Dec. 7, 1965 L. MESTRE 3,221,965

STAPLER MECHANICAL OPERATING MECHANISM FOR COLLATORS

Filed July 22, 1963 3 Sheets-Sheet 1

FIG. 1.

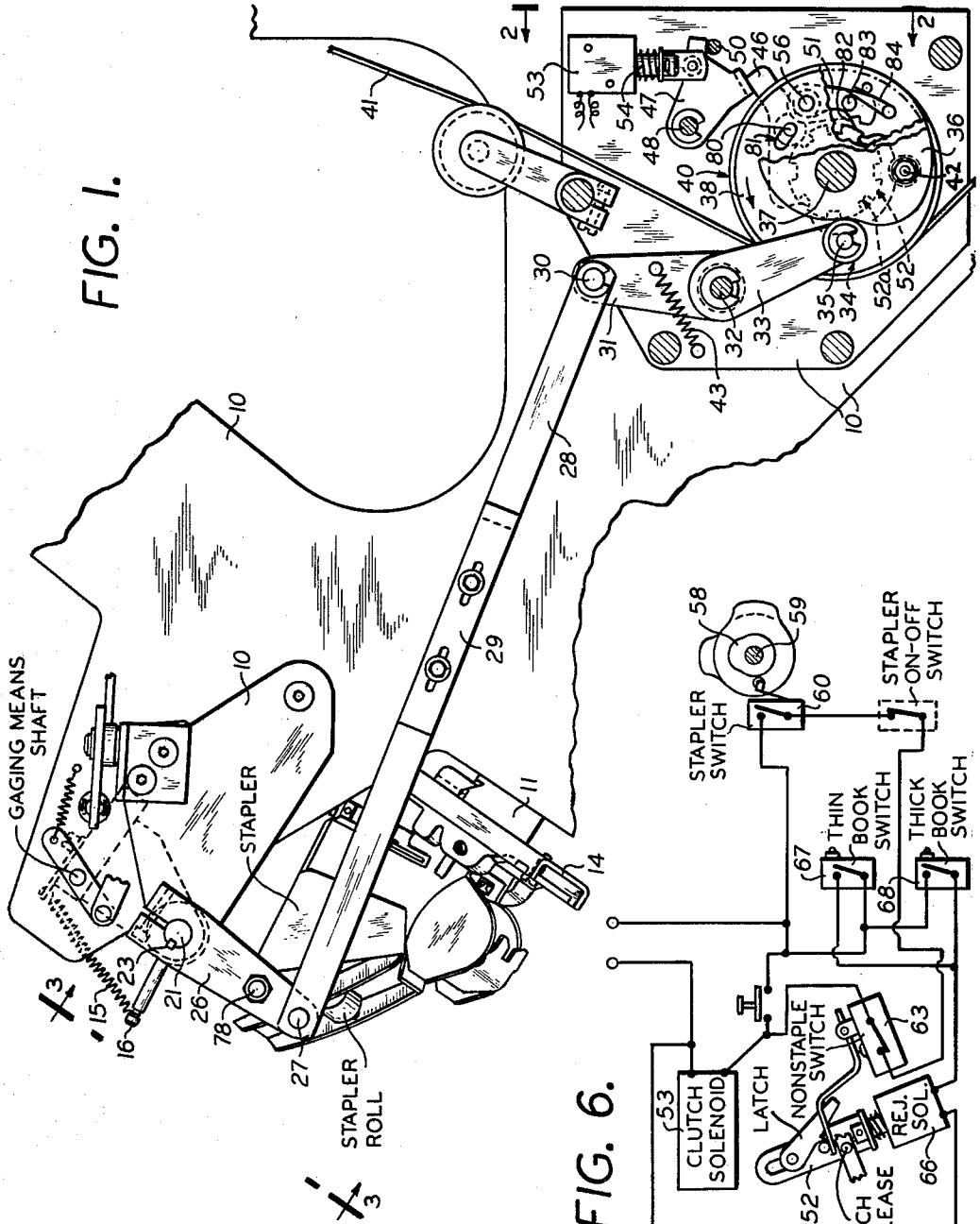


FIG. 6.

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STAPLER MECHANICAL OPERATING MECHANISM FOR COLLATORS

Filed July 22, 1963 3 Sheets-Sheet 2

FIG. 2.

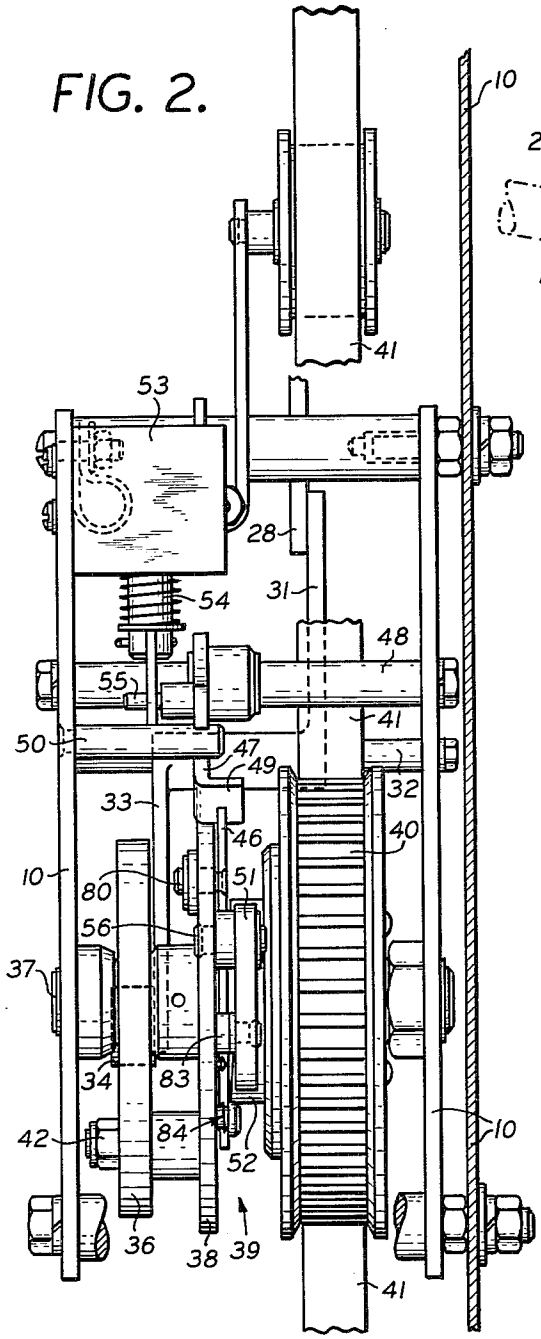


FIG. 4.

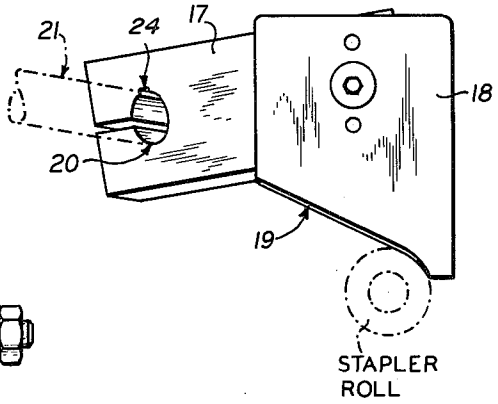
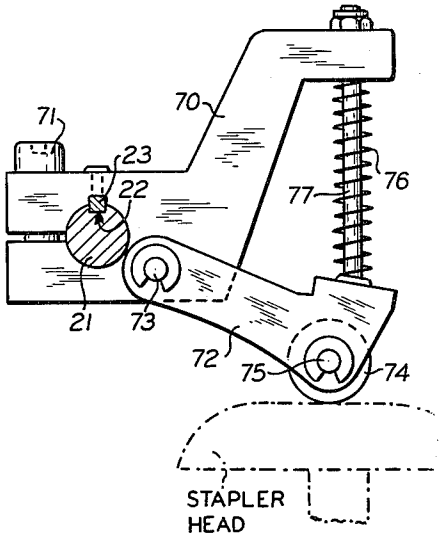


FIG. 5.



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STAPLER MECHANICAL OPERATING MECHANISM FOR COLLATORS

Filed July 22, 1963 3 Sheets-Sheet 3

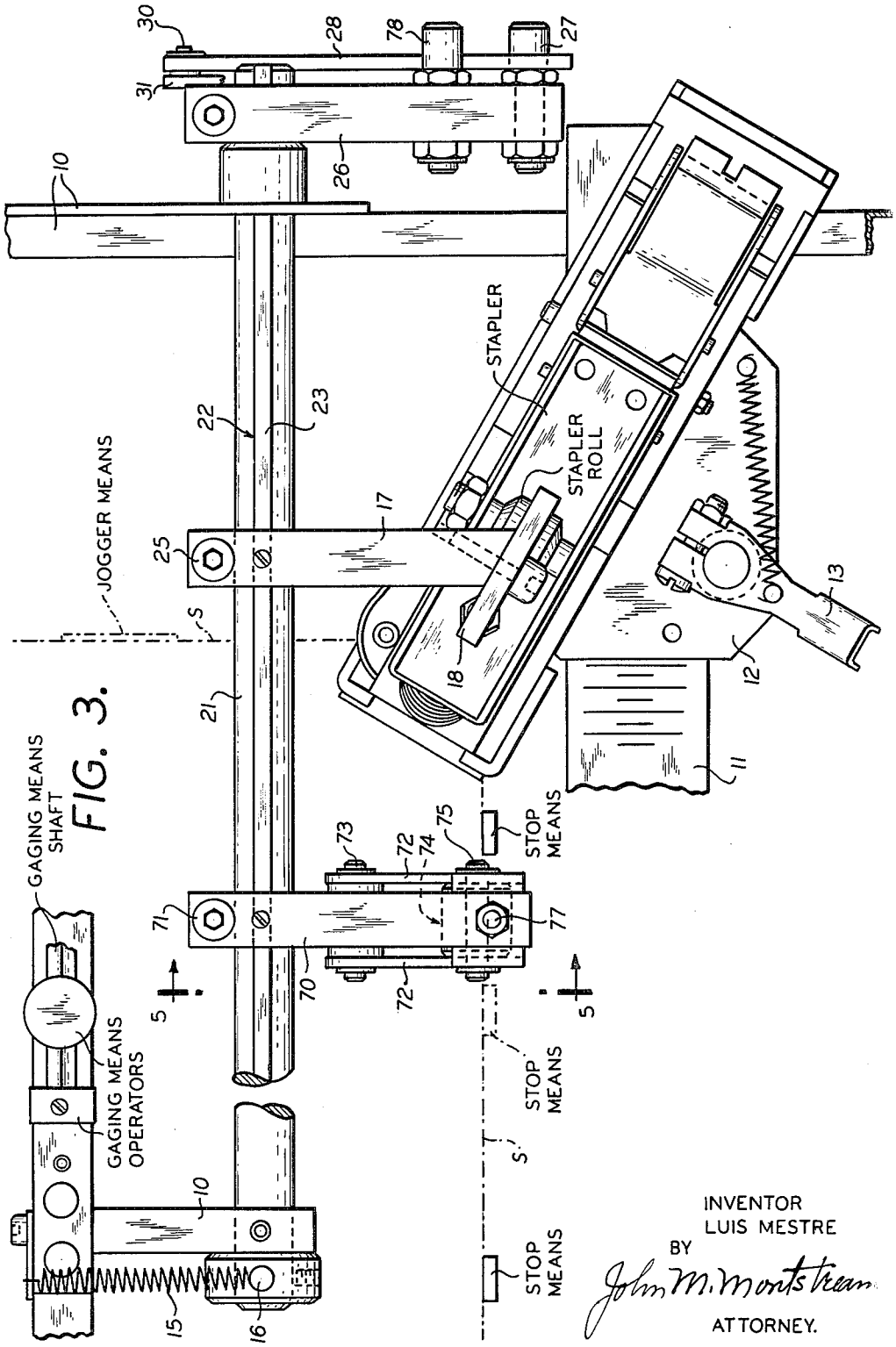


FIG. 3.

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STAPLER MECHANICAL OPERATING MECHANISM FOR COLLATORS

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Filed July 22, 1963, Ser. No. 296,589

11 Claims. (Cl. 227—7)

The invention relates to a stapler operating mechanism for collators and is particularly designed for the collator of the Luis Mestre application S.N. 191,141, filed Apr. 30, 1962, now Patent 3,108,797 dated Oct. 29, 1963, and S.N. 243,345, filed Dec. 10, 1962. In this collator the sheets of a book are withdrawn from storage pockets and transported by belt transporting means in over lapping relation and with their leading edges in spaced relation. In between the ends of the belt transporting means there is provided stop means which halt the sheets for a prescribed short time during which time the sheets are aligned longitudinally and laterally, the book of sheets is gaged, and stapled particularly in one corner after which the stop means is depressed and the book passes to the end of the transporting means and usually deposited on a deposit table. In the event the gaging means indicates that the book of sheets is too thin, that is it lacks one or more sheets, or too thick, in that it contains one or more duplicate sheets, the book of sheets is rejected, preferably without stapling, and passes to a rejection compartment or bin rather than to the deposit table. There are times, such as for a short run of books, when it is desirable to use a stapler using formed or pre-fabricated staples. At other times it may be desirable to run a large quantity of books in which event it is desirable to use a stapler which makes it own staples from a spool of wire, the stapler making the staples as it is used. Both of these types of staplers are purchasable on the market and are well known. Heretofore the staplers as used on a collator have been operated by a solenoid, the operation of which is subject to occasional misses and the power of the solenoid may be insufficient for full efficient operation. The mechanism herein is an improvement thereof.

It is an object of the invention to construct a stapling mechanism for a collator located on the transporting means for the sheets between the storage pockets and a deposit table or platform which stapling mechanism is mechanically operated from the collator.

Another object of the invention is to construct a stapling mechanism for a collator which may use either a stapler using pre-fabricated staples or a stapler which manufactures each staple as it is used as a part of the stapling operation.

Another object of the invention is to construct a stapling mechanism for a collator in which the stapler mechfrom a spool of wire, the stapler making the staple as tor.

A further object is to construct a stapler mechanism which operates through a clutch connected with a collator shaft.

A still further object is to construct a stapler mechanism which does not operate the stapler when a book of sheets is rejected.

Other objects of the invention will be more apparent from the following description when taken in connection with the accompanying drawings illustrating a preferred embodiment thereof in which:

FIG. 1 is a side elevation of the drive connection to th stapler operating lever;

FIG. 2 is an end view of the stapler mechanism of FIG. 1;

FIG. 3 is a top view of a stapler mounted in position on the belt transporting means of the collator and showing the stapler operating levers.

FIG. 4 is an enlarged view of the operating lever for operating a stapler of the style which manufactures its own staples from a spool of wires;

FIG. 5 is an enlarged view of the operating lever for use with the style of stapler which uses formed or prefabricated staples;

FIG. 6 is essentially an electrical circuit diagram of the switches and the means for controlling the operation of the drive connection for the stapler operating mechanism.

The frame **10** on which the stapling mechanism is mounted is of suitable form and is the frame of the collator or more particularly the frame of the sheet transmitting means of the collator. Means is provided as a part of the frame to secure the stapler to the frame which includes a stapler mounting ar **11**. This bar preferably has graduations to assist in properly locating the stapler for the particular width of sheets to be stapled. Mounting means is provided on this bar to mount a stapler, which means includes a stapler carriage **12** which is adjustable along the bar to adjust the position of the stapler depending upon the width of the sheets S and with respect to the edge of the book of sheets. The carriage is secured to the bar such as by being clamped in position on the bar by a clamp **13** of any suitable kind.

The sheets of the book are momentarily halted by a stop means at which time the sheets are aligned longitudinally by the stop means and other means and aligned laterally by a jogger means. Also while halted, the book of sheets is gaged by a pair of gages, as described in the aforesaid application; and if the book is acceptable, the sheets are stapled and the book passes to a deposit table at the end of the transporting means.

Preferably the stapler is suitably secured to the stapler carriage at an angle by a holding means **14**, shown as a channel, so that the staple is applied at an angle at the adjacent corner of the book although this position is not essential. The stapler particularly illustrated is of the type which manufactures its own staple as it is used. This stapler carries a stapler operating roll carried by the stapler head which is pressed downwardly in order to operate the stapler.

The staple is operated by stapler lever means which, for the type of stapler which makes its own staple, includes an operating lever **17**, FIG. 4. This lever has a stapler operating member **18** secured to the lever and forming a part thereof and providing an operating surface **19**. When the stapler is mounted at an angle to the corner of the sheets, this operating member is secured at an angle corresponding to, and in order to accommodate for, the angular position of the stapler. The operating member and its inclined lower surface **19** engages the stapler roll and presses it downwardly in order to operate the stapler. The stapler operating lever has a hole **20** therethrough to receive the stapler operating shaft **21**. The shaft has a key slot **22** for carrying a key **23** (FIG. 5) which key engages in a key slot **24** carried by the operating lever so that the lever may be adjusted along the operating shaft to position the lever to operatively engage the stapler in any adjusted position dependent upon the width of the book sheets to be operated. A bolt **25** secures or clamps the lever in position on the operating shaft. The shaft **21** is propelled to initial position by a spring **15** having one end secured to a pin **16** carried by the shaft and the other end being secured to the frame.

Operating means is provided to oscillate the stapler operating shaft **22** in timed sequence with respect to the collator cycle of operation in order that stapling take place immediately after the book of sheets is gaged. The operating means shown includes a clutch and a linking connection between the clutch and the stapler operating shaft **21**. The linking connection includes a lever **26** se-

cured to the end of the shaft, which lever carries a pin 27. One end of a link 28 is received on the pin 27 and carries a link adjustment means 29 by which the length of the link may be adjusted. The other end of the link is pivotally mounted on a pin 30 carried by a cam lever 31, which lever is pivotally mounted on a pivot 32 carried by the frame 10 or particularly on a bracket forming a part of the frame. The cam lever includes an arm 33 carrying a cam follower 34 rotatably mounted on a pin 35.

The cam follower engages a cam 36 mounted on a drive shaft 37, which cam is secured, such as by bolt means 42, to a driven member 38 of a clutch 39. This clutch may be of any suitable construction, however, it is of a type of clutch which rotates the driven member for one revolution on engagement of the clutch and upon completion of one revolution, the clutch is automatically disengaged or released. The clutch also is one which functions precisely at high speed. A spring 43 attached at one end to the cam lever retains its cam follower against the cam. The clutch 39, when engaged, is driven by a pulley member 40 which is driven by a belt 41 connected with one of the shafts of the collator.

It is immaterial whether the cam 36 and driven member 38 are secured to the drive shaft 37 and the pulley and driving member 52 are rotatably mounted on the shaft or whether the cam and driven member are rotatably mounted on the shaft and the pulley is secured to the shaft. As constructed, the cam and driven member are secured to the drive shaft. The pulley and clutch drives the driven member and the cam through a pulley ratio of 6 to 1 at a speed about six times the speed or revolutions of the cam shaft 59 of the collator which rotates once for each cycle of operation of the collator. If the speed of the driving member 52 were the same as that of the drive shaft 59 or once per cycle of the shaft there would be eight notches 52*a* per cycle to time the operation of the stapler. With a six to one speed ratio there are, in effect, 48 notches for each cycle of the collator to time the operation of the stapler. This enables the stapling to take place at precisely the right time immediately after gaging the book of sheets and opening of nonstop switch 63 if a gage switch 67 or 68 closes and completes the stapling while the sheets are stationary. The operating connection between the driven plate or member of the clutch and the stapler may be by other means rather than a cam but a cam makes it possible to select the type and speed of movement to be used.

The clutch particularly shown has a clutch operating lever 46 which controls a driving connection between the driving member 52 and the driven member 38 of the clutch when the lever is released. Lever 46 is moved counterclockwise (FIG. 1) to released position and held in released position by the pawl spring means 84 pressing the pawl pin 83 inwardly against the inclined portion 82 of the lever. Upon release of the clutch operating lever, the clutch is engaged to establish a driving connection between the pulley of a driving member 52 operatively connected therewith, and the driven member 38 and hence the cam.

A clutch control mechanism is provided for releasing and engaging the clutch operating lever. The mechanism shown includes a control lever 47 which is pivotally mounted on a pivot 48 carried by the frame to move the same away from and into engagement with the clutch operating lever. The control lever 47 may have a tongue 49 extending at right angles which normally is engaged by the clutch operating lever 46. A stop pin 50 limits the movement of the clutch control lever. As will appear more fully hereinafter the clutch uses pawl means including at least one pawl 51 and a clutch plate 52 having notches 52*a* in the periphery thereof.

The control mechanism includes means to operate the clutch control lever 47 to release the clutch operating lever 46 and engage the clutch for one revolution. The lever 46 rotates with the driven member for one revolution of the shaft, and just before completion of one revolution, the clutch engaging lever is engaged by the control lever 47 to release or disengage the pawl means and hence disengage the clutch. A convenient method of propelling the clutch control lever away from the clutch operating lever to engage the clutch is a solenoid 53, the armature 54 of which is operatively connected to the control lever by a pin 55.

The clutch drive shaft 37 rotates at a speed which is about six times that of the cam shaft 59 of the collator, one rotation of which is one cycle of operation of the controller so that shaft 37 makes one revolution in a much shorter time than one cycle of operation of the collator. In the clutch provided there are eight pawl notches 52*a* which enables the stapler to be operated at precisely the right time for the short period in which a book of sheets is held by the stop means in gaging position and after gaging has taken place.

The solenoid 53 is normally operated for each cycle of operation of the collator and consequently the clutch 39 is normally engaged one for each cycle of operation of the collator excepting when a book of sheets is to be rejected by the gaging means. The means for engaging the clutch once for each cycle of the collator or particularly for energizing the solenoid 53 includes a cam 58 secured to the cam shaft 59 of the collator. This shaft carries other cams for controlling the operation of the collator, such as operation of stop means, of sheet aligning means and the gaging means for the book. The cam 58 closes a switch 60 once for each cycle of the operation of the collator. The switch is closed and the clutch is operated immediately after the gaging means has performed its gaging of the book of sheets.

Means are provided to render the stapler inoperative in the event a book of sheets is rejected. With the sheets of a rejected book unstapled, it is easy to separate the sheets and replace them in the proper storage pockets of the collator. This means includes a normally closed non-stapler or stapler throwout switch 63 which is in series with the switch 60 and the clutch solenoid 53, so that when this non-staple switch is opened the closing of the stapler switch 60 is ineffective to operate solenoid 53. The non-staple switch 63 may be operated in any desirable manner under the control of the gaging means. The control may be directly from the switch means of the gaging means which includes switch 67 for a too thin book and a switch 68 for a too thick book. However, a more convenient way of opening the non-staple switch is to locate the switch adjacent to some part of the mechanism for rejecting a book of sheets. When the gaging means rejects a book it operates a book reject solenoid 66 which moves a reject member 252 (FIG. 6) to a position to render operable a book reject mechanism including a reject deflector which moves into the path of the book at the end of the transporting means. When this reject member is moved to reject position by the reject solenoid, the non-staple switch 63 is opened just before the stapler switch 60 is closed and held closed when the latter is closed so that the circuit for the clutch solenoid 53 remains open and the solenoid is not energized. The clutch 39 is, therefore, not engaged and the stapling mechanism is not operated. The non-staple switch 63, therefore, as well as the stapler switch 60 and its cam 58, and the clutch solenoid 53 comprise means for controlling the clutch.

The stapler illustrated in FIGS. 1 and 3 is the type which makes its own staples from a spool of wire. Such stapler can staple a great many more books since the spool of wire is sufficient to make a large number of staples. There are times when the collator is to collate a short run of books for which the type of stapler which uses premanufactured staples may be used. Both types of staplers are well known. A different operating lever, however, is used to operate the type of stapler, using premade staples, as illustrated in FIG. 5. A dot-dash line

shows the operating head of this type of stapler. This stapler is secured to the stapler carriage 12 in place of the stapler shown thereon and may be secured at an angle as shown so that the staple will be placed at an angle in the corner of the book.

The operating lever 17 is moved out of the way on the stapler operating shaft. The stapler operating lever 70 is then shifted on the shaft so that it is brought into proper position to engage the stapler head, FIG. 5, and is clamped in position by the bolt 71. The stapler operating lever 70 carries a secondary or pivotal operating lever 72, formed of two links, pivotally mounted on the lever on a pivot 73 and forming a part of the stapler operating lever. This lever carries a roller 74 rotatably mounted on a pin 75, such that the roller is in engagement with the stapler head. The secondary lever is pressed down by a spring 76 surrounding a rod 77 carried by the lever 72 and slidably received by the lever 78. The reason why the operating lever 70 carries a spring 76 is that additional freedom of movement of the operating lever is required with this type of stapler. A stapler which uses pre-made staples, has its own extent of operating movement. In order to avoid precise extent of movement of the lever 70 to accommodate for the stapler head movement, the lever 72 and roll 74 is pressed downwardly by the spring 76 so that when the stapler head has reached its limit of downward movement, the spring 76 yields or compresses. The spring 76 is, of course, strong enough to overcome the upward spring pressure in the stapler itself to raise the stapler head after stapling. In the stapler of the style illustrated in FIG. 4 the equivalent spring is provided as a part of the stapler itself, and hence a similar spring need not be provided on the stapler operating lever.

For the stapler which uses the prefabricated staples, the stroke is longer for operating the stapler and therefore, a second link pin 78 is provided on the lever 26 nearer to the stapler operating shaft 21 to receive the end of the link 28. With the same link stroke on a shorter radius, the shaft 21 is given a greater movement of oscillation.

As to the details of the clutch 37, particularly illustrated, the clutch operating lever 46 is oscillatably mounted such as on a clutch part or particularly on the drive shaft 37 with its movement limited by a limit pin 80 carried thereby and received in a slot 81 in the driven member 38. The clutch lever 46 has a pawl lifting portion 82 for each pawl 51 of the pawl means which lifting portion engages a lifting pin 83 carried by the pawl and moves the pawl radially outwardly away from engagement with notches 52*a* in the periphery of the clutch plate 52 when in the position illustrated in FIG. 1. The drawings show a similar lifting portion on the clutch lever on the opposite side for a second pawl, not shown which operates at the same time and in the same manner as the pawl 51. When the control lever 47 is raised, the spring 84 presses the pin 83 inwardly which presses against the inclined portion 82 to shift the clutch operating lever 46 out of the way. When the limit pin 80 is at the other end of the limit pin slot 81, the pawl is released and a pawl spring 84 carried by the driven member 38 engages the lifting pin 83 to propel the end of each pawl into a notch 52*a* and establish the driving connection between the driving member or clutch plate 52 and the pawl and hence the driven member 38. When the clutch operating lever 47 is released as described, it makes one revolution with the driven member in a counterclockwise direction (FIG. 1) whereupon the clutch engaging lever 46 engages the control lever 47 to oscillate the former sufficiently to raise the pawl means from engagement in the notch or notches and the clutch is disengaged. It is clear that the positions of the pawl means and the clutch plate may be reversed, that is the pawl means may be carried by one of the members including the driven member or the driving member and the notches may be carried by the other member.

In the collator of the aforesaid Mestre Patent a book of sheets is withdrawn from each sheet loaded storage pocket of the collator and is delivered to sheet transporting means between the ends of which there is provided stop means to halt the book of sheets. Means are provided at this stop position to bring the sheets of the book into alined relation. While halted at this stop position, the sheets are gaged after which the cam 58 closes the stapler switch 60. Closing of this switch energizes clutch solenoid 53 which withdraws the clutch operating lever 47 from engagement with clutch engaging lever 46 whereupon pawl 51 moves into a notch 52*a* to engage the clutch and the cam 36 is rotated for one revolution. The cam operates levers 33 and 31, link 28, lever 26, stapler operating shaft 21 and pivots the stapler operating levers 17 and 70. Depending upon which lever is in operative position with respect to a stapler, the stapler is operated mechanically by the cam 36. A book of incomplete or excess number of sheets is rejected. In the aforesaid application a stapler is provided to staple the book when the sheets are halted which stapler is solenoid operated.

The clutch 39 is of that type which disengages automatically when the driving member 52 has made one revolution. In the clutch mechanism particularly disclosed, when the clutch engaging lever 46 has made one revolution, it engages the clutch operating lever 47 so that the clutch engaging lever 46 is shifted in the slot 81 whereupon the inclined surface 82 presses the pin 83 and pawl 51 radially outwardly to withdraw the pawl 51 from its notch 52*a* on the driven member 52. This disengages the clutch, and the collator cycle repeats.

In the event that the book of sheets lacks one or more sheets so that it is a thin book, or has one or more extra sheets so that it is a thick book, the gaging means responds to this condition and closes the respective parallel connected switch 67 or 68. Closing of one of these switches operates the reject solenoid 66 and the book is rejected by being deflected at the end of the transporting means so that it is not deposited on a deposit means at the end of the transporting means. Whenever the reject solenoid 66 is operated, the non-staple switch 63 is opened which opens the circuit to the clutch solenoid 53 so that when the stapler switch 60 is closed, the clutch solenoid 53 is not energized and this book is not stapled. The unstapled sheets of this rejected book merely requires re-distribution of each sheet in its proper storage pocket in the collator.

This invention is presented to fill a need for improvements in Stapler Mechanical Operating Mechanism for Collators. It is understood that various modifications in structure, as well as changes in mode of operation, assembly, and manner of use, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. This disclosure illustrates the preferred means of embodying the invention in useful form.

I claim:

1. A mechanical stapler operating mechanism for a collator for operating a book stapler comprising a frame, mounting means adjustably mounted on the frame and adapted to carry a stapler, a stapler operating shaft oscillatably mounted on the frame, stapler lever means mounted on the operating shaft including a first operating lever, a pivotal operating lever pivotally mounted with respect to the first lever adapted to engage and operate a stapler and spring means operatively connected between the first operating lever and the pivotal operating lever; operating means operatively connected with the stapler operating shaft including a clutch and a linking connection between the clutch and stapler operating shaft, the clutch having a rotatable driving member adapted to be connected with the collator and a driven member which rotates one revolution upon engagement of the clutch, and

the linking connection operatively connecting the driven member and the stapler operating shaft to oscillate the latter including means having a fixed extent of movement; and control mechanism operated by the collator to control the clutch for engagement of the clutch once for each cycle of operation of the collator to rotate the driven member for one revolution.

2. A mechanical stapler operating mechanism for a collator as in claim 1 in which the stapler operating shaft is long, including a second stapler operating lever mounted on the stapler operating shaft having an inclined surface to engage a stapler and adjusting means carried by each operating lever to adjust the position of the operating lever on the stapler operating shaft.

3. A mechanical stapler operating mechanism for a collator as in claim 2 in which the mounting means includes an angularly disposed holding means, and in which the second operating lever includes an operating member angularly carried by the operating lever in alignment with the angularly disposed holding means and the inclined surface being carried by the operating member.

4. A stapler operating mechanism for a collator as in claim 1 in which the clutch includes pawl means carried by one of the members including the driving member and the driven member and pawl notches carried by the other member, and a clutch operating lever having a pawl raising portion and oscillatably mounted to release and raise the pawl means to and from engagement with the pawl notches.

5. A stapler operating mechanism for a collator as in claim 4 in which the control mechanism for the clutch includes a clutch control means mounted to engage and release the clutch operating lever, a solenoid operatively connected with the clutch control means, and an operating switch electrically connected with the solenoid and operable by the collator once for each cycle of operation of the collator.

6. A stapler operating mechanism as in claim 5 including a normally closed non-staple switch connected in series with the operating switch and solenoid and adapted to be opened under the control of switch means for a book gaging means.

7. A mechanical stapler operating mechanism as in claim 1 in which the clutch includes a clutch shaft, pawl notches carried by one member, pawl means pivotally mounted on the other member for engagement in the pawl

notches including at least one pawl, a clutch engaging lever mounted for movement with respect to the pawl means and engaging the pawl means to move the same to and from engagement with the notches, and the control means being operatively connected with the clutch engaging lever.

8. A mechanical stapler operating mechanism as in claim 7 including drive means connected with the driving member to rotate the latter about six revolutions for each cycle of operation of the collator.

9. A mechanical stapler operating mechanism as in claim 1 in which the clutch includes a notched plate having notches, pawl means pivotally mounted for engagement and disengagement with the notches, a carrier for the pawl means, one of said parts including the notched plate and the pawl means carrier being secured to the driven member and the other being secured to the driving member, pawl lifting means mounted with the pawl carrier and connnected with the pawl means to engage and disengage the latter from the notches, and clutch control means operated by the collator to actuate the pawl lifting means once for each cycle of operation of the collator to engage the pawl means with the notches and disengage the same upon one revolution of the driving member.

10. A mechanical stapler operating mechanism as in claim 9 in which the clutch control means includes a clutch solenoid, a clutch solenoid switch electrically connected with the solenoid, and solenoid switch operating means connected with the solenoid switch to operate the same once for each cycle of operation of the collator.

11. A mechanical stapler operating mechanism as in claim 10 including a reject solenoid, a non-staple switch operated by the reject solenoid, book gaging switch means electrically connected in series with the reject solenoid and adapted to be operated by book gaging means, and the non staple switch being connected in series with the clutch solenoid switch.

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GRANVILLE Y. CUSTER, JR., *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,221,965 December 7, 1965

Luis Mestre

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, lines 54 and 55, strike out "from a spool of wire, the stapler making the staple as tor." and insert instead -- anism is operated through a connection with the collator. --.

Signed and sealed this 10th day of May 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents