

Dec. 19, 1944.

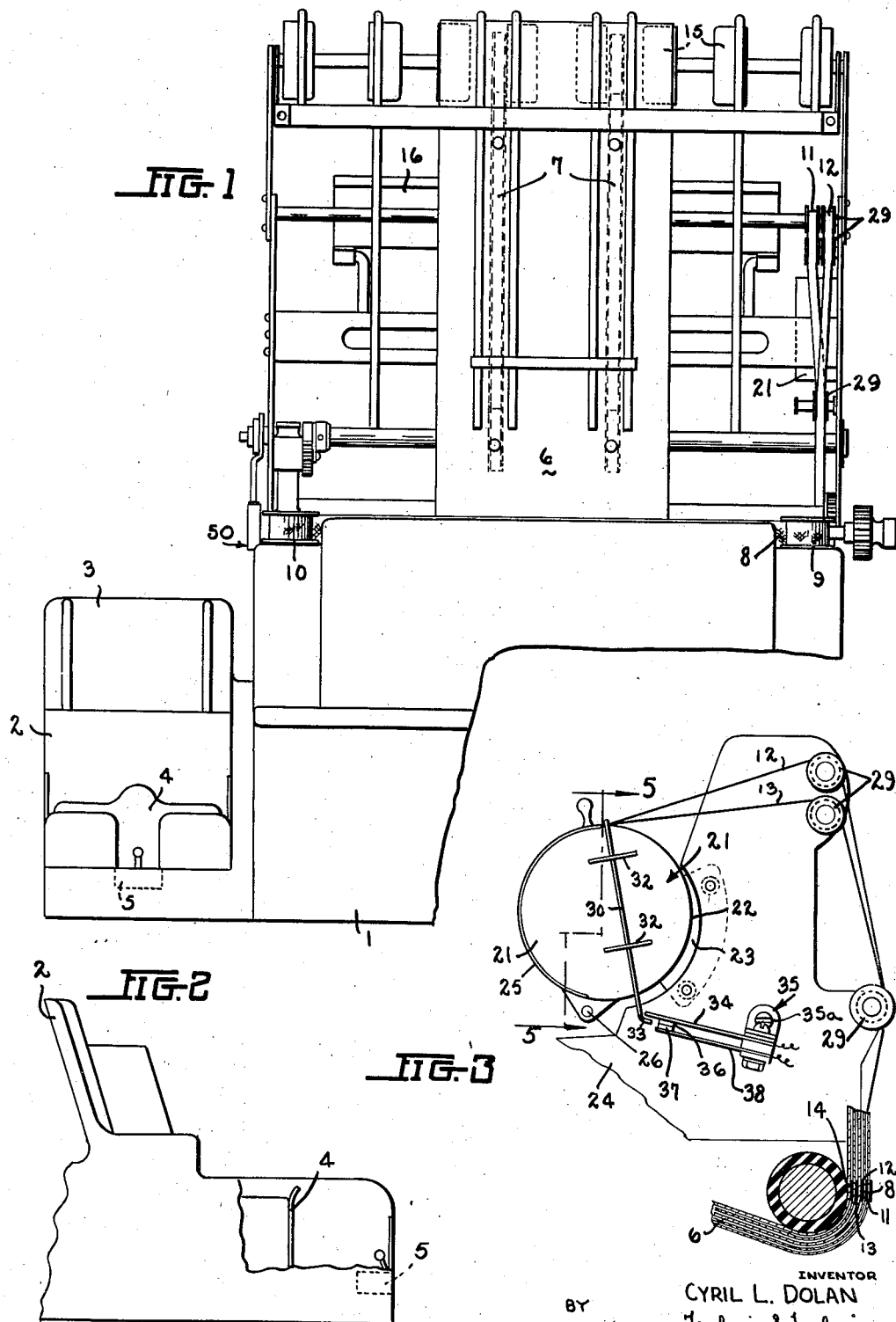
C. L. DOLAN

2,365,254

RIBBON CONTROL

Filed April 1, 1942

4 Sheets-Sheet 1



BY

INVENTOR
CYRIL L. DOLAN
Toulmin & Toulmin
ATTORNEYS

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C. L. DOLAN

2,365,254

RIBBON CONTROL

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4 Sheets-Sheet 2

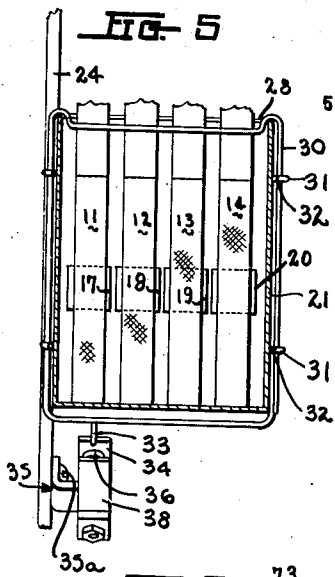
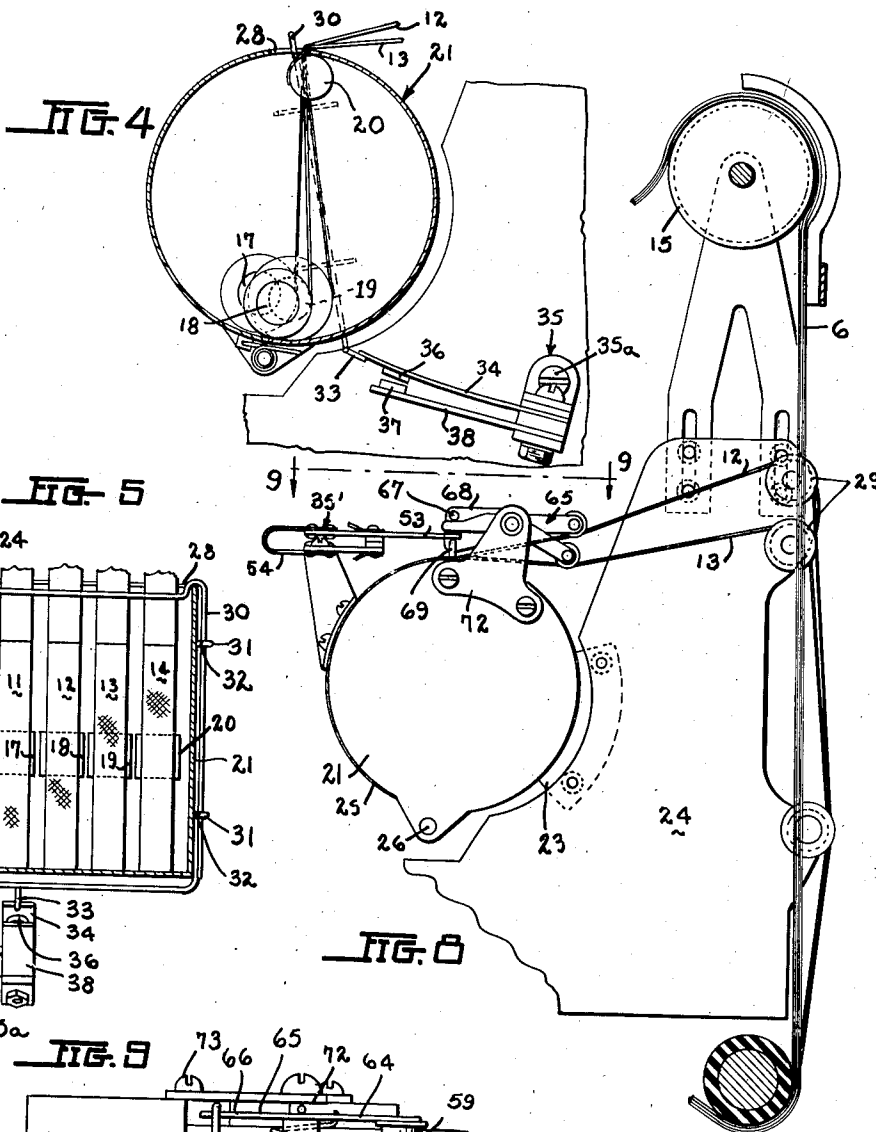
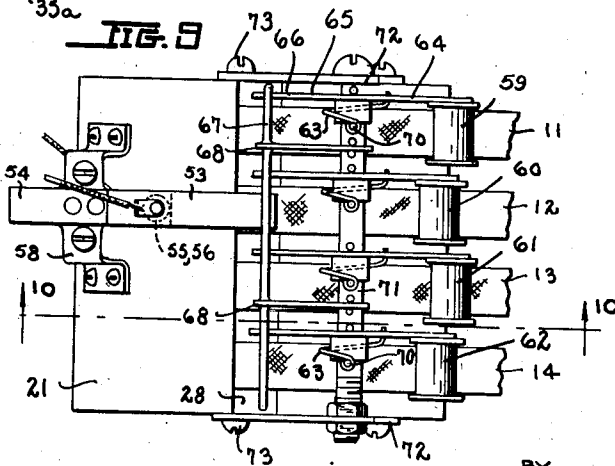


FIG. 6



BY

INVENTOR
CYRIL L. DOLAN
Toulmin & Toulmin
ATTORNEYS

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C. L. DOLAN

2,365,254

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4 Sheets-Sheet 3

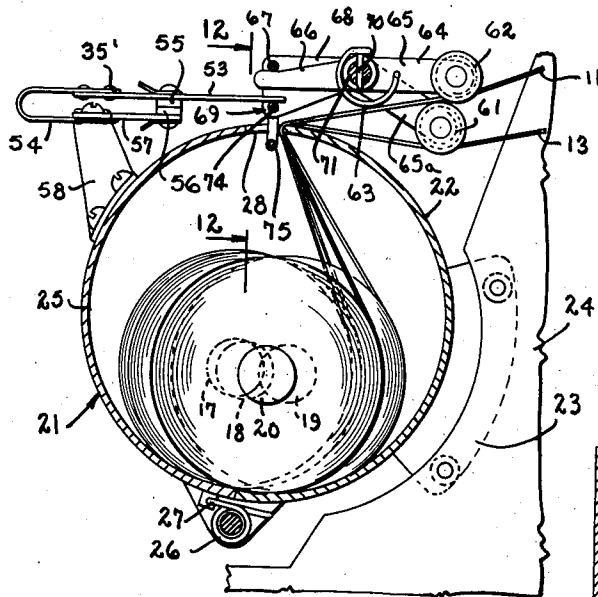


FIG. 10

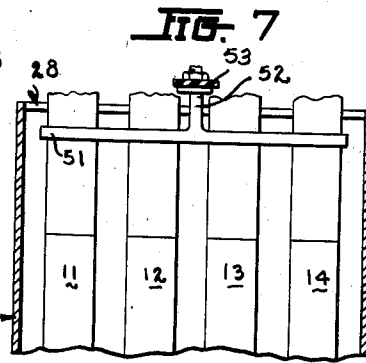


FIG. 7

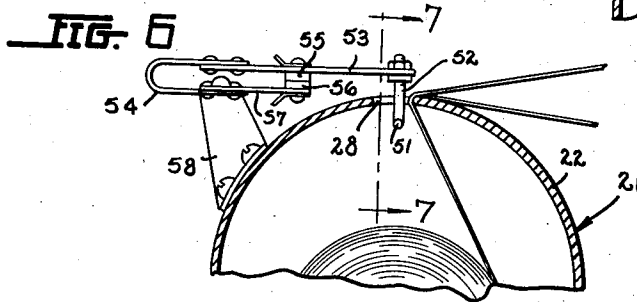


FIG. 6

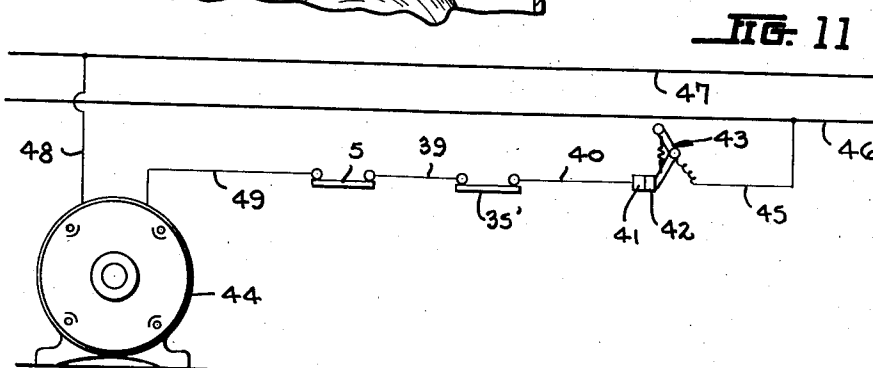


FIG. 11

INVENTOR
CYRIL L. DOLAN

BY

Toulmin & Toulmin
ATTORNEYS

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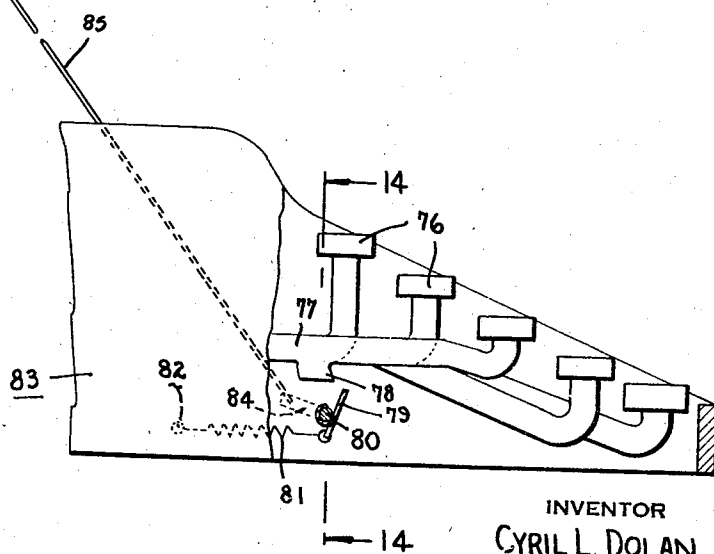
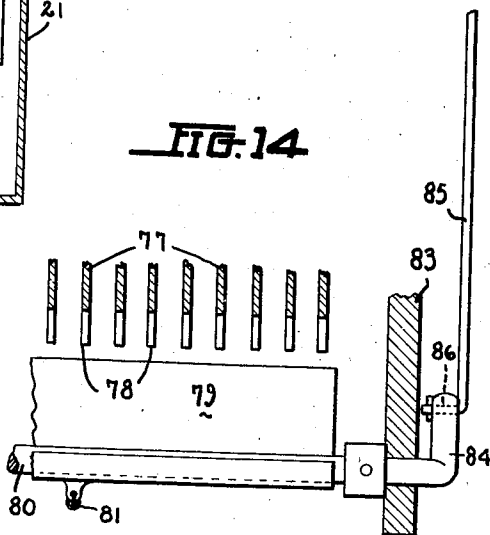
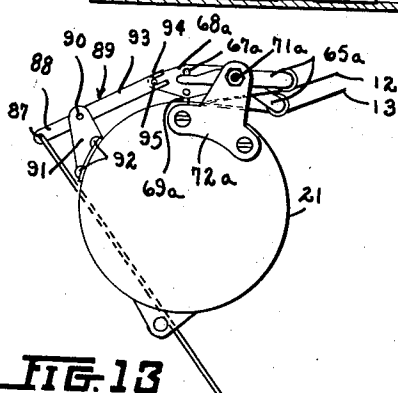
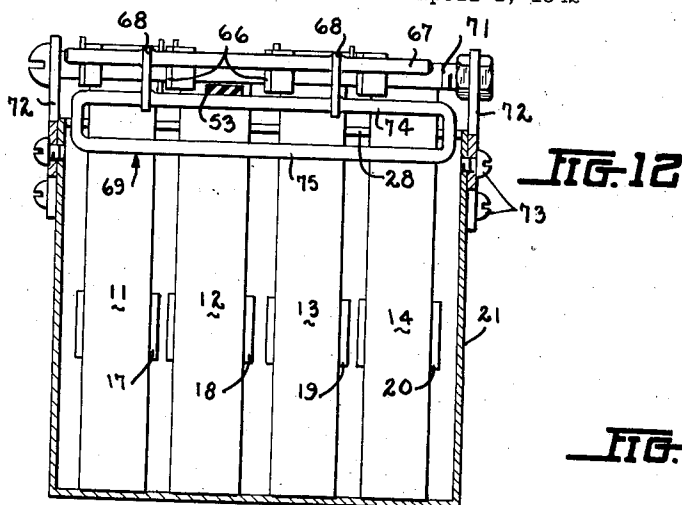
C. L. DOLAN

2,365,254

RIBBON CONTROL

Filed April 1, 1942

4 Sheets-Sheet 4



INVENTOR
BY **CYRIL L. DOLAN**
Toulmin & Toulmin
ATTORNEY

UNITED STATES PATENT OFFICE

2,365,254

RIBBON CONTROL

Cyril L. Dolan, Minneapolis, Minn., assignor to
The Egly Register Company, Dayton, Ohio, a
corporation of Ohio

Application April 1, 1942, Serial No. 437,300

5 Claims. (Cl. 197—151)

This invention relates to manifolding machines and, in particular, to machines such as typing, adding or tabulating machines, adapted to make multiple copies of documents by means of ribbons or carbons.

In manifolding machines of this type, it is customary to make multiple copies of records upon paper sheets or multiple paper webs interleaved with copying ribbons between the paper sheets or webs and travelling in a direction perpendicular to the direction of motion of the sheets or webs. These ribbons are narrow strips of carbon paper which are used only once while they pass through the machine and are then discarded.

When a spool of such carbon ribbon becomes empty, it is replaced by a full one, while the beginning of the new ribbon is pasted to the end of the old ribbon, thereby saving the work of threading the ribbon through the machine. The provision of these carbon ribbons also eliminates the intricate mechanism for reversing the feed of the ribbons as is required when using the expensive cloth copying ribbons.

While the use of such carbon ribbons is generally satisfactory, it may happen that one of the carbon ribbon spools becomes empty while the machine continues its operation. In such an instance, the record would not show up on the respective copy.

When using carbon ribbons, particularly in heavy duty machines, it may also happen that a carbon ribbon breaks while the machine remains in operation, in which instance the record would likewise be missing on the respective copy.

It is, therefore, an object of the present invention to provide controlling means in connection with a manifolding machine of the above mentioned type, which will remedy the drawbacks outlined above.

It is another object of the invention to provide a control mechanism for ribbons in manifolding machines, which will automatically bring the machine to a standstill when the spool of a copying ribbon becomes empty.

Another object of the invention consists in the provision of a ribbon control for use in connection with manifolding machines which will automatically stop the machine when a copying ribbon breaks.

It is a further object to provide a ribbon control for use in connection with electrically operated manifolding machines, in which the breakage of a copying ribbon or the emptying of a spool for a copying ribbon will control the elec-

tric circuit of the machine so as to stop the latter.

Still another object consists in the provision of a ribbon control for use in connection with hand operated manifolding machines, in which the emptying of a spool for a copying ribbon or the breakage of a copying ribbon will automatically actuate means for temporarily preventing further operation of the machine.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

Figure 1 shows a manifolding machine in connection with which the control device of the present invention may be used.

Figure 2 shows a side view of the lower portion of Figure 1.

Figure 3 illustrates a side view of a control device according to the invention for use in connection with electrically operated manifolding machines.

Figure 4 shows the interior of the ribbon box of Figure 3.

Figure 5 is a section along the line 5—5 of Figure 3.

Figure 6 shows a slight modification of a part pertaining to the control device of Figures 3 to 5.

Figure 7 is a section along the line 7—7 of Figure 6.

Figure 8 is a side view of a second embodiment of the invention, which will stop the machine not only when a ribbon spool becomes empty, but also when the copying ribbon breaks.

Figure 9 is a view along the line 9—9 of Figure 8.

Figure 10 shows, on a somewhat enlarged scale, a section along the line 10—10 of Figure 9.

Figure 11 indicates an electric circuit for the control device of Figures 8 to 10.

Figure 12 is a section along the line 12—12 of Figure 10.

Figure 13 shows the invention in connection with a manually operable manifolding machine, and

Figure 14 shows a section along the line 14—14 of Figure 13.

General arrangement

The control device according to the invention for temporarily preventing further operation of a manifolding machine in case a spool of a copying ribbon becomes empty, or if a copying ribbon breaks, comprises substantially a ribbon box in which the spools are loosely arranged and from

which the ribbons are passed by a member adapted to actuate stop means for the machine.

More specifically, according to one embodiment of the invention, the ribbons are passed by a member which, when a ribbon spool becomes empty, is directly engaged by the said ribbon spool so as to break the energizing circuit for an electromotor operating the manifolding machine, thereby bringing said machine to a standstill.

According to a second embodiment of the invention, tension means is provided which normally holds the ribbons tensioned, but which, in case a ribbon breaks, is free to move so as to break the energizing circuit for an electromotor operating the manifolding machine, thereby bringing the latter to a halt.

According to a third embodiment of the invention, which may be used in connection with manually operated manifolding machines, means is provided which, when a spool becomes empty or when a ribbon breaks, is so actuated as to prevent further operation of the keys pertaining to said manually operable manifolding machine.

Structural arrangement

Referring now to the drawings in detail and to Figure 1 thereof in particular; the manifolding machine illustrated therein, which may be a tabulating machine, an adding machine, a tabulating and listing machine, or any other suitable type of machine capable of printing a record, comprises a base 1 carrying a feeler mechanism (not shown) for feeling perforations in cards which are introduced into the card receiver 2 along the board 3. The cards are introduced in stacks into the receiver 2 and from there are individually advanced toward an abutment 4. The abutment 4 is adapted to be actuated by each card and to be moved toward the stacker switch 5 for actuating the same. The base 1 furthermore supports a printing or typing device (not shown) of any standard design which, as is customary with automatically operated manifolding machines, is actuated in accordance with the feeler mechanism feeling the perforations in the cards introduced into the card receiver so as to print corresponding records on a sheet 6 which is usually fed automatically by means of feeder chains 7.

While the printing on the original sheet 6 is preferably done by the intervention of a cloth ribbon 8, which rolls off one spool, for instance spool 9, and is wound up on another spool, in this instance spool 10, in the usual manner of typewriter ribbons, copies of the record on the original sheet 6 are made on sheets beneath the original sheet 6 by the intervention of paper carbon ribbons 11, 12, 13 and 14 (Figure 3) which are fed transverse to the paper to be printed upon and behind the cloth ribbon 8. The paper to be printed on is to be fed over guiding rollers 15 and thereafter automatically drops into a tray 16, from which the records and copies may be collected either manually or by any mechanism. The spools 17, 18, 19 and 20 for the carbon ribbons are located in a ribbon box 21, where they loosely rest on the bottom thereof.

The ribbon box 21 comprises a stationary cover portion 22 connected by means of a bracket 23 with the frame 24 of the manifolding machine, while another cover portion 25 is hinged to the cover portion 22 by means of a hinge 26. A spring 27 at the hinge 26 tends to hold the cover portion 25 in closed position.

The ribbons of the spools 17, 18, 19 and 20 are passed through an opening 28 over the guiding rollers 29 behind the cloth ribbon 8 and then leave the machine at a place where the free ends may easily be detached. To keep the ribbons at a desired tension while they are actuated upon for making copies, it is customary to provide sprockets which engage the free ends of the respective paper ribbons and feed the ribbons toward the outlet in the machine.

According to the invention, a mechanism is provided which automatically interrupts the operation of the manifolding machine in case one of the carbon ribbon spools becomes empty. Such an arrangement comprises substantially a frame member 30 which, by means of bent portions 31, is guided on extensions 32 on the ribbon box 21.

The frame member 30 has connected to its lower end a hook shaped portion 33 adapted to engage a resilient arm 34 of a ribbon control switch, generally designated 35 which is connected to the frame member 24 in any convenient manner, for instance, by a screw 35a. The arm 34 carries a contact 36 and urges the latter into engagement with a contact 37 carried by an arm 38. The hook shaped portion 33 is adapted to disconnect the contact 36 from the contact 37 when the frame member 30 is lifted, which may be effected by one of the carbon ribbon spools as soon as the latter becomes empty and is pulled toward the opening 28 by the carbon ribbon feeder in the manifolding machine.

The ribbon control switch 35, when closed, is adapted to connect the line 39 (Figure 11) with the line 40, which latter leads to a contact 41 normally in engagement with the contact 42. The contacts 41 and 42 pertain to a control switch 43 which, when open, breaks the energizing circuit for the electromotor 44 actuating the mechanisms for the manifolding machine of Figure 1. The contact 42 is connected by a line 45 with the main supply line 46, while the main supply line 47 is connected by line 48 with the electromotor 44.

The stacker switch 5, which is normally in closed position, is adapted to connect the line 39 with the line 49 leading to the electromotor 44.

The control mechanism of Figures 3, 4 and 5, in connection with the manifolding machine of Figure 1, operates in the following manner:

It may be assumed that all spools for the carbon ribbons are filled and at the bottom of the ribbon box 21, and that the original sheet 6 and the copies therefor are in their proper place and spaced from each other by the carbon ribbons from the said spools. The operator then introduces a stack of cards into the card receiver 2 and closes the control switch 43. This closes the energizing circuit for the electromotor 44 so that the latter begins to actuate the mechanisms in the manifolding machine of Figure 1. As a result thereof, the cards in the card receiver 2 are individually fed toward the abutment 4, while passing by a feeler mechanism which, in accordance to the perforations in the cards of the card stack, actuates a printing mechanism, which latter records on the original sheet 6. These records are simultaneously transferred, by means of the carbon ribbons to the copy sheets. Each time a line has been completed on the original sheet 6, the feeder chains 7 advance the sheet 6, together with the copies, by a predetermined distance. Each individual card of the card stack advances the abutment 4 by a

predetermined distance and when all cards have been fed by the feeler mechanism and have been properly recorded, the abutment 4 has reached a position in which it actuates the stacker switch 5 so as to open the latter. This breaks the energizing circuit for the electromotor 44 which then comes to a standstill, thereby halting the entire machine. Now the operator may introduce a new stack of cards and again start the machine in the manner previously described.

The completed sheets are collected on the tray 16 from where they are either automatically or manually removed. The free ends of the carbon ribbons leaving the manifolding machine at any desired place, for instance at the point 50 in Figure 1, are detached by the operator from time to time and discarded.

If it should occur that, during the operation of the manifolding machine, one of the carbon ribbon spools becomes empty, while the other carbon ribbon spools are still filled, it formerly happened that the copy sheet pertaining to the empty carbon ribbon spool would not show the records of the original sheet 6 and it would be necessary to make an extra copy. This, however, is avoided by the device according to the invention in the following manner:

As soon as a carbon ribbon spool becomes empty, for instance, the carbon ribbon spool 20, the latter will, by the feeding mechanism of the manifolding machine, be pulled upwardly toward the opening 28 in the ribbon box 21. As a result thereof, the empty ribbon spool 20 will engage the frame member 30 and actuate the latter so that the hook shaped portion 33 on the lower end of the frame member 30 engages the resilient arm 34 so as to disconnect the contact 36 from the contact 37. In this way, the energizing circuit for the electromotor 44 is broken, with the result that the manifolding machine comes to a standstill.

The operator, familiar with the mechanism of the manifolding machine, will then first open the control switch 43 and thereafter the ribbon box 21 and notice that one of the ribbon spools has become empty. He thereupon replaces the empty ribbon spool by a new spool and pastes the end of the old ribbon to the free end of the new ribbon, thereby saving the work of threading the ribbon through the machine.

As soon as the old ribbon spool is removed from the frame member 30, the resilient arm 34 brings the contact 36 again into engagement with the contact 37 while simultaneously pulling the frame member 30 downwardly into its previous position. After the end of the old carbon ribbon has been connected to the free end of the new carbon ribbon, the operator again closes the ribbon box 21 and the switch 43, thereby initiating a new cycle of the machine.

Referring to Figures 6 and 7, these figures show a slight modification of a detail shown in Figures 4 and 5. More specifically, the frame member 30 of Figures 4 and 5 is replaced by a bar 51 extending through the opening 28 into the ribbon box 21 and connected by an extension 52 with the arm 53 of insulating material, which arm is connected to a spring 54. The arm 53 carries a contact 55 corresponding to the contact 36 of Figure 4 and continuously urged into engagement with the contact 56 corresponding to the contact 37 of Figure 4.

The contact 56 is carried by an arm 57 of insulating material, which arm is connected to the spring 54. The spring 54 is carried by the rib-

bon box 21 by means of a bracket 58. Otherwise, the operation of the modification shown in Figures 6 and 7 is the same as described in connection with the arrangement of Figures 3 to 5.

Referring now to Figures 8 to 10 and 12, the same describe a control device which will stop the manifolding machine to which it is connected, not only when one of the carbon ribbon spools becomes empty, but also if it should happen that, during the operation of the manifolding machine, one of the paper carbon ribbons breaks. The device of Figures 8 to 10 and 12 comprises a ribbon box of the same construction as the ribbon box 21 and similar parts are, therefore, designated by the same reference numerals so that no further description thereof is necessary.

The ribbon box 21 of Figures 8 to 10 and 12 carries a switch of the same type as shown in Figures 6 and 7 and has its parts designated with the same numerals as they appear in Figures 6 and 7. However, according to Figures 8 to 10 and 12, the ribbons leaving the ribbon box 21 are held under a predetermined tension by means of tensioning rollers 59, 60, 61 and 62, which are continuously urged downwardly by means of springs 63. Each spring 63 has one end thereof in engagement with a lever arm 64 of a lever 65, while the other arm 66 of the lever 65 is adapted to engage a bar 67 which is connected by arms 68 (Figure 12) with a frame 69 extending through the opening 28 into the ribbon box 21. The other ends of the springs 63 are connected to respective pins 70 in a shaft 71 which is supported by arms 72 connected in any desired manner, for instance by screws 73, with the ribbon box 21. The levers 65 are rotatable about the shaft 71.

The arms 68, rigidly connected to the frame 69, are rotatable about the shaft 71. The upper bar 74 of the frame 69 is adapted to engage the arm 53 carrying the contact 55 so as to disconnect the contact 55 from the contact 56. The lower arm 75 of the frame 69 is adapted to be engaged by an empty carbon ribbon spool in the same manner as described in connection with Figures 3 to 6.

The device of Figures 8 to 10 and 12 may be operated in connection with the manifolding machine of Figure 1 and the circuit shown in Figure 11, in which instance the switch 35 is replaced by the switch 35' comprising the switch elements 53 to 57. To this end, the operator again starts the manifolding machine of Figure 1 in the manner previously described.

If it should now happen that, during the operation of the machine, a carbon ribbon spool becomes empty, the latter will be lifted in the same manner as previously described in connection with Figures 3 to 5, so that the empty ribbon spool will actuate the bar 75 of frame 69 to swing the latter about the shaft 71. This will cause the bar 74 of frame 69 to engage the arm 53, thereby disconnecting the contact 55 from the contact 56. As a result thereof, the energizing circuit for the electromotor 44 is broken in the manner previously described, so that the manifolding machine comes to a standstill and the operator may replace the empty spool by a new one in the manner likewise described above.

If it should happen that, during the operation of the manifolding machine of Figure 1, one carbon ribbon breaks, it will be obvious that the respective ribbon can no longer counteract the thrust of the respective spring 70 so that the latter shifts the respective lever 65 in clockwise direction. This causes the arm 66 to engage the

bar 67 so as to swing the arm 68 and, thereby, the frame 69 about the shaft 71. As a result thereof, the bar 75 of frame 69 engages the arm 53 and causes the contact 55 to disengage the contact 56, thereby breaking the energizing circuit for the electromotor 44. The electromotor 44 thereupon comes to a halt and, consequently, also the manifolding machine of Figure 1 must stop. The operator will then open the switch 43 and may then paste together the ends of the broken ribbon to bring the respective lever 55 into its previous position, thereby conditioning the manifolding machine for further operation.

The control device of the present invention, although described so far in connection with automatically operated manifolding machines, is by no means limited to the use in connection with such machines, but may as well be used in connection with manually operated manifolding machines of various types. In this instance, the arrangement of Figures 13 and 14 may be used.

Figure 13 shows a portion of a manifolding machine which may be of any standard type, operable by means of keys 76. Each of the keys 76, when depressed, is adapted to perform or initiate a recording operation. According to Figure 13, each of the keys 76 is connected with a lever 77 provided with a protruding portion or tongue 78, in a manner similar to the key levers of standard typewriters. The manifolding machine of Figure 13 furthermore comprises a stop member 79 which is rotatably connected to the shaft 80, for instance by welding or by a key, and is continuously urged by a weak spring 81 into a position in which it does not prevent the downward movement of the levers 77. The spring 81 has one end connected to the stop member 79, while the other end is preferably connected to a stationary point 82 on a frame portion 83 of the manifolding machine.

The shaft 80 is provided with a crank 84 which, in its turn, is pivotally connected to a rod 85 by means of a pin 86. The rod 85 is pivotally connected by a pin 87 with the arm 88 of a two-arm lever 89 and pivotable about the pivot 90. The pivot 90 is carried by a bracket 91 connected by screws 92 to the ribbon box 21. The arm 93 of the lever 89 has a fork shaped portion 94 straddling a pin 95 carried by an arm 68a. The arm 68a corresponds to one of the arms 68 of the arrangement of Figures 8 to 10 and 12 and is shiftable in the same manner as the latter about a shaft 71a corresponding to the shaft 71 of Figures 9, 10 and 12.

The ribbon box 21 of Figure 13 is likewise provided with arms 72a corresponding to the arm 72 and carrying the shaft 71a about which are pivotally arranged levers 65a, the construction of which fully corresponds to that of the levers 65 and which levers are adapted to actuate a bar 67a corresponding to the bar 67 of Figure 10 and a frame 69a corresponding to the frame 69 of Figure 12.

The control device of Figure 13 operates in the following manner:

It may be assumed that an operator actuates the keys 76 to perform a recording and manifolding operation similar to that performed automatically with the manifolding machine of Figure 1. If it should now happen that, during the operation of the keys 76, one of the carbon ribbon spools becomes empty, the latter will be lifted in the manner described in connection with Figures 1 to 12, thereby actuating the frame 69a so as to shift the arm 68a in clockwise direction about the

shaft 71a. This movement of the arm 68a causes the pin 95 connected thereto to shift the lever 89 in anticlockwise direction which, in its turn, actuates through rod 85 the crank 84 so as to move the stop member 79 beneath the protruding portions or tongues 78 of the key levers 77. This immediately prevents the levers 77 and thereby also the keys 76 from being depressed by the operator, thereby making further operation of the manifolding machine impossible. The operator may then open the ribbon box 21, replace the empty ribbon spool by a new one, paste together the ends of the new ribbon and the old ribbon, and recondition the manifolding machine for further operation.

It will be understood that, as soon as the new spool is resting on the bottom of the ribbon box 21, the spring 81 returns the stop member 79 to its initial position, shown in Figure 13, thereby also returning the rod 85 and lever 89 to their initial positions. The lever 77 may then again be shifted and the operator may now continue the operation of the machine by actuating the keys 76.

If, during the operation of the machine, a ribbon should break, the respective spring pertaining to the tensioning rollers for the broken ribbon will then actuate the bar 67a in the same manner as described in connection with the operation of the structure shown in Figures 8 to 10 and 12, so that the lever 89, by means of the rod 85, again moves the stop member 79 beneath the tongues 78 so as to prevent further operation of the keys 76. The operator may then rectify the situation in the same manner as previously described in connection with Figures 8 to 10 and 12, whereupon the stop member 79 will automatically return into its Figure 13 position and allow the operator to continue his operation of the machine.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a printing machine, a ribbon feeding mechanism therefor comprising floating spool means, a ribbon carried on and attached to said spool means, a control means operated by said ribbon mounted adjacent to said spool means for preventing the further operation of said machine in response to the breakage or exhaustion of said ribbon, said control means comprising a first means operated by ribbon tension and a second means operated by displacement of said floating spool means by lift of said ribbon, a common pivot for said first and second named means, and a common actuator member for said control means operated by said first and second named means.

2. In a printing machine, a ribbon feeding mechanism therefor comprising floating spool means, a ribbon carried on and attached to said spool means, a control means operated by said ribbon mounted adjacent to said spool means for preventing the further operation of said machine in response to the breakage or exhaustion of said ribbon, said control means comprising a first means operated by ribbon tension and a second means operated by displacement of said floating spool means by lift of said ribbon, a common pivot for said first and second named means, and a common actuator member for said control means operated by said first and second named

means, said actuator member forming a support for said second named means.

3. In a printing machine, a ribbon feeding mechanism therefor comprising floating spool means, a ribbon carried on and attached to said spool means, a control means operated by said ribbon mounted adjacent to said spool means for preventing the further operation of said machine in response to the breakage or exhaustion of said ribbon, said control means comprising a first means operated by ribbon tension and a second means operated by displacement of said floating spool means by lift of said ribbon, a common pivot for said first and second named means, and a common actuator member for said control means operated by said first and second named means, said control means operated by ribbon tension means having an arm extending on opposite sides of said common pivot.

4. In a printing machine, a ribbon feeding mechanism therefor comprising floating spool means, a ribbon carried on and attached to said spool means, a control means operated by said ribbon mounted adjacent to said spool means for preventing the further operation of said machine in response to the breakage or exhaustion of said ribbon, said control means comprising a first means operated by ribbon tension and a second means operated by displacement of said floating spool means by lift of said ribbon, a common pivot

for said first and second named means, and a common actuator member for said control means operated by said first and second named means, said pivot forming mounting means for said first and second named means, means providing independent limited rotational movement about said pivot of said first and second named means.

5. In a printing machine, a ribbon feeding mechanism therefor comprising floating spool means, a ribbon carried on and attached to said spool means, a control means operated by said ribbon mounted adjacent to said spool means for preventing the further operation of said machine in response to the breakage or exhaustion of said ribbon, said control means comprising a first means operated by ribbon tension and a second means operated by displacement of said floating spool means by lift of said ribbon, a common pivot for said first and second named means, and a common actuator member for said control means operated by said first and second named means, said control means operated by ribbon tension having an arm extending on opposite sides of said common pivot, one of said arms having a contact means for contacting a ribbon and means biasing said contact means toward said ribbon and about said pivot, and the other arm operatively connected with said actuator.

CYRIL L. DOLAN.