer for actuating said pasting means and said cutting means in timed relation a predetermined number of times for each operating cycle aforesaid.

3. In a book sewing machine, the combination with pasting and cutting means of a master control, a cyclically operable member, separate paster and cutter control means actuated in a predetermined order by said cyclically operable member during each cycle of operation thereof to effectuate operation of said pasting and cutting means, and means actuated by said master control for initiating a cycle of operation of said cyclically operable member.

4. In a book sewing machine of the class described, including pasting means and cutting means, a manually operable touch-responsive master control, timing means actuated by said master control, and actuating means for said pasting means and said cutting means operatively associated with said timing means in such manner that each operation of the latter will effectuate a predetermined number of operations of said actuating means in a certain timed relationship responsive to each touch-operation of said master control.

5. In a book sewing machine of the class described, which includes pasting means and cutting means, a master control, a timer operable in cycles, means actuated by said master control for effecting a cycle of operation of said timer for each operation of the master control, and means actuated by said timer during each cycle of operation thereof for effecting plural operation of said

pasting means and singular operation of said cutting means.

6. In a book sewing machine of the class described, which includes pasting means, cutting means, and book signature feeding means and mechanism for operating at least said pasting and cutting means severally, the combination of a master control, individual actuating means co-operable with said operating mechanism for effecting operation of said pasting means and said cutting means, together with timing means under control of said master control for operating each of said individual actuating means in a certain order and in timed relation to operations of said feeding means.

7. In a book sewing machine of the type which includes pasting means and cutting means and means for actuating the same severally together with lock-out means for each said pasting and cutting means and releasable from a normally locked condition to effect a single operation of said pasting and cutting means, the combination of: a master control, a timer actuated by said master control, and means under control of said timer for effecting release of said lock-out means at different intervals for each actuation of the timer by the master control as aforesaid.

8. In a book sewing machine of the type described and which includes pasting means and cutting means, a main drive shaft, means for actuating the pasting and cutting means severally, together with lock-out means for each said actuating means and normally rendering the pasting and cutting means inoperative but releasable to permit operation of the same severally, improvements comprising: the combination with said lock-out means of individual releasing means for each of the same, cam means co-operable with said shaft for restoring said lock-out means automatically after each release thereof, timing means driven from said shaft cyclically, releasable means normally restraining cyclic operation of said timing means, a master control, means actuated by said master control for effecting release of said releasable means to initiate a cycle of operation of said timing means, and means operated during each cycle of operation of the timing means for actuating said individual releasing means for the lock-out means in a predetermined manner.

9. In a book sewing machine of the class described including pasting and cutting mechanisms, together with a signature-feeding pawl driven from a main driving source at a certain rate, control means comprising: timing means adapted to rotate, slip-clutch means connecting said timing means with said main driving source, releasable holding means normally restraining rotation of said timing means, a master control for said timing means, tripping means actuated by said master control for releasing said holding means to permit rotation of the timing means, and means actuated by said timing means upon rotation thereof for effecting operation of said pasting and cutting mechanisms in timed relation to each other and to the driving rate of said feeding pawl.

10. In a book sewing machine of the type set forth which includes pasting and cutting mechanisms and a signature receiving saddle with reciprocable signature feeding means thereon, control means comprising: a master control mounted closely adjacent said saddle, timing means actuated by said master control, and means op-

erated by said timing means for effecting operation of said pasting and cutting mechanisms in a predetermined order and at a certain rate with respect to the rate of reciprocation of said feeding means.

11. In a book sewing machine of the type described which includes pasting and cutting mechanisms and a signature receiving saddle with signature feeding means thereon, control means comprising: a touch-responsive master control member mounted on said saddle as a part thereof and in position to be engaged by the hand of an operator depositing signatures on the saddle, and timing means actuated by said master control for effecting timed operations of said pasting and cutting mechanisms in a predetermined manner responsive to each operation of the master control.

12. The combination set forth in claim 11 in which said saddle includes a plane surface pitched at an angle with respect to the vertical, and said master control includes a plane surface portion arranged to lie normally in approximately flush relation to said surface of the saddle.

13. The combination, with pasting and cutting mechanisms in a book sewing machine, of a signature-feeding saddle having a touch-responsive master control associated therewith with at least a portion of said control lying in a plane which includes a portion of said saddle, and actuating means for said pasting and cutting mechanisms operatively controlled by said master control.

14. In a book sewing machine, means for pasting signatures and sections, means for cutting sewing threads, electromagnetic means for severally actuating said pasting and cutting means, a rotatable timer, a master switch and means controlled thereby for effecting predetermined rotation of said timer, together with switch means for actuating each of said electromagnetic means and arranged for operation in a certain order by said timer upon rotation thereof.

15. In a book sewing machine of the class described which includes pasting mechanism, cutting mechanism, and signature feeding means, control means comprising: a rotatable timer cam, a plurality of switches arranged for operation in succession by said cam upon rotation thereof, electrically controlled means each actuated by one of said switches and operable to actuate said pasting mechanism and said cutting mechanism respectively, means for rotating said cam at a predetermined rate correlated to the rate of operation of said feeding mechanism, and master control means for starting and stopping said cam.

16. The combination of claim 15 further characterized in that said master control means forms a part of said feeding means.

17. In a book sewing machine of the type which includes a signature saddle having at least one surface inclined in a plane sloping downwardly, the combination with said saddle of a control member having a planar surface portion normally adapted to be disposed in approximately flush relation with said first-mentioned surface

and further adapted to pivot about an axis closely parallel to said plane, and a control device actuated by said control member and including means normally urging said control member into the flush position aforesaid.

18. In a book sewing machine, in combination, pasting means, means normally urging said pasting means into operative position, lock-out means normally restraining movement of said pasting means into operative position, cutting means and means normally urging the same in cutting action, lock-out means normally restraining said cutting means from cutting action, signature feeding means, means for driving said feeding means at a determined rate, timing means including cam means arranged for joint rotation from a starting position, means for rotating said cam means at a predetermined rate relative to said determined rate by said driving means, means for controlling rotation of said cam means in cycles, and mechanism actuated by said cam means during each cycle of operation thereof for effecting release of said lock-out means respectively in a certain order, together with means for automatically restoring said lock-out means to locking condition following each release thereof as aforesaid.

19. In a book forming machine of the type which includes a plurality of mechanisms for performing book forming operations, which mechanisms are adapted to be driven from a common driving source in a predetermined timed relationship and are adapted to be severally actuated by operation of actuating means provided therefor, improvements comprising and characterized by: provision of controls for each said actuating means; timing means common to said controls and operable to effect actuation thereof for operating said actuating means in a predetermined order; means cooperable with said common driving source for driving said timing means; and means adapted to be actuated by an operator for starting and stopping said timing means.

20. In a book forming machine of the class which includes known mechanisms for effecting forming operations upon book esignatures, and operator-controlled means for effecting actuation of said mechanisms, improvements comprising and characterized by: the provision of a signature-receiving saddle including an inclined surface upon which portions, at least, of said signatures are received; master control means including a movable member having a surface normally disposed within a portion of the plane of said surface of the saddle so as to lie in approximately flush relation therewith, said member being mounted to move out of said flush relation; a controlling device actuated by said movable member and including a movable part normally disposing said movable member in said flush relation, whereby an operator in placing a signature upon the saddle may by a continuing movement of the hand touch said movable member and actuate the aforesaid mechanisms for effecting forming operations.

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