

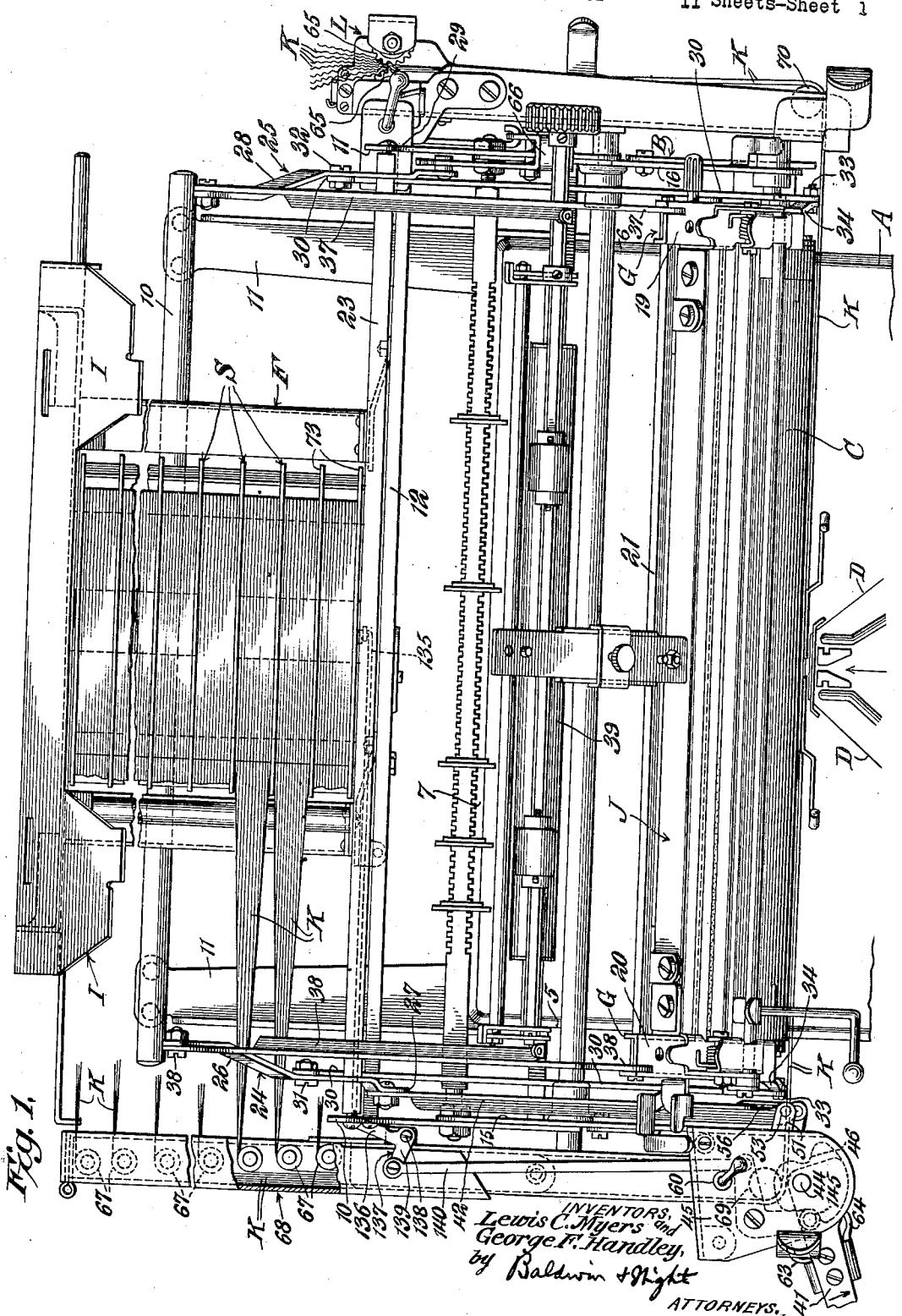
Dec. 13, 1932.

L. C. MYERS ET AL
MANIFOLDING DEVICE

1,890,547

Filed June 25, 1931

11 Sheets-Sheet 1



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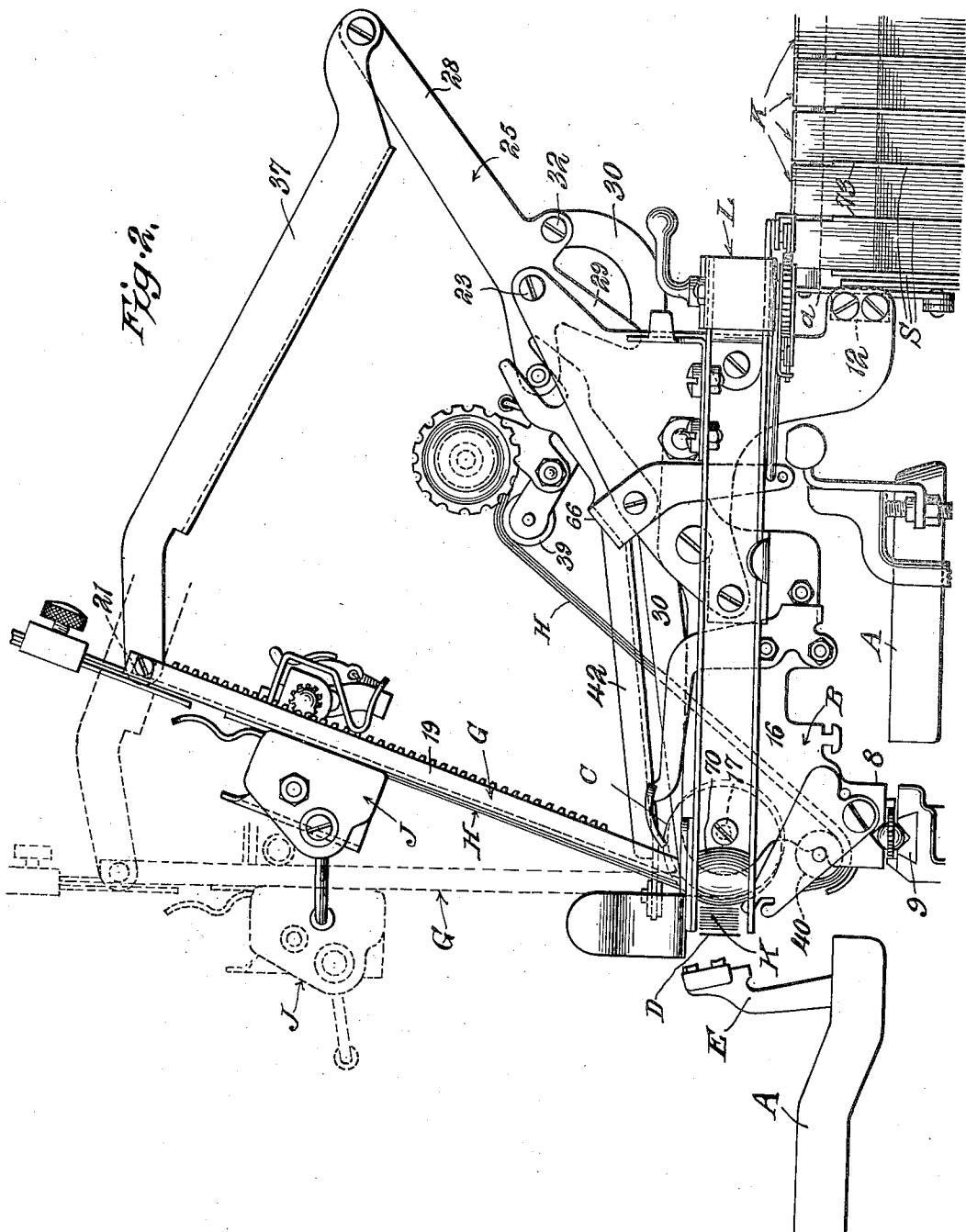
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11 Sheets-Sheet 2



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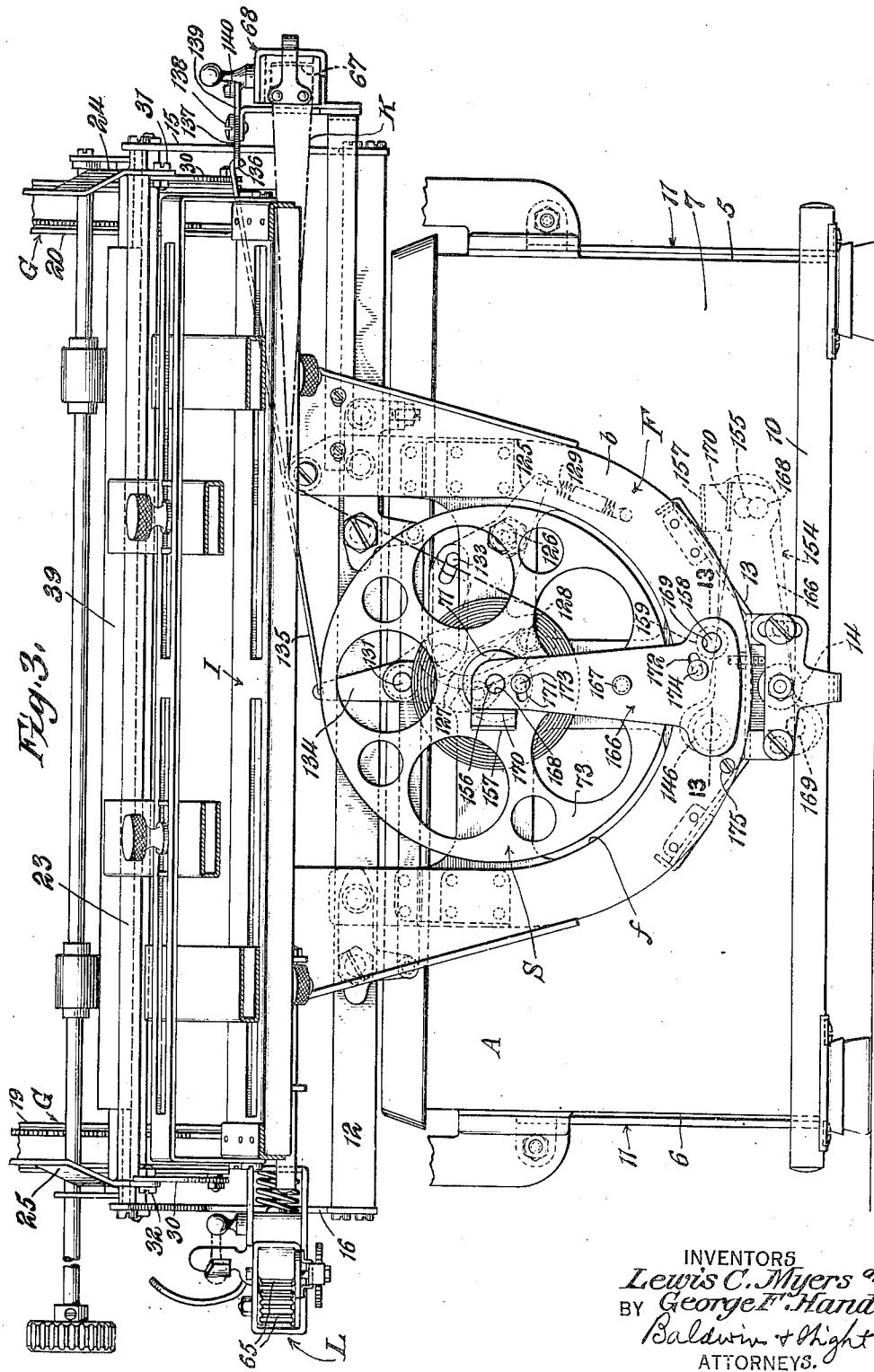
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MANIFOLDING DEVICE

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11 Sheets-Sheet 3



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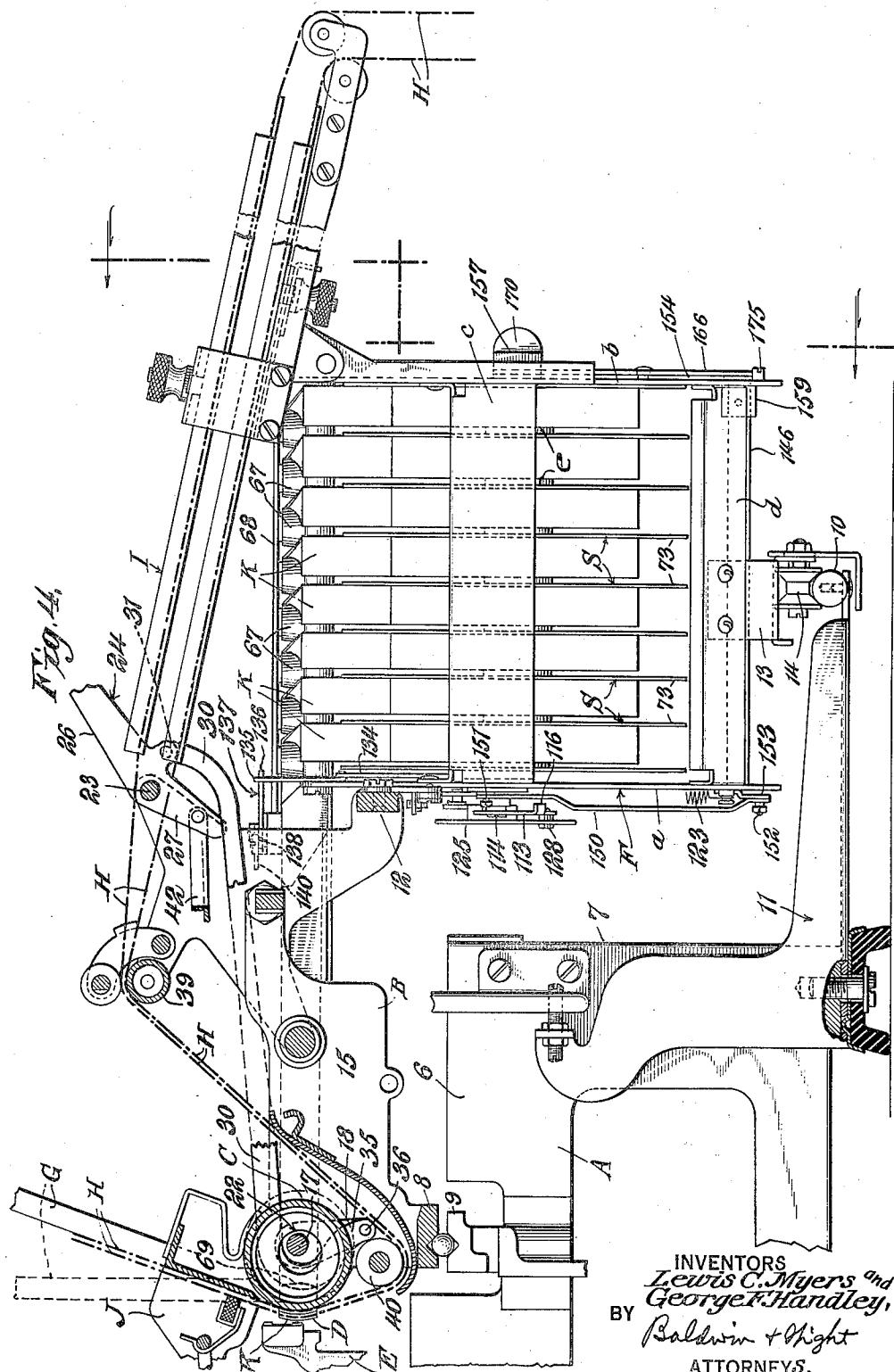
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MANIFOLDING DEVICE

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11 Sheets-Sheet 4



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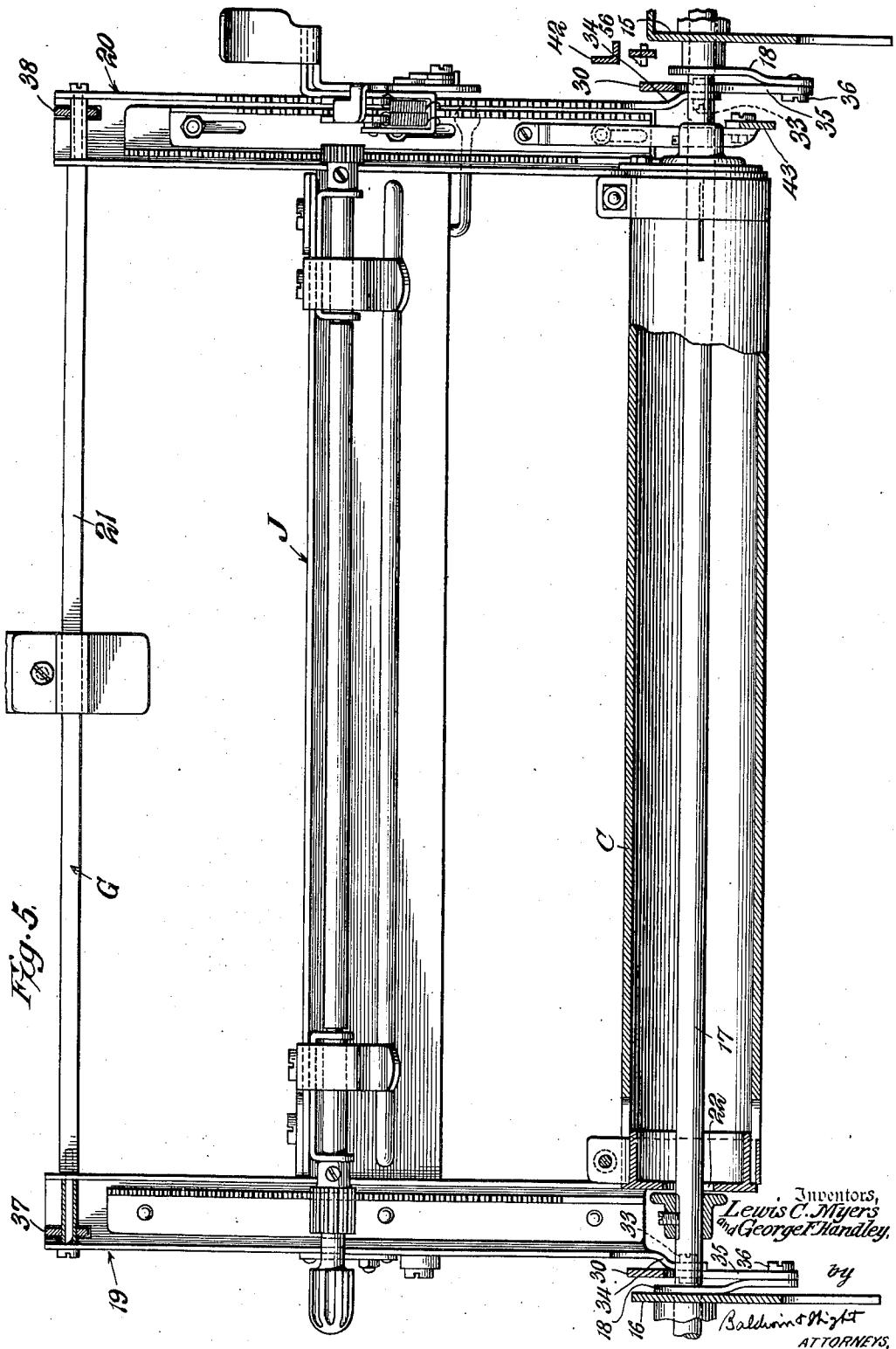
L. C. MYERS ET AL

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MANIFOLDING DEVICE

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11 Sheets-Sheet 5



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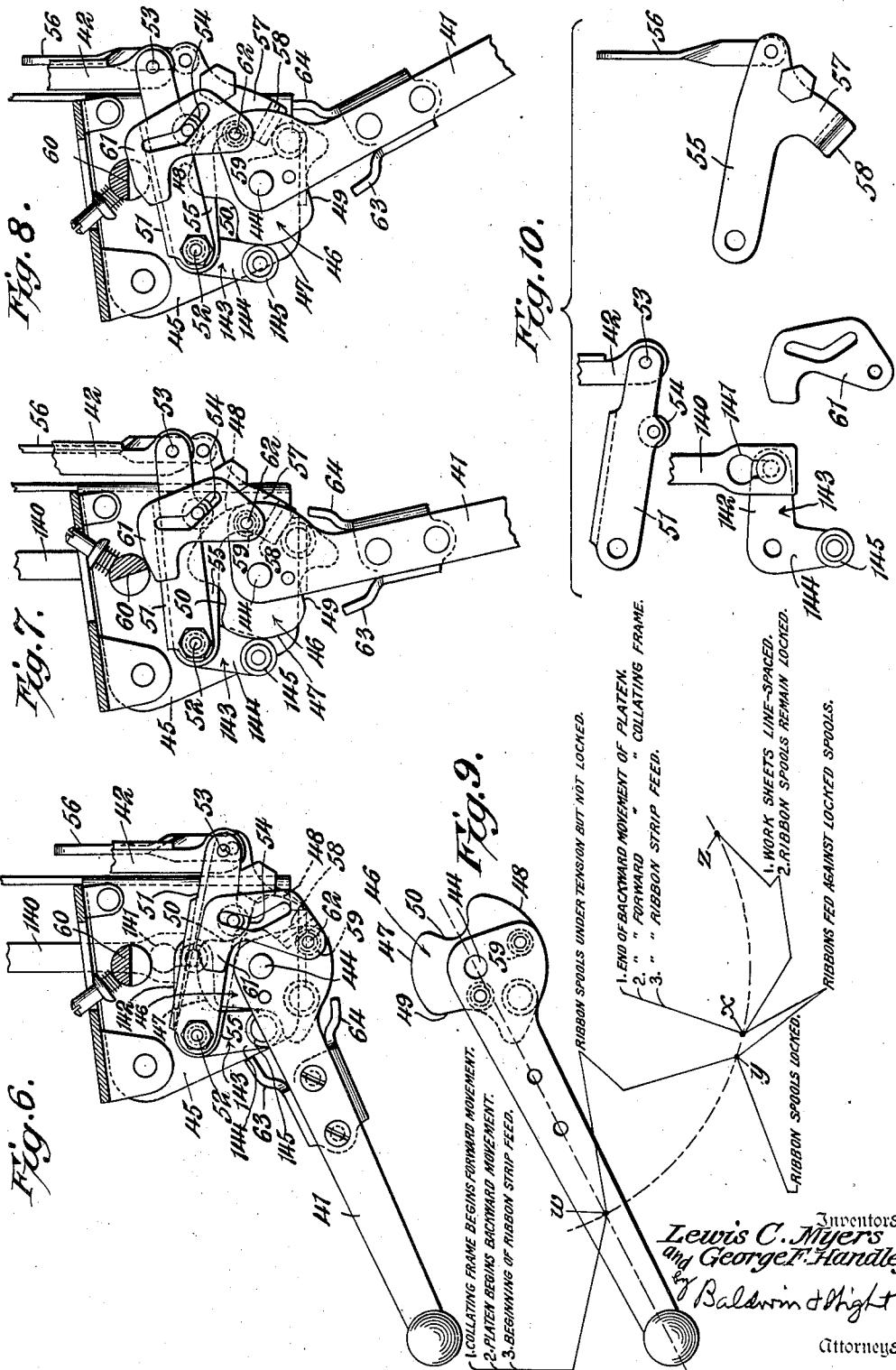
L. C. MYERS ET AL

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11 Sheets-Sheet 6



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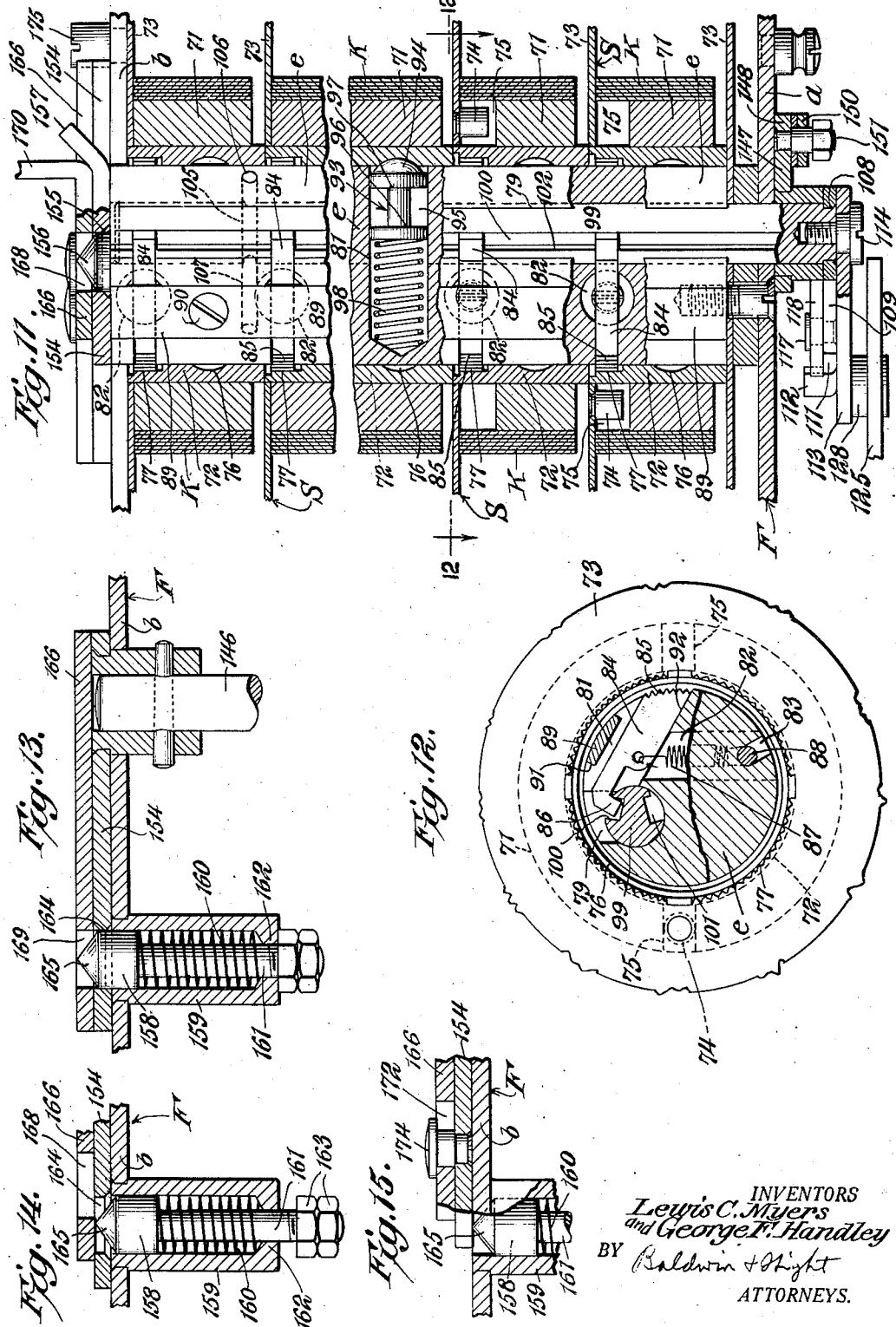
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11 Sheets-Sheet 7



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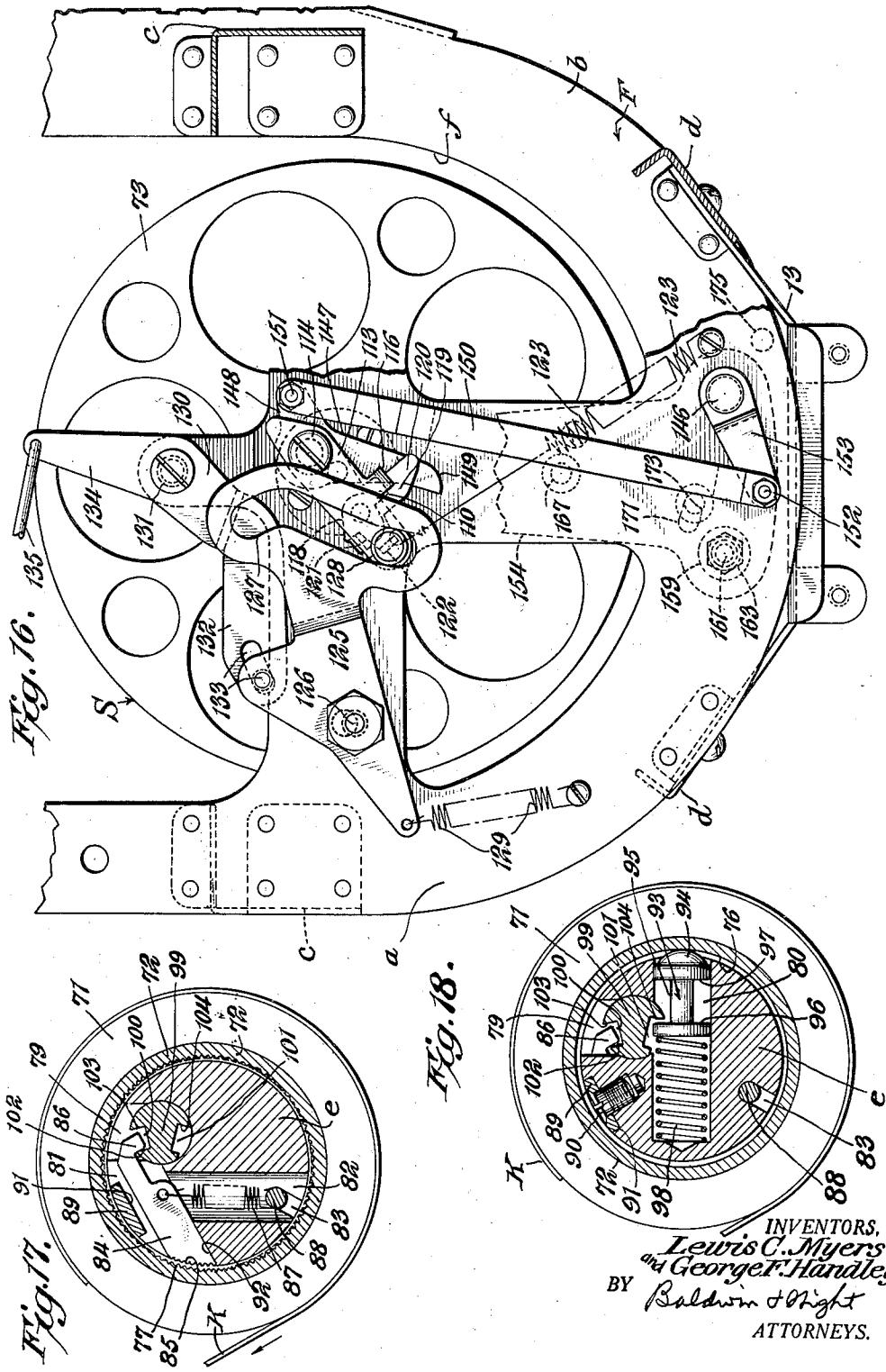
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11 Sheets-Sheet 8



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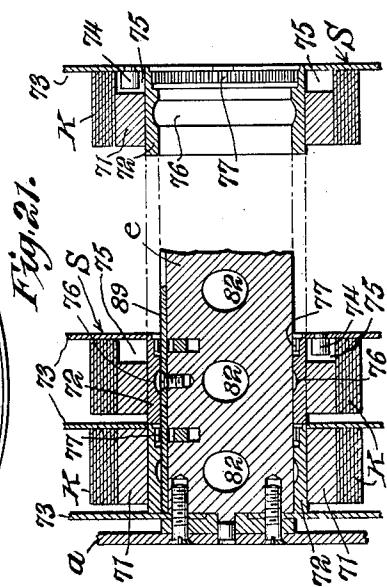
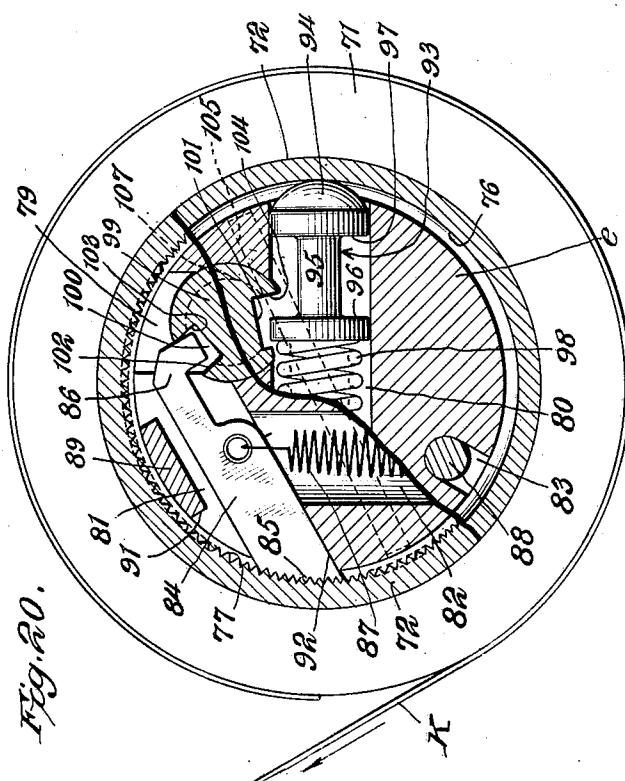
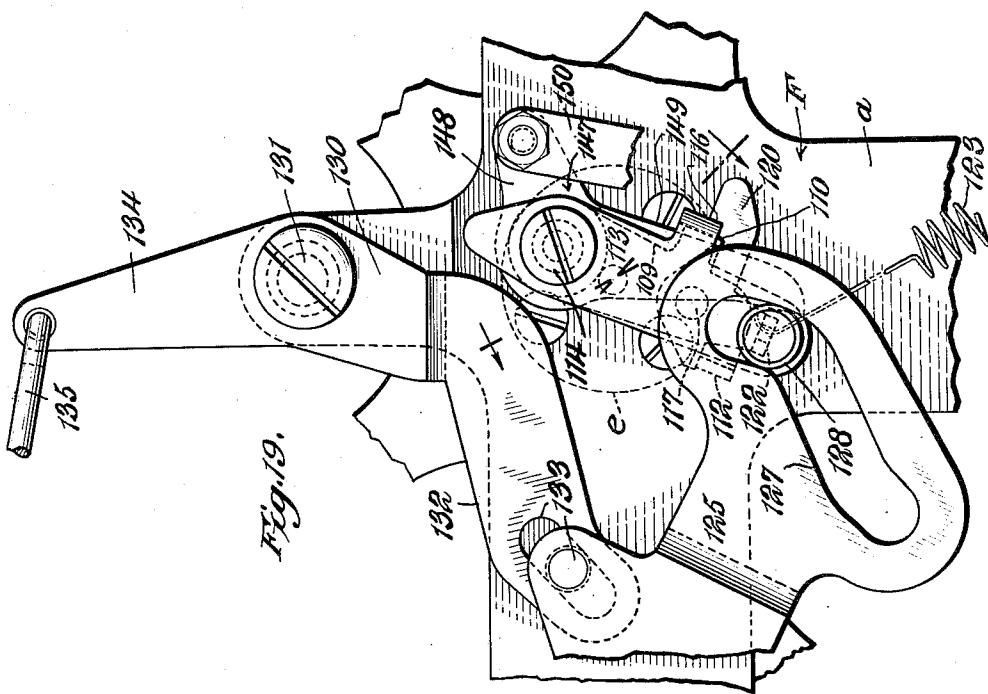
L. C. MYERS ET AL.

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MANIFOLDING DEVICE

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11 Sheets-Sheet 9



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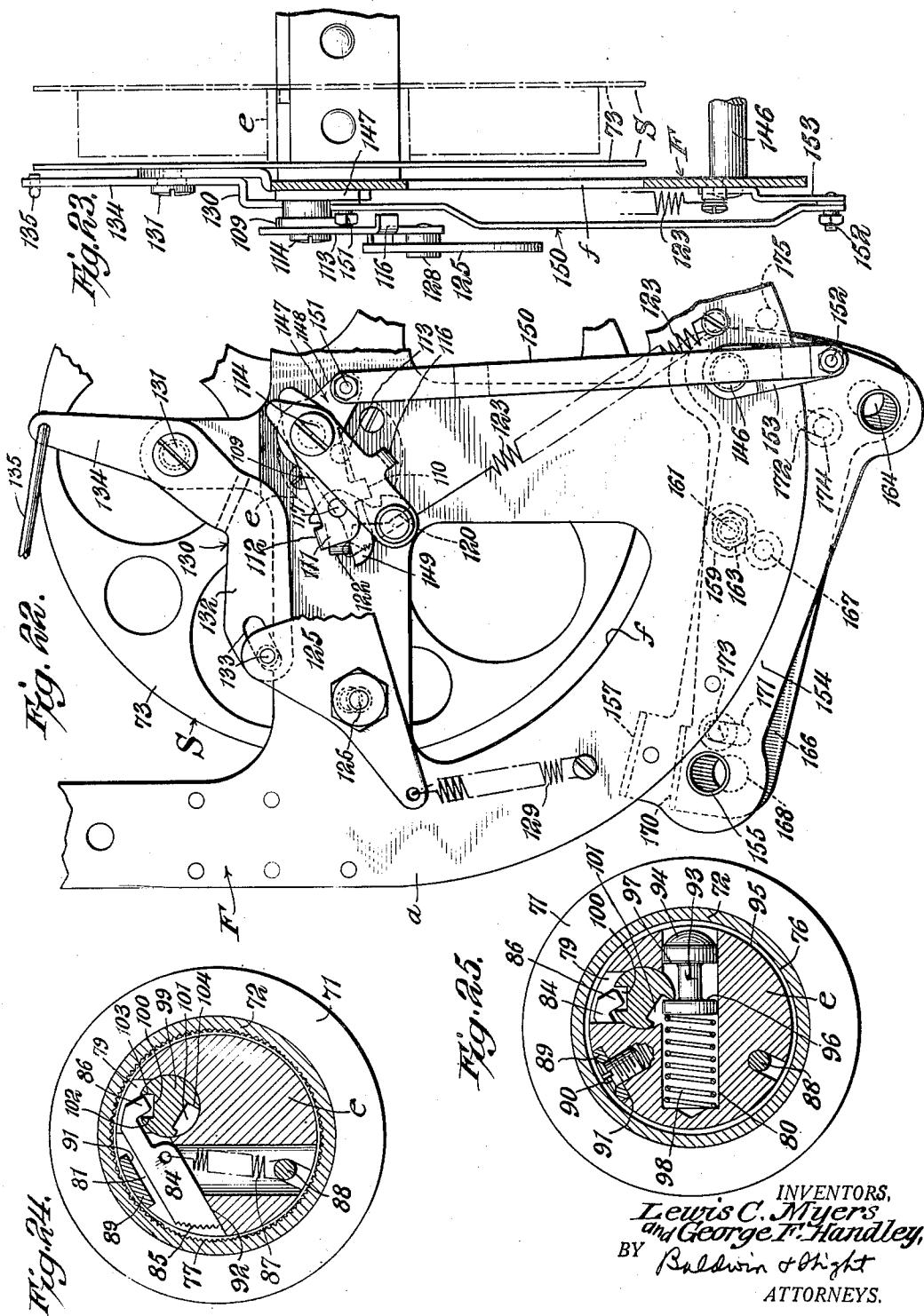
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11 Sheets-Sheet 10



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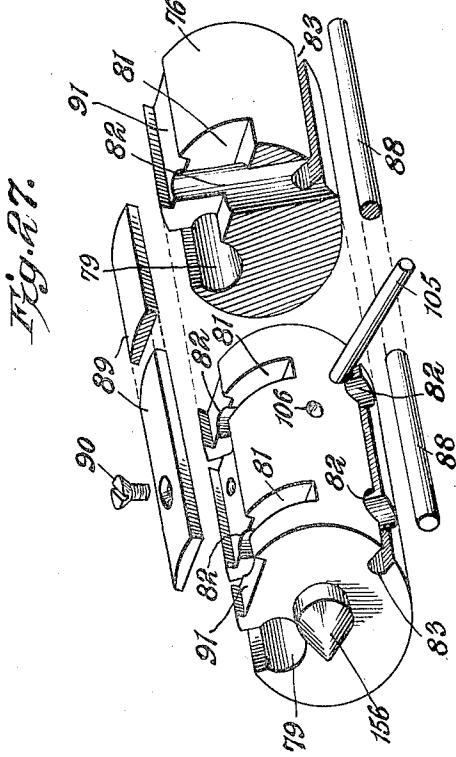
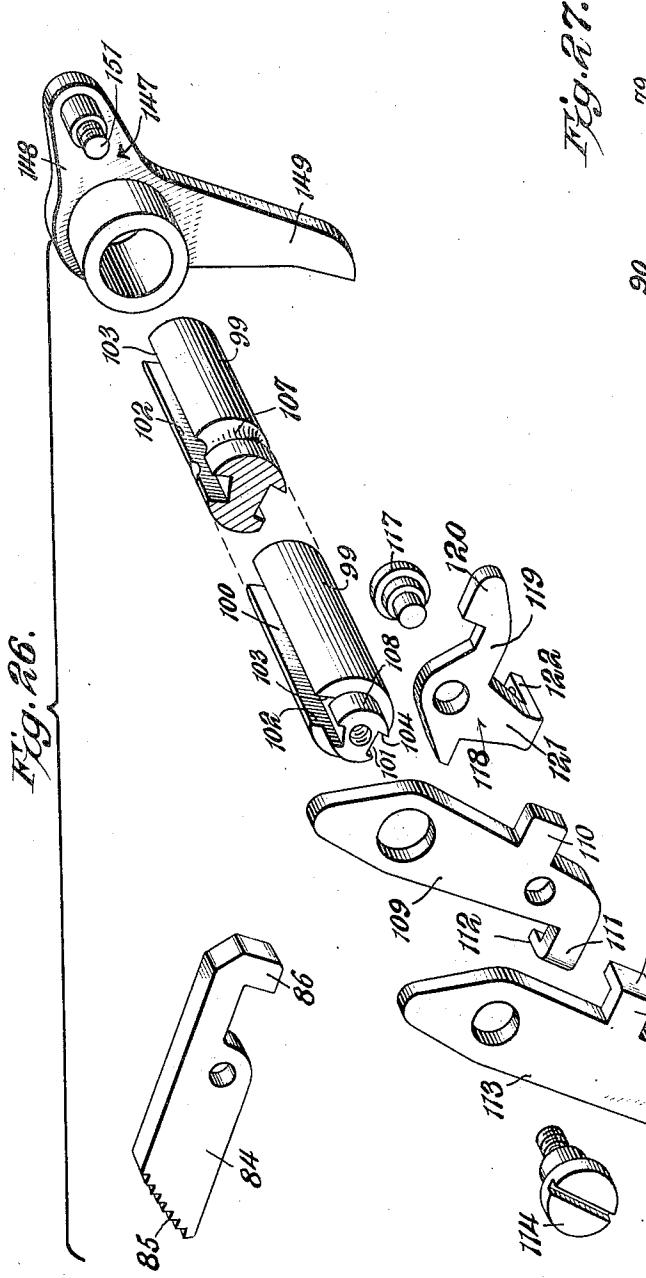
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MANIFOLDING DEVICE

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11 Sheets-Sheet 11



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UNITED STATES PATENT OFFICE

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MANIFOLDING DEVICE

Application filed June 25, 1931. Serial No. 546,858.

This invention relates to new and useful improvements in manifolding devices which may be readily attached to any standard typewriting machine without changing such machine in any material respect, and embodies certain improvements over the construction disclosed in the co-pending application of Gustave O. Degener, Serial No. 491,558, filed Oct. 27, 1930.

The present invention like that of the invention of the Degener application is designed for the purpose of writing on continuous forms of work sheets which are frequently in lengths of several hundred feet. In the Degener application the invention includes a carriage having a non-rotatable platen past which work sheets are fed, and a collating frame which supports the platen and is mounted on the carriage to swing forwardly and rearwardly, thereby moving the platen rearwardly to relieve the normal tight contact relation between the platen and the work sheets, and forwardly to resume said tight contact relation. A plurality of carbon strips or ribbons extend in front of the platen and in interleaved relation with the work sheets, and these strips are fed from individual spools which are rotatably mounted directly on the main frame of the machine.

These strips are fed by a feeding means located at one side of the carriage, and on the other side of the carriage between the spools and the platen, these strips pass through a tensioning means which is gradually increased during the feeding movement of the strips. Mounted on the collating frame is a line spacing mechanism for the work sheets and a driving connection between the collating frame and the strip feeding means is pro-

vided. A single manually operable carriage return lever is connected to the collating frame, to the line spacing means, and to the strip tensioning means, whereby when the lever is moved in one direction the collating frame will be swung forwardly and the platen rearwardly, and the strip feeding means and the strip tensioning means will be operated. The parts are so timed that the maximum tension of the strips is applied con-

but immediately prior to the operation of the line spacing mechanism, whereby the carbon strips will not be dragged upwardly with the work sheets during the line spacing movement of the latter.

Among the several objects of the present invention are to rotatably mount the ribbon spools on the carriage; to provide means for individually and constantly tensioning the ribbon spools against the feeding movements of the ribbons; to provide normally ineffective locking means for the spools and to render said locking means effective upon manipulation of the single manually operable lever at a point of time immediately prior to the completion of the ribbon feeding movement whereby the last part of the ribbon feeding movement will effectively take up any slack in the ribbons which was brought about by the rearward movement of the platen whereby said ribbons will be held in a taut condition and will not be dragged upwardly by the work sheets during the line spacing movement of the latter; to provide a single shaft for supporting all the ribbon spools and to support said tensioning devices and said locking means on the shaft for direct cooperation with the various ribbon spools, and to provide a manually operable means for simultaneously withdrawing all of the spool tensioning devices and all of the spool locking means from cooperation with the spools to thereby permit of said spools being readily removed from the shaft or positioned thereon.

In the drawings:—

Figure 1 is a top plan view of a typewriter carriage showing our invention applied thereto,

Figure 2 is an elevation taken from the right hand side thereof,

Figure 3 is a rear view thereof,

Figure 4 is a vertical sectional view taken centrally through Figure 1, the support for the spools and the guides for the work sheets being shown in elevation,

Figure 5 is a rear view of the collating frame, the platen, and the line spacing truck which is mounted on the collating frame and to which the lead-in ends of the work sheets

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are clamped, parts of the view being shown in section,

Figure 6 is a horizontal section showing the carriage return lever in its normal position and with the various cooperating elements in their normal positions,

Figure 7 is a similar view but showing the carriage return lever moved to a position for effecting a single line space movement to the work sheets,

Figure 8 is a similar view but showing the carriage return lever moved to a position for effecting a double line space movement to the work sheets,

15 Figure 9 is a view of a timing diagram showing the extent of movement of the collating frame and the platen, the time of feeding the carbon strips, and the time when the spool locking means becomes effective,

20 Figure 10 is a view showing the separated parts with which the carriage return lever cooperates for effecting certain movements to the work sheets, carbon strips, and spools,

25 Figure 11 is an enlarged view partly in horizontal section and partly in top plan showing the means for supporting the ribbon spools,

Figure 12 is a vertical sectional view taken on the line 12—12 of Figure 11,

30 Figure 13 is an enlarged horizontal sectional view taken on the line 13—13 of Figure 3,

Figure 14 is a fragmentary sectional view similar to Figure 13 but showing the latch release lever moved to its operative or releasing position,

35 Figure 15 is a view similar to Figure 14 but showing the latch release lever and the main operating lever moved to fully released positions,

40 Figure 16 is an enlarged front elevation of the spool supporting frame,

Figure 17 is a vertical cross section through one of the spools and the supporting shaft therefor, the view showing the locking means 45 in its normally ineffective position,

Figure 18 is a view similar to Figure 17 but showing the tensioning means for the same spool in its normal or tensioned position,

50 Figure 19 is an enlarged front elevation showing the spool locking means in its effective position,

Figure 20 is an irregular transverse section taken through one of the spools and the supporting shaft therefor, the view showing both the tensioning means and the locking means in effective positions,

60 Figure 21 is a longitudinal sectional view through several of the spools and the supporting shaft, the view showing the means employed for supporting the shaft on the spool supporting frame,

65 Figure 22 is a front elevation of the spool supporting frame and the mechanism thereon for releasing the spool locking means and

the spool tensioning means, the view showing the operating lever in its moved position for effecting the release of said locking and tensioning means,

Figure 23 is a detail view showing the mechanism of Figure 22 in elevation and the front plate of the spool supporting frame in section,

Figure 24 is a vertical cross sectional view taken through one of the spools and the supporting shaft therefor, the view showing the spool locking means fully retracted whereby the spool may be removed from the shaft or replaced thereon,

Figure 25 is a view similar to Figure 24 but showing the spool tensioning means fully retracted,

Figure 26 is a view showing certain of the movable parts which are mounted upon the spool supporting shaft, and

Figure 27 is a perspective view of the spool supporting frame.

The invention as illustrated in the accompanying drawings is shown as being applied to the well known standard Royal typewriting machine but it is to be understood that our invention is adapted to be applied to other types of typewriting machines, or to calculating machines and the like.

The typewriting machine includes a main frame A, a carriage B, a platen C, a main ribbon D, and type bars E which are operated in the usual manner.

The main frame A includes side walls 5 and 6, and a rear wall 7. The carriage B is supported along its front portion by upper and lower rails 8 and 9 respectively. The rear portion of the carriage is supported by a rail 10 which is fixed to brackets 11, 11 adjustably attached to the main frame A of the machine on opposite sides thereof. A spool supporting frame F is connected at its upper end to a cross bar 12 on the carriage, and attached to the lower part of the frame is a bracket 13 which supports a roller 14 engaging the rail 10 to thereby support the rear portion of the carriage and permit said carriage together with the spool supporting frame F to be moved with the carriage during letter space movements of the latter.

The carriage B includes end plates 15 and 16 respectively and rigidly connected to the front portions of said plates is a rod 17. Journalized on this rod adjacent the inner faces of the end plates are hanger arms 18, 18 which form a pivotal support for a collating frame G and the platen C, the latter being rigidly connected to the former. The collating frame G includes spaced side bars 19 and 20 which are rigidly connected at their upper ends by a cross rod 21 and at their lower ends by the platen C. The side bars 19 and 20 are each provided adjacent its lower end with an opening 22 through which the rod 17 passes, the openings 22 be-

ing of diameters considerably greater than the diameter of the rod 17 so as to permit the platen to swing about said rod.

Journaled in the rear ends of the end plates 5 15 and 16 of the carriage is a rock shaft 23 and fixed to said rock shaft adjacent the ends thereof are rock levers 24 and 25 respectively, the lever 24 including an upwardly extending arm 26 and a downwardly extending 10 arm 27, and the lever 25 including an upwardly extending arm 28 and a downwardly extending arm 29. Substantially horizontal links 30 extend rearwardly from the platen C toward the rock shaft 23. These links 30 15 extend under the rock shaft 23 and have their rear end portions curved upwardly and pivotally connected to the upper arms 26 and 28 of the levers 24 and 25 as at 31 and 32 respectively. The front ends of these links 30 20 are pivotally connected as at 33, 33 to depending lugs 34, 34 integral with the lower ends of the side bars 19 and 20 of the collating frame G. The front ends of the links 30 25 extend beyond the pivots 33 and terminate in downwardly extending arms 35, 35 which are pivotally connected at their lower ends as at 36, 36 to the lower ends of the hanger arms 18, 18. Pivotally connected to the upper ends of the lever arms 26 and 28 are the 30 rear ends of links 37 and 38, the front ends of said links being pivotally connected to the upper ends of the collating frame G.

The collating frame G in its normal position is inclined rearwardly as shown in Figures 2 and 4. In this position of the frame the platen C is located in its normal or printing position. When, however, the shaft 23 is rocked forwardly the levers 24 and 25 together with the links 30, 30 cause the collating 40 frame to swing forwardly and the platen C to swing rearwardly to the dotted line position shown in Figure 4. Thus the platen C is bodily moved rearwardly from its normal writing position to its abnormal or non-writing position.

Work sheets H are generally arranged in a roll or continuous form of work sheets positioned in rear of the machine and the lead-in ends of the work sheets are fed forwardly 50 over a table I, thence over a roller 39 located between the platen C and said table, thence downwardly under a guide roller 40 located below the platen C, thence upwardly past the platen and in rear of the main ribbon D, and 55 the end portions are removably clamped to a truck J which is mounted on the collating frame G for upward line spacing movements. The truck J is fully described in the Degener application Serial No. 491,558 referred to 60 above and therefore a detail description thereof is thought to be unnecessary. The mechanism for line spacing the truck is also fully shown and described in the Degener application and a detail description thereof is 65 thought to be unnecessary.

There is provided a single manually operable lever 41 which in the present case is the carriage return lever, and have provided connections including a link 42 between this lever and the lever 24 for effecting a forward 70 swinging movement to the collating frame and a simultaneous bodily movement rearwardly to the platen and connections indicated generally by the numeral 43 between the lever 41 and the truck J for effecting line spacing movement to the latter. Both of said connections are disclosed in the Degener application referred to above and a detail description thereof is thought to be unnecessary.

The operating lever 41 is pivoted as at 44 to a supporting bracket 45 which extends laterally from the plate 15 of the carriage. The inner end of the lever 41 is provided with a cam head 46 having diametrically opposite concentric portions 47 and 48, a recess or cam portion 49 between the portions 47 and 48, and a recess 50 located diametrically opposite the recess 49. A lever 51 is fulcrumed at one end to a vertically disposed pivot bolt 52 mounted on the bracket 45 and the free end of the lever 51 is pivotally connected as at 53 to the front end of the link 42. A roller 54 is journaled on the lever 51 and is normally seated in the recess or cam portion 50 of the operating lever 41 as shown in Figure 6. Thus when the lever 41 is swung to the right, the roller 54 will ride along the surface of the recess 50 until it is positioned on the concentric portion 48. During this movement of the lever 41, the lever 51 will be swung rearwardly and consequently the link 42 will be also swung rearwardly. This rearward movement of the link 42 will swing the collating frame G forwardly to an upright position shown in dotted lines in Figure 2, and simultaneously cause the platen C to be moved rearwardly a distance sufficient to relieve the normal tight contact relation between the work sheets and the platen.

The mechanism for effecting a line spacing operation to the truck J upon swinging movement of the operating lever 41, includes a lever 55 which is pivoted on the pivot bolt 52, and pivotally connected to the free end of this lever is the front end of a link 56 forming a part of the driving connections between the operating lever 41 and the truck J. The lever 55 is provided with a forwardly extending arm 57 which terminates in an upturned end or toe 58. Journaled on the head 46 of the operating lever 41 is a roller 59 which is located on the lever in such a position that when said lever is in its normal position, the roller 59 is spaced a considerable distance from the toe 58 and will not contact with said toe until the operating lever has been swung to the right a distance sufficient to completely move the platen C rearwardly and swing the collating frame G

forwardly. Consequently upon swinging movement of the operating lever 41 to the right the collating frame will be first swung forwardly and the platen rearwardly and immediately thereafter a line spacing movement will be imparted to the truck J.

In some conditions of work, it may be desirable to effect a single line space movement to the work sheets whereas with other work it may be desirable to impart a double line space movement to said work sheets. For this purpose, there is mounted upon the bracket 45 an oscillatory limiting post 60 with which a limiting plate 61 is adapted to cooperate, said plate being pivotally connected to the operating lever 41 by a pin 62. The construction and operation of the post 60 and plate 61 is fully described in the Degener application referred to above.

The carriage return lever 41 is provided with a pair of fixed stops 63 and 64 which cooperate with the bracket 45 to limit the extreme swinging movement of said lever. The position of the lower guide roller 40 relative to the platen C and clamp J, is such that the work sheets will remain in contact with the platen even when the platen is moved rearwardly but the rearward movement of the platen is sufficient to relieve the normal tight contact relation between the work sheets and the platen.

The machine as thus far described is similar to the machine shown in the Degener application referred to above.

In this invention, like in the Degener invention, a plurality of auxiliary ribbons K which are preferably in the form of narrow carbon strips, are fed from spools S located in rear of the machine, thence forwardly along the left hand side of the carriage, thence across the front of the platen in a direction transverse to the travel of the work sheets and in interleaved relation therewith, and thence rearwardly along the right hand side of the carriage to a ribbon feeding means L.

The ribbon feeding means L and the actuating mechanism therefor is identical with that shown in the Degener application referred to above, and includes a pair of corrugated feed rollers 65 which are intermittently actuated from the rock shaft 23 through a connection which includes a lever 66 as shown in Figures 1 and 2. These ribbons, immediately after leaving the spools S, pass around individual guide rollers 67 which are mounted on a bracket 68 on the left hand side of the carriage. These ribbons extend forwardly and all pass around a guide roller 69 located at the left hand end of the carriage and in substantial alinement with the front edge of the platen C, and after leaving the work sheets with which they are interleaved, the ribbons extend around a guide roller 70 mounted on the carriage at the front of the right hand end thereof, and thence rearward-

ly to the feed rollers 65. Thus the guide rollers 69 and 70 cooperate to position the ribbons in parallelism with the platen C.

From the foregoing, it will be observed that when the collating frame G is in its normal or rearwardly inclined position, the front line of the platen C is in a position to cause the work sheets W to bow forwardly between the lower guide 41 and the truck J, and thereby create a tight compact relation between the platen and the work sheets while the latter are being printed upon, the tight contact relation insuring clear printing on the several work sheets; that when the collating frame is swung forwardly, the platen is moved rearwardly to relieve the normal tight contact relation between the platen and the work sheets; that the rearward movement of the platen relieves the normal pressure of the platen against the ribbons and causes a small amount of slack to form in said ribbons; and that the ribbon feeding movement takes places simultaneously with the forward swinging movement of the frame.

As previously stated the ribbon spools S are rotatably mounted in the ribbon spool frame F which bodily moves back and forth with the carriage. We have provided individual tensions for the ribbon spools in order to place a drag on the ribbons against the action of the ribbon feeding means L. We have also provided individual locking means for the spools which are normally ineffective, but which are simultaneously rendered effective by the operating lever 41 immediately prior to the completion of the operation of the ribbon feeding means L, whereby the spools will be locked against further feeding movement and the last part of the movement of the ribbon feeding means will result in removing the slack in the ribbons whereby said ribbons will be held taut and will not be dragged upwardly by the work sheets during the line spacing of the latter.

The ribbon spool supporting frame F comprises front and rear walls or plates *a* and *b*, which are rigidly connected together by side braces *c*, *c* and bottom braces *d*, *d*, the latter being connected by the brace 13 which supports the roller 14. A horizontal shaft *e* on which the ribbon spools S are rotatably mounted, is fixedly attached at its rear end to the front plate *a* of the frame F, and the free rear end of the shaft is centrally disposed with respect to an opening *f* formed in the rear plate or wall *b*, the opening being of a size to permit the spools S to be readily positioned on the shaft or removed therefrom.

Each spool S includes a core 71 upon which a ribbon is wound, the core surrounding a metal hub 72 fixed to a separating disc 73, and the latter being provided with a pin 74 fitting into a recess 75 in the core to form an interlocking connection between the disc and core

whereby said parts will rotate in unison about the spool shaft *e* during feeding movement of the ribbon. The hub 72 is provided with an internal annular groove 76 and with an internal annular groove having a clutch surface 77, as shown particularly in Figure 12.

The shaft *e* carries means for constantly tensioning the individual spools against the feeding action of the ribbons, and also normally ineffective means for locking the individual spools against feeding rotation which, however, will be rendered effective during the operation of the machine as hereinafter explained. To this end the non-rotatable shaft *e* is provided with an eccentrically disposed longitudinal bearing recess 79 which extends throughout the length of the shaft, a plurality of equally spaced transverse recesses 80 which are disposed at one side of the longitudinal recess 79 and extend inwardly from one side of the shaft and have their inner ends terminating short of the other side of the shaft and arranged in open communication with said longitudinal recess, a plurality of chord-line recesses 81 which extend inwardly from one side of the shaft and have their inner ends in open communication with said longitudinal recess, a plurality of spring-receiving recesses 82 extending inwardly from the periphery of the shaft and having their inner ends disposed in open communication with the chord-line recesses 81, and a longitudinal groove 83 which bisects the spring-receiving recesses 82, there being one recess 80, one recess 81, and one recess 82 associated with each ribbon spool *S*.

Slidably mounted in each chord-line recess 81 is a clutch pawl 84 which is provided at its outer end with clutch teeth 85 for engaging the clutch surface 77 of the associated spool *S* and thereby lock the spool against feeding rotation. The inner end of each pawl is provided with a foot or shoulder 86 which projects downwardly into the longitudinal bearing recess 79. Coil springs 87 are respectively disposed within the recesses 82 and have their upper ends connected to the pawls 84 and their lower ends engaged with an anchor rod 88 positioned within the longitudinal groove 83. A cap plate 89 which is secured by screws 90 in a peripheral longitudinal seat 91 formed in the shaft *e*, extends across the chord-line recesses 80 to retain the pawls 84 in said recesses. The springs 87 not only urge the pawls 84 outwardly towards the clutch surfaces 77, but also yieldably retain the same against the seating surfaces 92 of the recesses 81.

Slidably mounted in each recess 80 is a plunger 93 which includes a rounded brake head or shoe 94 and a shank which is reduced intermediate its ends to form a resultant annular groove 95 and spaced inner and outer shoulders 96 and 97. A coil spring 98 is located in the recess 80 between the inner end

thereof and the plunger and functions to normally urge and retain the brake head or shoe 94 in frictional contact with the groove 76 of the associated spool *S* and thereby brake or frictionally tension the spool against feeding movements of the ribbon. 70

In order to simultaneously and positively move all of the pawls 84 into or out of locking engagements with the ribbon spools, or to simultaneously retract all of the pawls and all of the brake plungers 93 out of engagements with the spools to permit either the removal of the spools from the shaft *e* or the application of spools thereon, we have positioned a rockable actuator or shaft 99 in the longitudinal bearing recess 79 of the shaft. This actuator is provided with longitudinal grooves 100 and 101, all of the feet 86 of the pawls 84 projecting into the groove 100 and all of the shoulders 96 of the plungers 93 projecting into the groove 101. The groove 100 includes spaced walls or shoulders 102, 103 for cooperation with the opposite sides of the feet 86 of the pawls to positively slide the pawls in opposite directions upon oscillation of the actuator in opposite directions, and the groove 101 includes a wall or shoulder 104 for cooperation with the shoulders 96 of the plungers 93 to positively slide the plungers inwardly against the tensions of the springs 98 upon oscillation of the actuator 99 in the direction which releases the pawls 84. 80

The actuator rock shaft 99 is retained against longitudinal movement by means of a locking pin 105 which is seated in a transverse opening 103 formed in the supporting shaft *e*, and fitting into a circumferential groove 107 formed in the actuator. 100

Connections are provided between the actuator 99 and the carriage return lever 41 whereby the latter will rock the actuator immediately prior to the completion of the operation of the ribbon feeding means and thereby render the ribbon spool locking means effective by positively moving all of the clutch pawls 84 into locking engagements with the hubs 72 of the ribbon spools *S*, and whereby the pawls will be returned to their normal or ineffective locking positions upon the return movement of the lever 41. To this end, the front end of the actuator shaft 99 projects forwardly of the front plate *a* of the spool supporting frame, and is provided with a reduced end portion 108. Brazed or otherwise fixedly secured to the end portion 108 is a rock arm 109 having integral and oppositely extending upper and lower side lugs 110 and 111, the latter terminating in a rearwardly projecting portion 112. Disposed in front of the rock arm 109 is a lever arm 113 which is pivoted relative to the rock arm 109 and the shaft 99 at its upper end by a shoulder screw 114. The lever arm 113 is provided with an integral side lug 115 which is disposed in front of the lug 110 and termi- 110 120 125

nates in a rearwardly projecting portion 116 which is disposed along side of the end of the lug 110. Pivotedly supported against the rear face of the rock arm 109 by a pivot pin 117 is a latch lever 118 having a laterally extending latch arm 119 provided with a nose 120, and a depending arm 121 which terminates in a rearwardly projecting portion 122. The rearwardly projecting portion 116 of the lever arm 113 extends past the lug 110 of the rock arm 109 and is normally engaged by the nose 120 of the latch lever 118 whereby upon swinging movement of the lever arm 113 to the right the latch lever 118 and the rock arm 109 will be swung therewith to thereby oscillate the actuator shaft 99. The latch lever 118 is normally held in operative or latched engagement with the portion 116 by a coil spring 123 having its upper end connected to the rearwardly extending portion 122 thereof and the lower end connected to the front wall or plate *a* of the ribbon spool frame F. In order to swing the lever arm 113 to the right upon manipulation of the carriage return lever 41, and thereby rock the actuator shaft 99 to effect the locking of the spools against feeding rotation, we have provided the following mechanism:—

A cam lever 125 which is fulcrumed intermediate its ends to an eccentrically supported pivot bolt 126, is provided at one end with a cam groove 127 which normally extends in a general vertical plane for cooperation with a cam roller 128 journaled on the lower end of the lever arm 113. A spring 129 which is connected at its upper end to the end of the cam lever opposite the cam groove 127 and at its lower end to the front wall *a* of the ribbon spool frame F, functions to yieldably retain the cam lever in position with the roller 128 at the lower end of said cam groove. An actuating bell crank lever 130 is fulcrumed intermediate its ends as at 131 to the front plate or wall *a*. The horizontal arm 132 of the bell crank lever is connected to the cam lever 125 at a point between the pivot 126 thereof and the cam groove 127 by a pin and slot connection 133. The vertical arm 134 of the bell crank lever is connected to one end of a link 135, the other end of the link being connected to one arm 136 of a bell crank lever 137 fulcrumed on a vertical pivot 138 attached to the bracket 67 on the left side of the carriage. The other arm 139 of the bell crank lever is connected to the rear end of a link 140 whose front end is engaged by a pin and slot connection 141 to one arm 142 of a bell crank lever 143 fulcrumed at its angle on the pivot bolt 52 which is carried by the bracket 45 to which the carriage return lever 41 is fulcrumed. Journaled on the other arm 144 of the bell crank lever 143 is a cam roller 145 which is normally seated in the cam recess 49 of said operating lever 41. Thus when the operating lever 41 is swung to the

right, the bell crank lever 143 will be rocked, and the link 140, bell crank lever 137, and link 135 will swing the actuating bell crank lever 130, as shown in Figure 19, in a direction to lift the cam arm of the cam lever 125 against the tension of the spring 129, and swing the lever arm 113, latch 120 and rock arm 109 as a unit to thereby rock the actuator shaft 99 towards the left to simultaneously move the clutch pawls 84 outwardly into engagements with the clutch surfaces 77 of the respective spools, thus locking all of the spools against feeding rotation. When the operating lever is returned to its initial position, the spring 129 will return the various connected parts to their initial positions.

In order to position the ribbon spools on the shaft *e* or to remove the spools from the shaft, it is desirable to retract the tension plungers 95 from the annular friction grooves 76 of the spools, and for this purpose there is provided manually operable means for simultaneously retracting all of the plungers, for retaining the plungers in their retracted position for any desired period of time, and for simultaneously rendering said plungers effective. To this end, a rock shaft 146 is journaled in the front and rear walls or plates *a* and *b* of the ribbon supporting frame F below the ribbon spools S. A release lever 147 is journaled on the front end of the actuator shaft 99 in rear of the rock arm 109 and latch 118, and this lever includes a horizontal arm 148 and a depending or vertical arm 149. A vertical link 150 has its upper end pivotally connected as at 151 to the horizontal arm 148 and its lower end pivotally connected as at 152 to a laterally extending rock arm 153 fixed to the rock shaft 146. In the normal position of the parts as shown in Figure 16, the vertical or depending arm 149 is located at the right of and in spaced relation to the rearwardly extending portion or arm 122 of the latch 120, and the depending arm 121 of the latch is located at the right of and in spaced relation to the rearwardly extending portion or arm 112 of the rock arm 109. Thus when the rock shaft 146 is rocked towards the left, the rock arm 153 will be swung downwardly until the pivot 152 passes to the right of a line connecting the pivot 151 and the axis of the rock shaft 146, as shown in Figure 22. The release lever arm 149 during this movement, has been moved to the left to engage the rearwardly extending arm 122 of the latch 117 and to swing said latch against the tension of the spring 123 and out of engagement with the lever arm 116 of the lever arm 113. Upon continued swinging movement of the latch 117 the depending arm 121 engages the rearwardly extending arm 112 of the rock arm 109 and swings the latter to the left to thereby rock the actuator shaft in a clockwise direction to effect a simultaneous retraction of all the tension plungers 93 and clutch pawls 130

84 within the periphery of the spool shaft *e* and thereby permit the spools *S* to be readily positioned on the shaft or removed therefrom without any interference whatever. It will be noted that in this position of the parts, 5 by reason of the latch being disengaged from the lever arm 113, no movement will be transmitted to the cam lever 125 and consequently the actuating connections between the operating lever 41 and the lever arm 113 will not be disturbed. When the rock shaft 146 is turned in the opposite direction the parts will return to their initial positions. In order to 10 turn the rock shaft 146, there is fixed to the rear end thereof a manually operable flat lever or arm 154 having an opening or seat 155 in its upper end to receive a cam stud 156 extending rearwardly from and preferably integral with the rear free end of the spool 15 supporting shaft *e*. Thus the lever arm 154 in its normal position serves as a rigid support for the rear free end of the shaft *e*. As viewed in Figures 3, the upper end of the lever arm 154 is provided on its left side with 20 a cam nose 157 adapted to engage the stud 156 when the arm is being returned from its abnormal position to its normal position and thereby guide or spring the upper end of the arm to effect engagement between the opening or seat 155 and the stud. In order to lock 25 the lever arm 154 in its normal position of engagement with the stud 156, there is provided a spring plunger 158 which is mounted in a barrel 159 attached to the inner face of the rear wall or plate *b*, as shown in Figs. 13, 30 14, and 15 particularly. The plunger 158 is pressed rearwardly by a coil spring 160 mounted within the barrel and disposed around the shank 161 of the plunger. The 35 front end of the shank 161 projects forwardly through the front end 162 of the barrel and is provided with an adjustable stop nut or nuts 163 to limit the rearward movement of the plunger. The plunger is located at the 40 left of the rock shaft 146 and is normally seated in an opening 164 formed in the lever arm 154, and the rear end of the plunger is formed with a cam end 165 which projects rearwardly beyond the rear face of the lever 45 arm. Thus, in the normal locked position of the lever arm 154, as shown in Figure 13, it is impossible for the lever arm to become accidentally shifted, or to be physically moved until after the plunger proper has been 50 pushed forwardly to a position shown in Figure 14 wherein the plunger proper is disengaged from the lever arm 154. A flat lock release lever 166 is disposed against the rear face of the lever arm 154 and is pivoted inter- 55 mediate its ends thereto by a pivot 167 as shown in Figures 3 and 22. The release lever 166 is of the same area as the lever arm 154, and the upper end is provided with an opening or seat 168 to receive the stud 156 of the 60 spool shaft *e*, and the lower end is provided 65 with an opening or seat 169 to receive the rear end of the lock plunger 158. The upper end of the release lever 166 is provided with a thumb piece 170. The release lever above and below the pivot 167 thereof, is provided 70 with upper and lower slots 171 and 172 respectively, and fixed to the lever arm 154 are headed pins 173 and 174 which project through said slots and function to limit the rearward springing movements of the upper 75 and lower end portions of the release lever. When it is desired to turn the rock shaft 146 to release the tension plungers 93 and the clutch pawls 84 from the spools *S*, the operator pushes towards the right as viewed in 80 Figure 3, against the thumb piece 170 and swings the release lever about its pivot relative to the lever arm 154, the swinging movement being limited by the length of either one or both slots 171, 172. During this swinging 85 movement of the release lever, the upper end thereof is cammed over the stud 156 and the lower end is cammed over the lock plunger 158, thereby depressing the latter as shown 90 in Figure 14. Thus the plunger 158 is disengaged from the lever arm 154 and upon continued swinging movement of both the release lever 166 and the lever arm 154, the rock shaft 146 will be turned until the lever arm 95 contacts a stop pin 175 fixed to the rear wall *b* of the spool frame *F*. At this time the rock arm 153 will be in the position shown 100 in Figure 22 and the actuator shaft 99 will be retained in its released position for any desired period of time to permit ready removal 105 of spools *S* from the shaft *e* or the application of such spools. 110

It will be observed that the ribbon spools *S* are retained against longitudinal movement relative to the shaft *e* by reason of the clutch pawls 84 projecting outwardly beyond the periphery of the shaft and into the annular clutch grooves of the spools, coupled with the fact that the tension plungers 93 also project outwardly beyond the periphery of the shaft and into the annular grooves 76 of the spools; that by rocking the actuator 99 in one direction by the lever 134, all of the pawls 84 will be projected outwardly into clutching engagements with the clutch surfaces 77 of the spools and thereby lock the latter against feeding rotation; that by rocking the actuator in the opposite direction by the lever 166 all the pawls 84 and all the tension plungers will be moved inwardly within the periphery of the shaft *e* whereby all of the spools *S* may be readily removed from the shaft by sliding said spools rearwardly along the shaft and removing the spools from the rear end of the shaft through the opening *f* in the rear wall *b* of the spool frame, or the spools may be readily positioned on the shaft through said opening.

In operation, the work sheets *H* are first led forwardly over the paper guide *I*, thence

over the roller 39, thence under the lower guide roller 40, and thence upwardly between the main ribbon D and the platen C. The carbon strips or ribbons K are then inter-leaved with the work sheets and the free ends of said ribbons are positioned between the feed rolls 65, 65 of the ribbon feeding means L. The line spacing truck J is positioned at the bottom of the collating frame G, and the free ends of the work sheets are clamped to the truck. The operator then proceeds by writing the first line on the work sheets, and then swings the carriage return lever towards the right previous to returning the carriage, for the purpose of (1) swinging the collating frame G forwardly and the platen C rearwardly to relieve the normal tight contact relation between the platen and the work sheets and ribbons, (2) actuating the ribbon feeding means L concomitantly with the backward movement of the platen, (3) effecting a locking of the ribbon spools S against feeding movement prior to the completion of the operation of the feeding means L whereby the ribbons K will be rendered taut, and (4) line spacing the work sheets W subsequent to the ribbon feeding movement and while the ribbons K are retained in their taut relation whereby the work sheets will not drag the ribbons upwardly therewith. During this swinging movement of the carriage return lever 41, as shown in Figure 9, the first part of the movement from the point w to the point x results in the swinging forwardly of the collating frame, the rearward movement of the platen, and the operation of the ribbon feeding means; the lever 41 from the point w to the point y functions to turn the actuator shaft 99 and there-by effect the locking of all the ribbon spools S to the stationary shaft e prior to the completion of the ribbon feeding movement, and prior to the line spacing operation; and the lever 41 during the latter part of its movement i. e., from the point x to the point z, effects the line spacing movement to the work sheets by the upward movement of the truck J along the collating frame G. The operator then continues to press on the carriage return lever 41 in the same direction and returns the carriage to its initial position, after which the lever is released and all the parts previously effected thereby are returned to their initial positions.

55 We claim:—

1. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, means mounted on the shaft for applying a constant tension to the spool, means for feeding the ribbon against the drag of said tension means, and means extending longitudinally within the shaft for releasing said tensioning means.

2. In a typewriting machine, the combina-

tion with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon and including a hub, a radially disposed spring pressed tension plunger mounted in the shaft for constant frictional engagement with the hub, means for feeding the ribbon against the drag of said tension means, and means extending longitudinally within the shaft for releasing said tension plunger from engagement with the hub.

3. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon and including a hub having an internal annular groove, a radially disposed spring pressed tension plunger mounted in the shaft for constant frictional engagement with the annular groove of the hub, and means for feeding the ribbon against the drag of said tension means.

4. In a typewriting machine, the combination with a plurality of ribbon spools freely rotatable about a common axis, of ribbon feeding means, separate means for normally and individually tensioning the spools against the simultaneous feeding movements of the ribbons, and means common to all of the tensioning means for simultaneously rendering all of said tensioning means ineffective.

5. In a typewriting machine, the combination with a non-rotatable shaft having a plurality of spaced transverse recesses formed therein, of a plurality of ribbon spools rotatably mounted on said shaft and respectively provided with hubs having internal annular grooves, spring pressed tension plungers slideable in the respective recesses and having their outer ends frictionally engaging in the grooves of the spools, means for feeding all the ribbons against the drag of the tension plungers, and means for simultaneously retracting all of said plungers out of engagement with the spool hubs.

6. In a typewriting machine, the combination with a non-rotatable shaft having a plurality of spaced transverse recesses formed therein, of a plurality of ribbon spools rotatably mounted on said shaft and respectively provided with hubs having internal annular grooves, spring pressed tension plungers slideable in the respective recesses and having their outer ends frictionally engaging in the grooves of the spools, means for feeding all the ribbons against the drag of the tension plungers, and means for simultaneously retracting all of said plungers out of engagement with the spool hubs including a single manually operable rock shaft journaled longitudinally within the shaft and operatively connected to all of the plungers.

7. In a typewriting machine, the combination with a main frame, of a carriage including a platen mounted thereon for letter space movements, a ribbon spool supporting frame

connected to the carriage to move therewith and located in rear of the main frame, a non-rotatable shaft fixed to the supporting frame, a plurality of ribbon spools journaled on said shaft, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding said ribbons from said spools along the other side of the carriage and thence along in front of the platen to said ribbon feeding means, separate means mounted on the supporting frame for individually tensioning the respective spools against the feeding movements thereof, and means for simultaneously rendering all of said tensioning means ineffective.

8. In a typewriting machine, the combination with a main frame, of a carriage including a platen mounted thereon for letter space movements, a ribbon spool supporting frame connected to the carriage to move therewith and located in rear of the main frame, a non-rotatable shaft fixed to the supporting frame, a plurality of ribbon spools journaled on said shaft, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding said ribbons from said spools along the other side of the carriage and thence along in front of the platen to said ribbon feeding means, separate means supported on the spool shaft for individually tensioning the respective spools against the feeding movements thereof, and means for simultaneously rendering all of said tensioning means ineffective including a single manually operable rock shaft journaled longitudinally within the spool shaft and operatively connected to all of the tensioning means.

9. In a typewriting machine, the combination with a rotatable ribbon spool, of ribbon feeding means, normally ineffective means cooperating with the spool for locking the same against feeding rotation, and means for feeding the ribbon and concomitantly rendering the locking means effective.

45 10. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, normally ineffective means mounted on the shaft for locking the spool against feeding rotation, and means for feeding the ribbon and concomitantly rendering the locking means effective.

11. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon and including a hub having an annular clutch surface, normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl movably mounted in the shaft and adapted to engage the clutch surface of the hub, and means for feeding the ribbon and concomitantly rendering the locking means effective.

12. In a typewriting machine, the combination with a non-rotatable shaft, of a rib-

bon spool rotatably mounted thereon, normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl slidable in the shaft transversely of the longitudinal axis thereof and adapted to engage the clutch surface of the hub, and means for feeding the ribbon and concomitantly rendering the locking means effective including a rock shaft journaled longitudinally within the shaft and operatively connected to the clutch pawl.

13. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, normally ineffective means mounted on the shaft for locking the spool against feeding rotation, a ribbon feeding means, and means including a single manually operable lever movable in one direction for actuating the ribbon feeding means and concomitantly rendering the locking means effective and movable in the opposite direction to effect return of the locking means to ineffective position.

14. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, a plurality of normally ineffective means mounted on the shaft for locking the respective spools against feeding rotation, and means for feeding the ribbon and concomitantly rendering all of the locking means effective.

15. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon and each including a hub having an annular clutch surface, a plurality of normally ineffective means mounted on the shaft for locking the respective spools against feeding rotation, said means each comprising a clutch pawl movably mounted in the shaft and adapted to engage the clutch surface of the associated hub, and means for feeding the ribbon and concomitantly rendering all of the locking means effective.

16. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, a plurality of normally ineffective means mounted on the shaft for locking the spools against feeding rotation, said means each comprising a clutch pawl slidable in the shaft transversely of the longitudinal axis thereof and adapted to engage the clutch surface of the associated hub, and means for feeding the ribbon and concomitantly rendering all of the locking means effective including a rock shaft journaled longitudinally within the shaft and operatively connected to all of said clutch pawls.

17. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, a plurality of normally ineffective means mounted on the shaft for lock-

ing the spools against feeding rotation, said means each comprising a clutch pawl slidable in the shaft transversely of the longitudinal axis thereof and adapted to engage the clutch 5 surface of the associated hub, said clutch pawls being respectively provided with transversely extending rigid feet, and means for feeding the ribbon and concomitantly rendering all of the locking means effective including 10 a rock shaft journaled longitudinally within the shaft, said rock shaft being formed with a longitudinal recess for receiving the feet of the pawls and providing resultant shoulders for engaging said feet for moving 15 said pawls to effective locking positions.

18. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, a normally ineffective clutch pawl 20 mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the 25 lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft.

19. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, a normally ineffective clutch pawl 30 mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft, a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, and actuating connections between the cam lever 35 and the operating lever.

40 20. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, a normally ineffective clutch pawl mounted in the shaft for cooperation 45 with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft, a lever arm normally connected to the actuator to oscillate therewith and provided with a cam roller, a cam lever having 50 a cam groove cooperating with said roller, and actuating connections between the cam lever having 55 a cam groove cooperating with said roller, and actuating connections between the cam lever and the operating lever.

60 21. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, rib-

bon feeding means, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft, a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, a spring for yieldably retaining the cam lever in its normal position, and actuating connections between the cam lever and the operating lever.

65 22. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft, a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, a bell crank lever having a loose pivotal connection with the cam lever, and actuating connections between the bell crank lever 70 and the operating lever.

90 23. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon and including a hub having an annular clutch surface, normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl movably mounted in the shaft and adapted to engage the clutch surface of the hub, an operating lever, operating connections between the lever and the ribbon feeding means, and operating connections between the lever and the spool locking clutch pawl for rendering the latter effective including an oscillatory actuator mounted in the shaft.

95 24. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, ribbon feeding means, a plurality of normally ineffective clutch pawls mounted in the shaft for locking the respective spools against rotation, an oscillatory actuator journaled in the shaft and having operative connections with all of said clutch pawls, an operating lever, operating connections between the ribbon feeding means and the operating lever, and operating connections between the actuator and the operating lever for simultaneously rendering the clutch pawls effective.

25. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, ribbon feeding means, a plurality of normally ineffective clutch pawls mounted in the shaft for locking the respective spools against rotation, an oscillatory actuator journaled in the shaft and having operative connections with all of said clutch pawls, an operating lever, operating connections between the ribbon feeding means and the operating lever, and operating connections between the actuator and the operating lever for simultaneously rendering the clutch pawls effective, comprising a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, and actuating connections between the cam lever and the operating lever. 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

26. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, ribbon feeding means, a plurality of normally ineffective clutch pawls mounted in the shaft for locking the respective spools against rotation, an oscillatory actuator journaled in the shaft and having operative connections with all of said clutch pawls, an operating lever, operating connections between the ribbon feeding means and the operating lever, and operating connections between the actuator and the operating lever for simultaneously rendering the clutch pawls effective, comprising a lever arm normally connected to the actuator to oscillate therewith and provided with a cam roller, a cam lever having a cam groove cooperating with said roller, and actuating connections between the cam lever and the operating lever. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

27. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, ribbon feeding means, a plurality of normally ineffective clutch pawls mounted in the shaft for locking the respective spools against rotation, an oscillatory actuator journaled in the shaft and having operative connections with all of said clutch pawls, an operating lever, operating connections between the ribbon feeding means and the operating lever, and operating connections between the actuator and the operating lever for simultaneously rendering the clutch pawls effective, comprising a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, a spring for yieldably retaining the cam lever in its normal position, and actuating connections between the cam lever and the operating lever. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

28. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted for rotation thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, operating connections between the actuator and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, and manually operable means for oscillating the actuator in the opposite direction to release the tension from the spool. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

29. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, operating connections between the actuator and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, and manually operable means for oscillating the actuator in the opposite direction to release the tension from the spool. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

30. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, operating connections including a releasable latch between the actuator and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, and manually operable means for releasing the latch and oscillating the actuator in the opposite direction to release the tension from the spool. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

31. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for rotation thereon, ribbon feeding means, a plurality of normally ineffective clutch pawls mounted in the shaft for locking the respective spools against rotation, an oscillatory actuator journaled in the shaft and having operative connections with all of said clutch pawls, an operating lever, operating connections between the ribbon feeding means and the operating lever, and operating connections between the actuator and the operating lever for simultaneously rendering the clutch pawls effective, comprising a lever arm normally connected to the actuator to oscillate therewith, a cam lever having operative connection with the lever arm, a bell crank lever having a loose pivotal connection with the cam lever, and actuating connections between the bell crank lever and the operating lever. 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130

for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, a rock arm fixed to the actuator, a lever arm journaled on the actuator, a latch pivoted on one arm and normally engaged with the other arm, operating connections between the lever arm and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, and manually operable means for first releasing the latch and for subsequently oscillating the actuator in the opposite direction to release the tension from the spool.

32. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, a rock arm fixed to the actuator, a lever arm journaled on the actuator, a latch pivoted on one arm and normally engaged with the other arm, operating connections between the lever arm and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, a release lever fulcrumed on the actuator, and manually operable means for first swinging the release lever to release the latch and for subsequently oscillating the actuator in the opposite direction to release the tension from the spool.

33. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, a rock arm fixed to the actuator, a lever arm journaled on the actuator, a latch pivoted to the rock arm and normally engaged with the lever arm, a spring for normally retaining the latch in engagement with the lever arm, operating connections between the lever arm

and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, a release lever fulcrumed on the actuator for cooperation with the latch, and means including a manually operable lever for actuating the release lever to first release the latch from the rock arm and for subsequently engaging the latch with the lever arm and moving the latter to oscillate the actuator in the opposite directions to release the tension from the spool.

34. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon spool rotatably mounted thereon, ribbon feeding means, means mounted in the shaft for normally applying a constant tension to the spool, a normally ineffective clutch pawl mounted in the shaft for cooperation with the spool to lock the latter against feeding rotation, an operating lever, operating connections between the lever and the ribbon feeding means, an oscillatory actuator mounted in the shaft and operatively connected to the tension means and to the clutch pawl, a rock arm fixed to the actuator, a lever arm journaled on the actuator, a latch pivoted to the rock arm and normally engaged with the lever arm, a spring for normally retaining the latch in engagement with the lever arm, operating connections between the lever arm and the operating lever to render the clutch pawl effective upon oscillation of the actuator in one direction, a release lever fulcrumed on the actuator for cooperation with the latch, and manually operable means for oscillating the actuator in the opposite direction to release the tension from the spool, comprising a release rock shaft disposed in parallelism with the spool shaft, a rock arm fixed to the rock shaft, a link connecting the rock arm of the release rock shaft, and a manually operable lever fixed to the rock shaft for actuating the release lever to first release the latch from the rock arm and for subsequently engaging the latch with the lever arm and moving the latter to oscillate the actuator in the opposite direction to release the tension from the spool.

35. In a typewriting machine, the combination with a rotatable ribbon supply spool, of a ribbon feeding means, means for applying a constant tension to the spool, and means for actuating the feeding means and concomitantly locking the spool against feeding rotation.

36. In a typewriting machine, the combination with a rotatable ribbon supply spool, of a ribbon feeding means, means for applying a constant tension to the spool, and means for actuating the feeding means and for locking the spool against feeding rotation prior to the completion of the movement of the ribbon feeding means whereby the last portion of the movement of the feeding means will render the ribbon taut.

37. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon supply spool rotatably mounted thereon, a ribbon feeding means, means for applying a constant tension to the spool, a normally ineffective locking means for the spool supported on the shaft, and means for actuating the feeding means and concomitantly rendering the locking means effective. 70

38. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon supply spool rotatably mounted thereon, a ribbon feeding means, means supported on the shaft for applying a constant tension to the spool, and means for actuating the feeding means and concomitantly locking the spool against feeding rotation. 75

39. In a typewriting machine, the combination with a non-rotatable shaft, of a ribbon supply spool rotatably mounted thereon, a ribbon feeding means, means supported on the shaft for applying a constant tension to the spool, a normally ineffective locking means for the spool supported on the shaft, and means for actuating the feeding means and concomitantly rendering the locking means effective. 80

40. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted thereon for feeding rotations, individual tensioning means for the respective spools supported by said shaft, and means for simultaneously rendering all of said tensioning means ineffective. 85

41. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted thereon for feeding rotations, normally ineffective individual locking means for the respective spools supported by said shaft, and means for simultaneously rendering all of said locking means effective. 90

42. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted thereon for feeding rotations, individual tensioning means for the respective spools supported by said shaft, and individual locking means separate from the tensioning means for the respective spools supported by said shaft. 95

43. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted thereon for feeding rotations, individual tensioning means for the respective spools supported by said shaft, normally ineffective individual locking means for the respective spools supported by said shaft, and means mounted on the shaft for rendering said locking means effective. 100

44. In a typewriting machine, the combination with a non-rotatable shaft, of a plurality of ribbon spools individually mounted thereon for feeding rotations, a plurality of outwardly spring-pressed plungers mounted in the shaft for normally engaging the spools and tensioning the same against feeding rotation, a plurality of clutch pawls for the respective spools mounted in the shaft and normally disposed out of engagement with the spools, an actuator journaled in the shaft and having operative connections with the tension plungers and clutch pawls, and means for oscillating the actuator in one direction to move the pawls into clutching engagement with the spools, and in the other direction to withdraw the tension plungers out of engagement with the spools. 105

45. In a typewriting machine, the combination with a non-rotatable shaft formed with an eccentrically disposed longitudinal bearing recess, a plurality of transverse recesses disposed below the longitudinal recess and extending inwardly from one side of the shaft and arranged in open communication with the longitudinal recess, of a plurality of ribbon spools individually mounted on said shaft and respectively disposed in register with the transverse recesses, outwardly spring-pressed tension plungers respectively located in the transverse recesses and normally engaging the spools, an actuator journaled in the longitudinal bearing recess and having connections with all of said plungers, and means for oscillating the actuator to simultaneously disengage said plungers from the spools. 110

46. In a typewriting machine, the combination with a non-rotatable shaft formed with an eccentrically disposed longitudinal bearing recess, a plurality of transverse recesses disposed below the longitudinal recess and extending inwardly from one side of the shaft and arranged in open communication with the longitudinal recess, a plurality of chord-line recesses extending inwardly from one side of the shaft and having their inner ends arranged in open communication with the longitudinal recess, of a plurality of ribbon spools individually mounted on said shaft and respectively disposed in register with the transverse recesses, outwardly spring-pressed tension plungers respectively located in the transverse recesses and normally engaging the spools, a plurality of pawls mounted in the chord-line recesses for engaging and locking the spools against feeding rotation and normally disposed out of engagement therewith, an actuator journaled in the longitudinal bearing recess and having connections with all of said plungers and pawls, and means for oscillating the actuator in one direction to move the pawls into locking engagement with the spools and in the opposite direction to retract the pawls and tensions from engagement with the spools. 115

47. In a typewriting machine, the combination with a main frame, of a carriage 120

mounted thereon for letter space movements and including a platen, a spool supporting frame disposed in rear of the main frame and attached to the carriage to move therewith, a plurality of ribbon spools rotatably mounted on said supporting frame, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding the ribbons from the spools forwardly along the other side of the platen and then past the platen to the feeding means, means for tensioning the spools against feeding rotation, normally ineffective means for locking the spools against feeding rotation, and means including a manually operable lever mounted on the carriage for actuating the ribbon feeding means and for rendering the locking means effective prior to the completion of the operation of the ribbon feeding means.

48. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a spool supporting frame disposed in rear of the main frame and attached to the carriage to move therewith, a plurality of ribbon spools rotatably mounted on said supporting frame, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding the ribbons from the spools forwardly along the other side of the platen and then past the platen to the feeding means, separate means for tensioning the respective spools against feeding rotation, normally ineffective means for locking the spools against feeding rotation, and means including a manually operable lever mounted on the carriage for actuating the ribbon feeding means and for rendering the locking means effective prior to the completion of the operation of the ribbon feeding means.

49. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a spool supporting frame disposed in rear of the main frame and attached to the carriage to move therewith, a plurality of ribbon spools rotatably mounted on said supporting frame, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding the ribbons from the spools forwardly along the other side of the platen and then past the platen to the feeding means, means for tensioning the spools against feeding rotation, normally ineffective means for locking the spools against feeding rotation, and means including a manually operable lever mounted on the carriage for actuating the ribbon feeding means and for rendering the locking means effective prior to the completion of the operation of the ribbon feeding means.

50. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and in-

cluding a platen, a spool supporting frame disposed in rear of the main frame and attached to the carriage to move therewith, a plurality of ribbon spools rotatably mounted on said supporting frame, a ribbon feeding means mounted on the carriage at one side thereof, means for guiding the ribbons from the spools forwardly along the other side of the platen and then past the platen to the feeding means, separate means for tensioning the respective spools against feeding rotation, normally ineffective means for locking the spools against feeding rotation, and means including a manually operable lever mounted on the carriage for actuating the ribbon feeding means and for rendering the locking means effective prior to the completion of the operation of the ribbon feeding means.

51. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a horizontal rail disposed in rear of the main frame and fixed thereto, a spool supporting frame disposed in rear of the main frame and attached to the carriage to move therewith and supported by said rail, said spool supporting frame including spaced front and rear walls, and a horizontal spool shaft extending longitudinally between the walls and having its front end fixedly secured to the front wall, the rear wall being formed with an opening of a size to receive a ribbon spool and the free rear end of the shaft being substantially centered with respect to the opening.

52. In a typewriting machine, a spool supporting frame unit adapted to be attached to the carriage of the machine and including a wall, a horizontal spool supporting shaft having its front end fixedly secured to the wall and having a free rear end, and an arm pivoted on the frame and having its free end normally engaged with the rear free end of the shaft to form a support therefor.

53. In a typewriting machine, a spool supporting frame unit adapted to be attached to the carriage of the machine and comprising spaced front and rear walls, and a horizontal spool shaft extending longitudinally between the walls and having its front end fixedly secured to the front wall, the rear wall being formed with an opening of a size to receive a ribbon spool and the free rear end of the shaft being substantially centered with respect to the opening, and an arm pivoted on the rear wall of the frame below the opening therein and having its free end normally engaged with the rear free end of the shaft to form a support therefor.

54. In a manifolding device, the combination with a front strike typewriting machine including a main frame, a carriage movable on the main frame and including a platen in front of which work sheets are disposed and

with which said work sheets normally compactly engage; a ribbon spool mounted for rotation on the carriage and movable bodily therewith; a ribbon feeding means mounted on the carriage; normally ineffective means 5 for locking the ribbon spool against feeding rotation; means for constantly tensioning the ribbon spool against feeding rotation; a line spacing mechanism mounted on the carriage for the work sheets and disposed above the platen; means for guiding the ribbon from the spool to the ribbon feeding means and in interleaved relation with said work sheets, said ribbon extending in front of and lengthwise of the platen; and means for first relieving 10 the compact engagement of the work sheets and ribbon relative to the platen, then concomitantly actuating the ribbon feeding means and the ribbon spool locking means, and then operating the line spacing means 15 while the compact engagement between the work sheets and platen is relieved and while the interleaved ribbon is held taut by the spool locking means and the ribbon feeding means.

55. In a manifolding device, the combination with a front strike typewriting machine including a main frame, a carriage movable on the main frame and including a platen 20 in front of which work sheets are disposed and with which said work sheets normally compactly engage; a ribbon spool mounted for rotation on the carriage and movable bodily therewith; a ribbon feeding means mounted on the carriage; normally ineffective means 25 for locking the ribbon spool against feeding rotation; means for constantly tensioning the ribbon spool against feeding rotation; a line spacing mechanism mounted on the carriage for the work sheets and disposed above the platen; means for guiding the ribbon from the spool to the ribbon feeding means and in interleaved relation with said work sheets, said ribbon extending in front of and lengthwise of the platen; and means including a carriage return lever for 30 first relieving the compact engagement of the work sheets and ribbon relative to the platen, then concomitantly actuating the ribbon feeding means and the ribbon spool locking means, and then operating the line spacing means 35 while the compact engagement between the work sheets and platen is relieved and while the interleaved ribbon is held taut by the spool locking means and the ribbon feeding means.

56. In a manifolding device, the combination with a front strike typewriting machine including a main frame, a carriage movable 40 on the main frame and including a platen in front of which work sheets are disposed and with which said work sheets normally compactly engage. a guide for the work sheets disposed below the platen; means for 45 supporting the platen for backward and forward bodily movement; a ribbon spool mounted for rotation on the carriage and movable bodily therewith; a ribbon feeding means mounted on the carriage; normally ineffective means for locking the ribbon spool 50 against feeding rotation; means for constantly tensioning the ribbon spool against feeding rotation; a line spacing mechanism mounted on the carriage for the work sheets and disposed above the platen; means for 55 guiding the ribbon from the spool to the ribbon feeding means and in interleaved relation with said work sheets, said ribbon extending in front of and lengthwise of the platen; and means for first bodily moving the platen rearwardly to relieve the compact engagement of the work sheets and ribbon relative to the platen, then concomitantly actuating the ribbon feeding means and the ribbon spool locking means, and then operating the line spacing means 60 while the compact engagement between the work sheets and platen is relieved and while the interleaved ribbon is held taut by the spool locking means and the ribbon feeding means.

57. In a manifolding device, the combination with a front strike typewriting machine including a main frame, a carriage movable on the main frame and including a platen in front of which work sheets are disposed and with which said work sheets normally compactly engage; a ribbon spool mounted for rotation on the carriage and movable bodily therewith; a ribbon feeding means mounted on the carriage; normally ineffective means 65 for locking the ribbon spool against feeding rotation; means for constantly tensioning the ribbon spool against feeding rotation; an upwardly extending collating frame mounted on the carriage above the platen; a truck to which the lead-in ends of the work sheets are clamped mounted on the collating frame for line space movements; means for guiding the ribbon from the spool to the ribbon feeding means and in interleaved relation with said 70 work sheets, said ribbon extending in front of and lengthwise of the platen; and means for first relieving the compact engagement of the work sheets and ribbon relative to the platen, then concomitantly actuating the ribbon feeding means and the ribbon spool locking means, and then imparting a line spacing movement to the truck while the compact engagement between the work sheets and platen is relieved and while the interleaved ribbon is held taut by the spool locking means and the ribbon feeding means.

58. In a manifolding device, the combination with a front strike typewriting machine including a main frame, a carriage movable 75 on the main frame and including a platen in front of which work sheets are disposed and with which said work sheets normally compactly engage; a plurality of ribbon spools mounted on the carriage for independent ro-

tation; means mounted on the carriage for feeding said ribbons simultaneously; normally ineffective means for locking the spools against feeding rotation; means for constantly tensioning the ribbon spools against feeding rotation; a line spacing mechanism mounted on the carriage for the work sheets and disposed above the platen; means for guiding the ribbons from the spool to the ribbon feeding means and in interleaved relation with said work sheets, said ribbons extending in front of and lengthwise of the platen; and means for first relieving the compact engagement of the work sheets and ribbons relative to the platen, then concomitantly actuating the ribbon feeding means and the ribbon spool locking means, and then operating the line spacing means while the compact engagement between the work sheets and platen is relieved and while the interleaved ribbon is held taut by the spool locking means and the ribbon feeding means.

59. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and means for projecting the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub; and means for moving the pawl inwardly within the periphery of the shaft to permit removal of the spool from the shaft.

60. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and means including a lever movable in one direction for projecting the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub; and means including a lever movable in the opposite direction to move the pawl inwardly within the periphery of the shaft to permit the removal of the spool from the shaft.

61. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and an oscillatory actuator mounted in the shaft and engageable with the pawl and rockable in one direction to project the

pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub and rockable in the opposite direction to move the pawl inwardly within the periphery of the shaft to permit the removal of the spool from the shaft.

62. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, an oscillatory actuator mounted in the shaft and engageable with the pawl and rockable in one direction to project the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub and rockable in the opposite direction to move the pawl inwardly within the periphery of the shaft to permit the removal of the spool from the shaft; a lever for rocking the actuator in one direction; and a lever independent of the first lever for rocking the actuator in the opposite direction.

63. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, an oscillatory actuator mounted in the shaft and engageable with the pawl and rockable in one direction to project the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub and rockable in the opposite direction to move the pawl inwardly within the periphery of the shaft to permit the removal of the spool from the shaft; a lever for rocking the actuator in a direction to effect locking action of the pawl; a spring for normally retaining said lever against movement; and a lever independent of the first lever for rocking the actuator in the opposite direction.

64. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; ribbon feeding means; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and means for actuating the ribbon feeding means and concomitantly rendering the spool locking means effective.

65. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and in-

cluding a hub having an annular groove forming a clutch surface; and an annular groove forming a frictional braking surface; means for normally applying a tension to the spool against the action of the ribbon feeding means comprising a radially disposed spring pressed tension plunger projecting outwardly beyond the periphery of the shaft into frictional engagement with said braking surface; 5 means for feeding the ribbon against the drag of said tension means; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and means including a lever movable in one direction for projecting the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub; and means for simultaneously moving the tension plunger 10 and the clutch pawl inwardly within the periphery of the shaft to permit removal of the spool from the shaft.

66. In a typewriting machine, the combination with a non-rotatable shaft; of a ribbon spool rotatably mounted thereon and including a hub having an annular groove forming a clutch surface; and an annular groove forming a frictional braking surface; 15 means for normally applying a tension to the spool against the action of the ribbon feeding means comprising a radially disposed spring pressed tension plunger projecting outwardly beyond the periphery of the shaft into frictional engagement with said braking surface; means for feeding the ribbon against the drag of said tension means; an oscillatory actuator mounted in the shaft and engageable with the clutch pawl and the tension plunger; means for 20 rocking the actuator in one direction for projecting the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub to thereby lock the spool against feeding movement; and means for rocking the actuator in the opposite direction for simultaneously moving the clutch pawl and the tension plunger inwardly within the periphery of the 25 shaft to permit removal of the spool from the shaft.

67. In a typewriting machine, the combination with a non-rotatable shaft; of a plurality of ribbon spools rotatably mounted thereon and each spool being provided with a hub having an annular groove forming a clutch surface; means for locking the spools against feeding rotation comprising separate clutch pawls mounted for transverse 30 movements in the shaft, and means for projecting all of the pawls outwardly beyond the periphery of the shaft into locking engagements with the clutch grooves of the spool hubs; and means for simultaneously moving all the clutch pawls inwardly within the periphery of the shaft to permit removal of the spools from the shaft.

68. In a typewriting machine, the combination with a non-rotatable shaft; of a plurality of ribbon spools rotatably mounted thereon and each spool being provided with a hub having an annular groove forming a clutch surface.

means for locking the spools against feeding rotation comprising separate clutch pawls mounted for transverse movements in the shaft, and means including a lever for projecting all of the pawls outwardly beyond the periphery of the shaft into locking engagements with the clutch grooves of the spool hubs; and means including an oscillatory actuator mounted in the shaft and engageable with all the pawls for simultaneously moving all the clutch pawls inwardly within the periphery of the shaft to permit removal of the spools from the shaft, and a lever independent of the first lever for rocking the actuator in a direction for inwardly moving the pawls.

69. In a typewriting machine, a spool supporting frame unit adapted to be attached to the carriage of the machine and comprising front and rear walls; a horizontal spool shaft extending between the walls and having its front end fixedly secured to the front wall; a ribbon spool rotatably mounted on the shaft and including a hub having an annular groove forming a clutch surface; the rear wall of the frame being formed with an opening of a size to receive the spool and the free end of the shaft being centered with respect to said opening; normally ineffective means mounted on the shaft for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movement in the shaft, and means including a lever movable in one direction for projecting the pawl outwardly beyond the periphery of the shaft into locking engagement with the clutch groove of the spool hub; and means including a lever movable in the opposite direction to move the pawl inwardly within the periphery of the shaft to permit the removal of the spool from the frame by sliding the spool rearwardly along and off the shaft and through the opening in the rear wall of the frame.

70. In a typewriting machine, a spool supporting frame unit adapted to be attached to the carriage of the machine and comprising front and rear walls; a horizontal spool shaft extending between the walls and having its front end fixedly secured to the front wall; a ribbon spool rotatably mounted on the shaft and including a hub having an annular groove; the rear wall being formed with an opening of a size to receive the spool and the free end of the shaft being centered with respect to said opening; means for normally tensioning the spool against rotation comprising a radially disposed spring pressed

plunger projecting outwardly beyond the periphery of the shaft and engaging the groove of the spool hub; and means for retracting the plunger to within the periphery of the shaft to permit removal of the spool from the shaft.

71. In a typewriting machine, a spool supporting frame unit adapted to be attached to the carriage of the machine and comprising front and rear walls; a horizontal spool shaft extending between the walls and having its front end fixedly secured to the front wall; a ribbon spool rotatably mounted on the shaft and including a hub having spaced annular grooves forming braking and clutch surfaces respectively; the rear wall being formed with an opening of a size to receive the spool and the free end of the shaft being centered with respect to said opening; means for normally tensioning the spool against rotation comprising a radially disposed spring pressed plunger projecting outwardly beyond the periphery of the shaft and engaging the groove of the spool hub; means for locking the spool against feeding rotation comprising a clutch pawl mounted for transverse movements in the shaft, and means for projecting the pawl outwardly beyond the periphery of the shaft into the clutch groove of the spool and into locking engagement with the clutch surface thereof; and means for moving the clutch pawl and the tension plunger inwardly within the periphery of the shaft to permit removal of the spool from the shaft through the opening in the rear wall of the frame.

72. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a chord-line recess in open communication therewith; of a ribbon spool rotatably mounted on the shaft; ribbon feeding means; and normally ineffective means for locking the spool against feeding rotation comprising a clutch pawl slidably mounted in the chord-line recess, an oscillatory actuator mounted in the bearing seat and operatively connected to the pawl, and means for rocking the actuator and thereby moving the pawl into clutching engagement with the spool.

73. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a chord-line recess in open communication therewith; of a ribbon spool rotatably mounted on the shaft; ribbon feeding means; and normally ineffective means for locking the spool against feeding rotation comprising a clutch pawl slidably mounted in the chord-line recess, an oscillatory actuator mounted in the bearing seat and operatively connected to the pawl, a spring connecting the pawl and shaft for retaining the pawl in engagement with the actuator, and means for rocking the

actuator and thereby moving the pawl into clutching engagement with the spool.

74. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a chord-line recess in open communication therewith; of a ribbon spool rotatably mounted on the shaft; ribbon feeding means; and normally ineffective means for locking the spool against feeding rotation comprising a clutch pawl slidably mounted in the chord-line recess and provided on its outer end with clutch teeth and on its inner end with a rigid foot, an oscillatory actuator mounted in the bearing seat and operatively connected to the foot of the pawl, and means for rocking the actuator and thereby moving the pawl into clutching engagement with the spool.

75. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a plurality of chord-line recesses in open communication therewith; of a plurality of ribbon spools rotatably mounted on said shaft; ribbon feeding means; and normally ineffective means for simultaneously locking all of the spools against feeding rotation comprising clutch pawls slidably mounted in the chord-line recesses, an oscillatory actuator common to all of the clutch pawls mounted in the bearing seat and operatively connected to said pawls, and means for rocking the actuator and thereby moving the pawls simultaneously into clutching engagements with the spools.

76. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a plurality of chord-line recesses in open communication therewith; of a plurality of ribbon spools rotatably mounted on said shaft; ribbon feeding means; and normally ineffective means for simultaneously locking all of the spools against feeding rotation comprising clutch pawls slidably mounted in the chord-line recesses, an oscillatory actuator common to all of the clutch pawls mounted in the bearing seat and operatively connected to said pawls, springs respectively connecting the pawls and the shaft for retaining said pawls in engagements with the actuator, and means for rocking the actuator and thereby moving the pawls simultaneously into clutching engagements with the spools.

77. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a plurality of chord-line recesses in open communication therewith; of a plurality of ribbon spools rotatably mounted on said shaft; ribbon feeding means; and normally ineffective means for simultaneously locking all of the spools against feeding rotation comprising clutch pawls slidably mounted in the chord-line recesses and provided on their

outer ends with clutch teeth and on their inner ends with rigid feet, an oscillatory actuator common to all of the clutch pawls mounted in the bearing seat and operatively connected to the feet of said pawls, and means for rocking the actuator and thereby moving the pawls simultaneously into clutching engagements with the spools.

78. In a typewriting machine, the combination with a non-rotatable shaft having a longitudinally extending bearing seat and a plurality of chord-line recesses in open communication therewith; of a plurality of ribbon spools rotatably mounted on said shaft; ribbon feeding means; and normally ineffective means for simultaneously locking all of the spools against feeding rotation comprising clutch pawls slidably mounted in the chord-line recesses and provided on their outer ends with clutch teeth and on their inner ends with rigid feet, an oscillatory actuator common to all of the clutch pawls mounted in the bearing seat and operatively connected to the feet of said pawls, said actuator being provided with a longitudinal groove for receiving the feet of the pawls and forming resultant shoulders for engaging the pawls, and means for rocking the actuator and thereby moving the pawls simultaneously into clutching engagement with the spools.

79. In a typewriting machine, the combination with a non-rotatable shaft provided with a radially disposed seat extending inwardly from the periphery thereof and with a longitudinally extending bearing having open communication with said seat; of a ribbon spool rotatably mounted on said shaft in registry with said seat; ribbon feeding means; a spring pressed tension plunger mounted in the seat and normally engaging the spool; an oscillatory actuator mounted in the bearing and operatively connected to the tension plunger; and means for rocking the actuator to move the plunger inwardly and out of engagement with the spool to permit the latter being removed from the shaft.

80. In a typewriting machine, the combination with a non-rotatable shaft provided with a plurality of radially disposed seats extending inwardly from the periphery thereof and with a longitudinally extending bearing having open communication with said seats; of a plurality of ribbon spools rotatably mounted on said shaft in registry with said seats; ribbon feeding means; a spring pressed tension plunger mounted in each seat and normally engaging the associated spool; an oscillatory actuator mounted in the bearing and operatively connected to the tension plungers; and means for rocking the actuator to move the plungers inwardly and out of engagement with the spools to permit the latter being removed from the shaft.

81. In a typewriting machine, the com-

bination with a non-rotatable shaft having a chord-line recess, a radially disposed seat extending inwardly from the periphery thereof, and a longitudinally extending bearing seat in open communication with said recess and with said radial seat; of a ribbon spool rotatably mounted on said shaft and in registry with said recess and with said radial seat, said spool including an annular groove forming a clutch surface and an annular groove forming a tension surface; a ribbon feeding means; means for applying a constant tension to the spool against the action of the ribbon feeding means comprising a spring pressed tension plunger mounted in the radial seat of the shaft and normally engaging the tension surface of the second mentioned annular groove; normally ineffective means for locking the spool against feeding rotation comprising a clutch pawl slidably mounted in the chord-line recess of the shaft; an oscillatory actuator mounted in the longitudinal seat of the shaft and operatively connected to the tension plunger and to the clutch pawl; means for rocking the actuator in one direction for moving the pawl outwardly beyond the periphery of the shaft into clutching engagement with the annular clutch surface of the spool to lock the spool against feeding rotation; and means for rocking the actuator in the opposite direction for moving both the plunger and the clutch inwardly within the periphery of the shaft to permit removal of the spool from the shaft.

82. In a typewriting machine, the combination with a non-rotatable shaft having a chord-line recess, a radially disposed seat extending inwardly from the periphery thereof, and a longitudinally extending bearing seat in open communication with said recess and with said radial seat; of a ribbon spool rotatably mounted on said shaft and in registry with said recess and with said radial seat, said spool including an annular groove forming a clutch surface and an annular groove forming a tension surface; a ribbon feeding means; means for applying a constant tension to the spool against the action of the ribbon feeding means comprising a spring pressed tension plunger mounted in the radial seat of the shaft and normally engaging the tension surface of the second mentioned annular groove; normally ineffective means for locking the spool against feeding rotation comprising a clutch pawl slidably mounted in the chord-line recess of the shaft and provided at its outer end with clutch teeth and at its inner end with a rigid foot; an oscillatory actuator mounted in the longitudinal seat of the shaft and operatively connected to the tension plunger and to the foot of the clutch pawl; a spring connecting the pawl and the shaft for retaining the foot of the pawl in operative engagement with the actuator; means for rocking the actuator

in one direction for moving the pawl outwardly beyond the periphery of the shaft into clutching engagement with the annular clutch surface of the spool to lock the spool against feeding rotation; and means for rocking the actuator in the opposite direction for moving both the plunger and the clutch inwardly within the periphery of the shaft to permit removal of the spool from the shaft.

10. In testimony whereof, we have hereunto subscribed our names.

LEWIS C. MYERS.
GEORGE F. HANDLEY.

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