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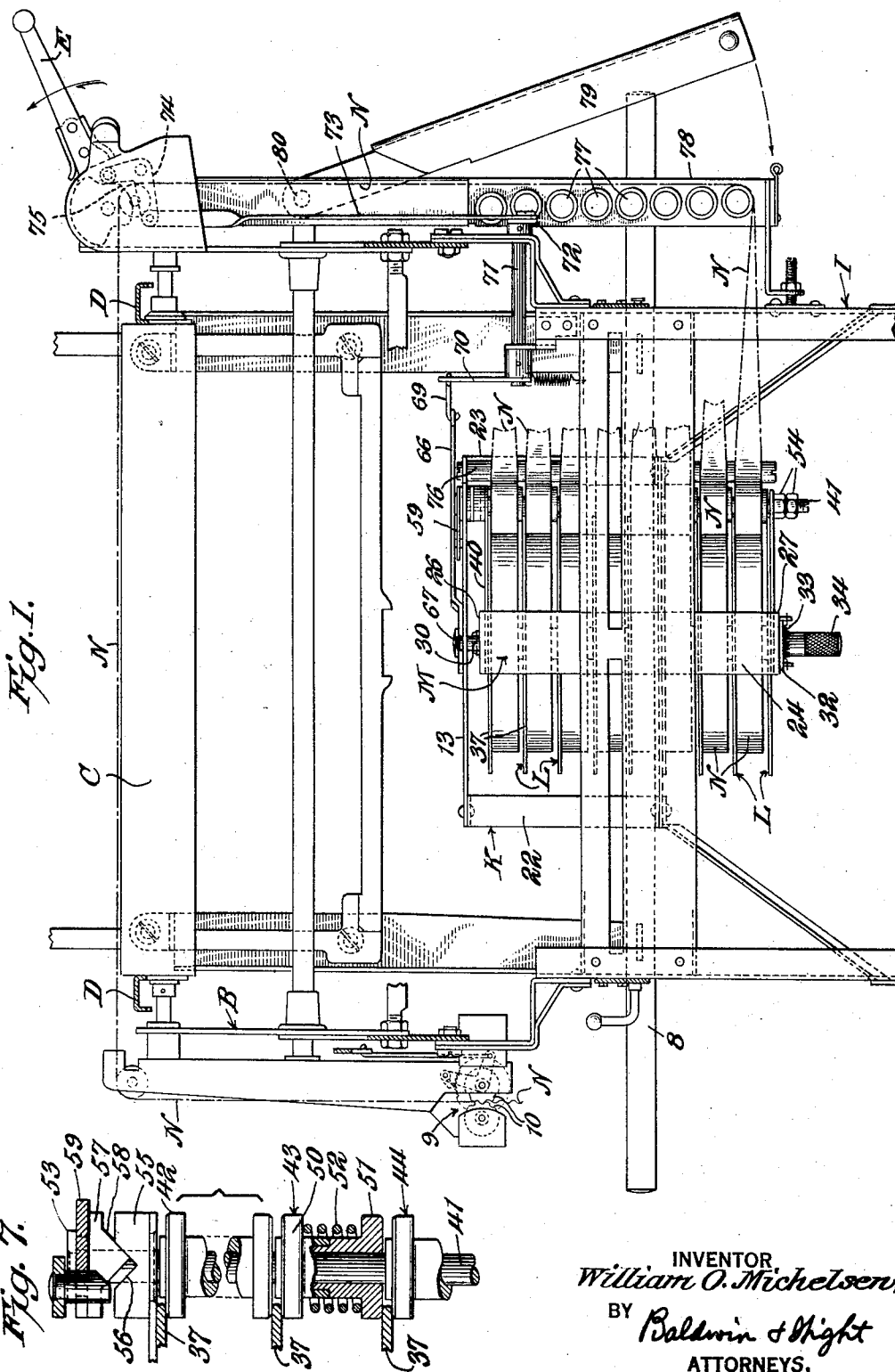
W. O. MICHELSEN

1,891,567

MANIFOLDING ATTACHMENT

Filed July 9, 1931

5 Sheets-Sheet 1



INVENTOR  
*William O. Michelsen,*  
 BY *Baldwin & Hight*  
 ATTORNEYS.



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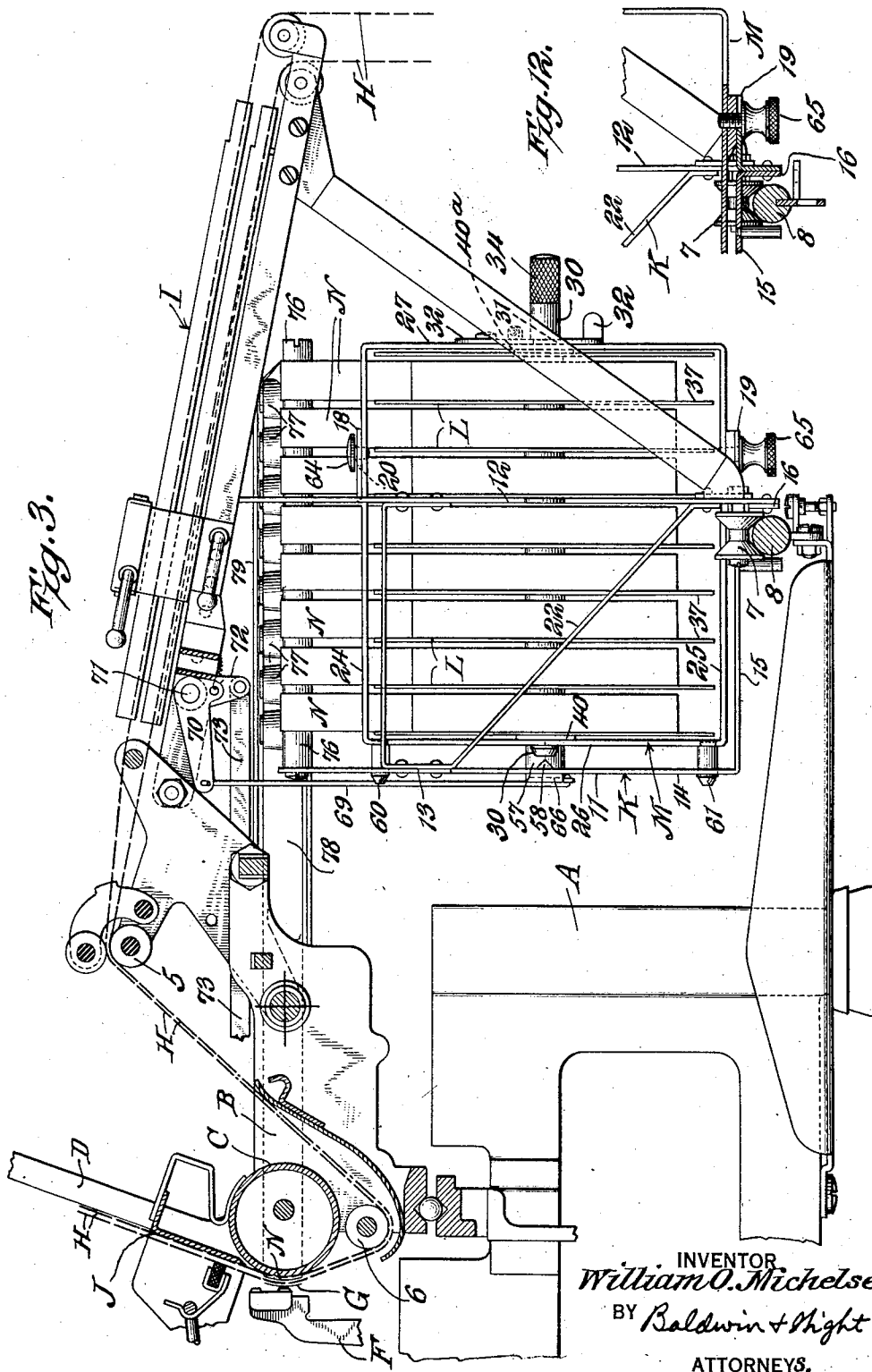
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5 Sheets-Sheet 3



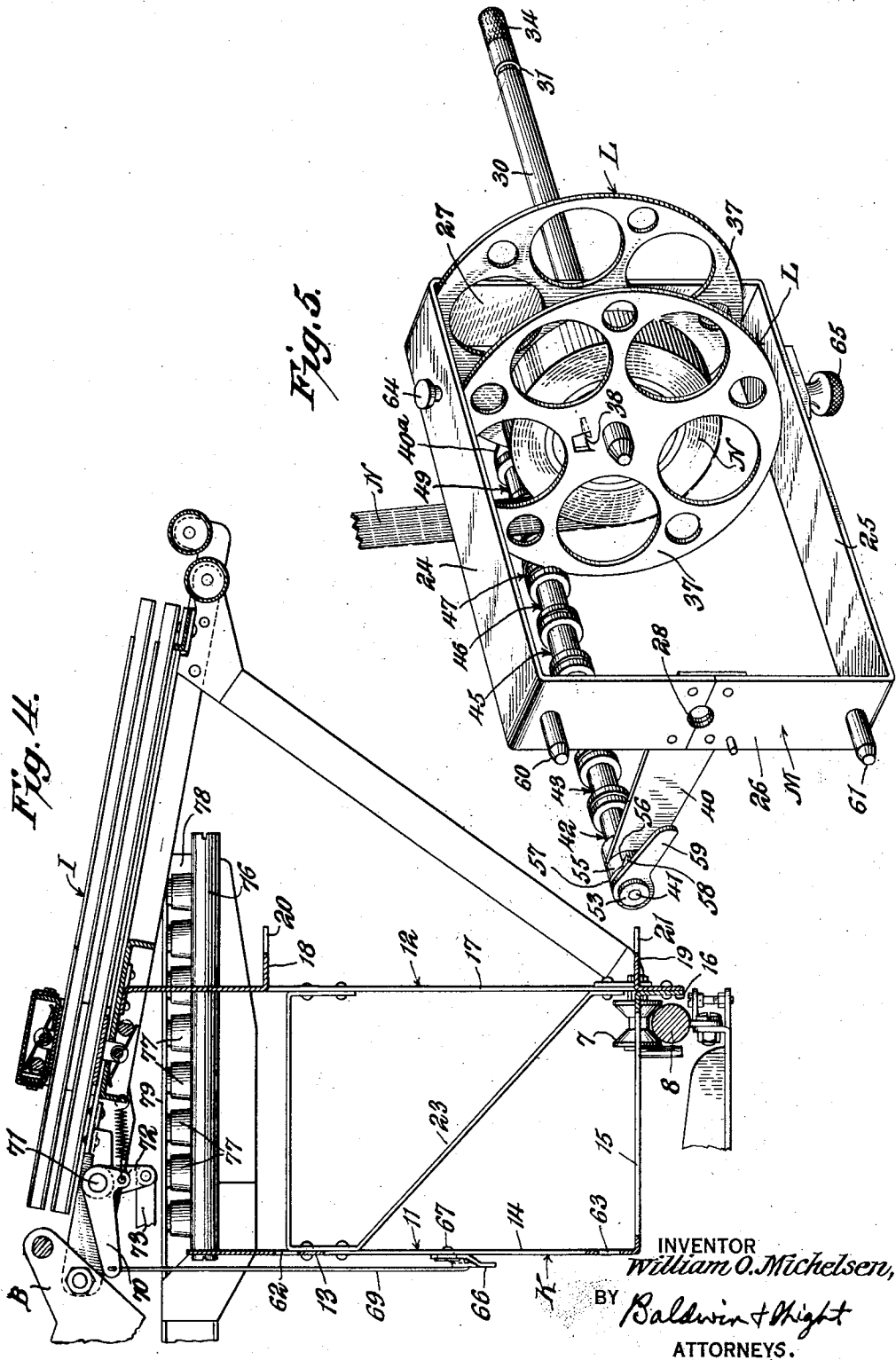
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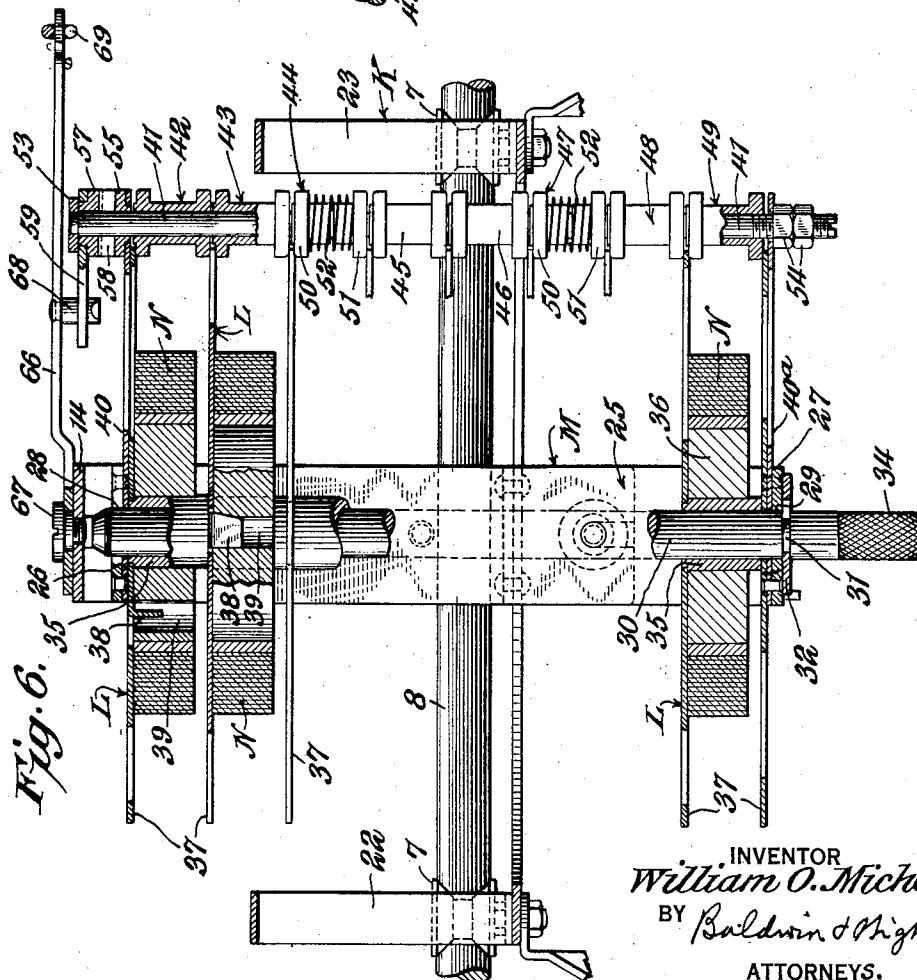
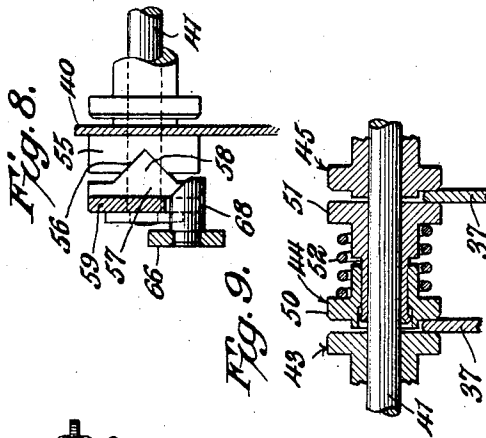
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5 Sheets-Sheet 5



INVENTOR  
*William O. Michelsen,*  
BY *Baldwin & Knight*  
ATTORNEYS.

## UNITED STATES PATENT OFFICE

WILLIAM O. MICHELSEN, OF WOODHAVEN, NEW YORK, ASSIGNOR TO ROYAL TYPE-  
WRITER COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

## MANIFOLDING ATTACHMENT

Application filed July 9, 1931. Serial No. 549,772.

This invention relates to new and useful improvements in manifolding attachments for typewriting machines or the like, and embodies certain improvements over the co-  
5 pending application Serial No. 546,858, filed June 25, 1931, by Myers and Handley relative to the tensioning means for the ribbon spools, the manually actuated locking means for the spools, and the manually actuated means for  
10 withdrawing the tensioning means and the locking means away from the spools a distance sufficient to permit of the spools being readily removed from or applied to their supporting shaft without any interference.

15 Among the several objects of this invention are to provide novel means for supporting ribbon spools on the machine, a constant tensioning means for the spools, and means for increasing the tension of the tensioning  
20 means to effect a locking of the spools against feeding rotation during the feeding movement of the carbon strips or ribbons and preferably prior to the completion thereof whereby the last portion of the ribbon feeding  
25 movement will remove all slack in the ribbon immediately prior to the line spacing operation of the work sheets; and to provide a ribbon spool assembly of the character described which can be readily and cheaply  
30 manufactured and easily applied to a typewriting machine of the construction illustrated in the co-pending application referred to above.

35 With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

40 In the drawings:—

Figure 1 is a top plan view of a typewriting machine constructed in accordance with my invention,

45 Figure 2 is a rear elevation thereof,

Figure 3 is a view in elevation of the right hand side of the machine, parts thereof being shown in section,

50 Figure 4 is a vertical sectional view taken through the work guide and the spool frame,

Figure 5 is a perspective view of the spool carrying cage,

Figure 6 is an enlarged horizontal sectional view through the spool frame, the spool carrying cage, and the ribbon spools,

55 Figure 7 is a plan view partly in section of the combined tensioning and locking means for the spool, the view showing the spools locked against ribbon feeding movement,

60 Figure 8 is a detail view showing the normal position of the cam employed for increasing the tensions on the spools,

Figure 9 is a longitudinal sectional view showing the spring tension for the spool,

65 Figure 10 is a perspective view of the latch,

Figure 11 is a detail section of the track supporting means, and

70 Figure 12 is a detail section of the spool frame, cage, and track.

As previously stated, this invention relates to improvements in the ribbon spool tensioning and locking means shown in the Myers and Handley application filed June 25, 1931, and therefore only that much of the type-  
75 writing machine is illustrated in the drawings as will be necessary to an understanding of the present invention.

The typewriting machine includes a main frame A on which a carriage B is supported  
80 for letter space movements. A platen C is fixed to the lower end of a collating frame D pivoted on the carriage to swing forwardly and rearwardly to effect a rearward and forward movement of the platen upon swinging  
85 movement of the carriage return lever E through suitable connections shown in said co-pending application. Type bars F cooperate with the platen, and a main ribbon G is disposed in front of the platen. Work  
90 sheets H are led forwardly to the platen over a work guide I attached to the carriage, thence over a roller 5 journaled on the carriage, thence downwardly under a guide roller 6 journaled on the carriage below the platen,  
95 and thence upwardly past the platen and have their upper edge portions clamped to a truck J which is mounted on the collating frame D for line spacing movements, the truck being line spaced by the lever E by a 100

mechanism shown in said co-pending application. A spool supporting frame K is disposed in rear of the main frame A and is attached to the carriage to move therewith, the frame K carrying rollers 7, 7 which ride along a rail 8 attached to the main frame A.

A plurality of ribbon spools L are rotatably mounted in a cage M which is removably mounted together with the spools as a unit in the spool frame K. The carbon strips or ribbins N are led from the spools forwardly along the left side of the carriage, thence along and in front of the platen and in rear of the main ribbon G and in interleaved relation with the work sheets, and thence rearwardly along the right hand side of the carriage to a ribbon feeding means 9 which includes cooperating feed rolls 10, 10. The ribbon feeding means 9 is actuated from the collating frame D by connections shown in said co-pending application. Means are provided for normally and individually tensioning the spools against feeding rotation, and manually operative means are provided for actuating the ribbon feeding means and increasing the action of the tensioning means to effect the locking of the spools against feeding rotation prior to the completion of the operation of the ribbon feeding means, whereby the last part of movement of the ribbon feeding means will render the ribbons taut and thereby prevent the work sheets from dragging the ribbons upwardly therewith during line spacing movements of said work sheets.

The ribbon spool frame K comprises front and rear plates or walls 11 and 12 respectively, the front plate including a horizontal arm 13 and a centrally connected and depending vertical arm 14 which terminates at its lower end in a rearwardly extending horizontal arm 15 having a downturned flange 16 at its rear end which is riveted to the rear plate 12. The rear plate 12 is centrally formed with an opening 17, and the wall at diametrically opposite points of said opening is provided with rearwardly extending upper and lower integral attaching lugs 18 and 19 respectively and having forwardly extending slots 20 and 21 formed therein. Side braces 22, 23 connect the front and rear plates 11 and 12 and are disposed on opposite sides of the opening 17.

Removably mounted in the ribbon spool frame is the ribbon spool cage M which includes a rectangular frame comprising top and bottom walls 24, 25 and front and rear walls 26, 27. The front and rear walls are respectively formed with aligned openings 28 and 29, and removably mounted in said openings is a shaft 30 on which the ribbon spools L are individually and freely mounted for rotation. The rear end of the shaft is formed with an annular groove 31 located adjacent the rear wall 27, and pivoted on said

rear wall is a manually releasable latch 32 which is normally held in engagement with the groove by a spring 33 to retain the shaft against longitudinal movements relative to the cage. The shaft extends rearwardly beyond the latch to form a finger piece 34 by means of which the shaft may be readily applied to or removed from the cage.

Each spool L includes a metal hub 35 and a core 36, and a peripheral member 37 such as a disc is fixed to the hub and is interlocked with the core by means of a lug 38 pressed from the disc and fitting into a seat 39 formed in the core.

Attached to the front and rear walls 26 and 27 of the cage M are laterally extending arms 40, 40<sup>a</sup>, and journaled in these arms is a tension shaft 41. Journaled on the shaft 41 between said arms is a plurality of brake shoes or collars 42 to 49, the adjacent faces of adjacent shoes frictionally engaging the opposite faces of the associated disc 37 to normally brake or tension the spool against feeding rotation. For this purpose, two of the collars 44 and 47 are each of two-part telescopic construction and respectively formed with peripheral flanges 50, 51 at their outer ends for receiving therebetween a tension spring 52. These collars are preferably arranged in spaced pairs, collars 42, 43 and 48, 49 being at the ends of the shaft, collars 45, 46 being in the center of the shaft, tension collar 44 being between collars 43 and 45, and tension collar 47 being between collars 46 and 48. Fixed to the end of shaft 41 beyond the arm 40 is a collar or head 53, and adjustable on the other end of the shaft beyond the arm 40<sup>a</sup> are clamping nuts 54 which engage said arm 40<sup>a</sup>. A stationary cam block 55 which is fixed to the outer face of the arm 40 is bored to receive the shaft 41, and is formed in its outer face with a transverse cam groove 56 which is V-shaped in cross section. Journaled on the shaft 41 between the collar 53 and the cam block 55 is a movable or oscillatory cam block 57 having a transverse cam 58 of V-shaped cross section which fits the cam groove 56 and normally lies therein. A laterally extending work arm 59 is fixed to the cam block 57, and when said arm is swung, the cam 58 engaging the cam groove 56 will effect a relative longitudinal movement between the shaft 41 and the tension collars 42 to 49 mounted thereon whereby the tensions on the discs 37 will be increased an amount sufficient to effect a locking of the spools L against ribbon feeding rotation.

In order to removably retain the cage M in proper position in the frame K, the front wall 26 of the cage is provided with a pair of forwardly projecting upper and lower centering pins 60, 61 which engage in upper and lower openings 62, 63 formed in the vertical arm 14 of the frame K, and upper and lower clamping screws 64, 65 which are

threadably engaged with the top and bottom walls 24, 25 of the cage M are engaged in the slots 20, 21 of the upper and lower attaching lugs 18 and 19 of the frame K.

5 It will be noted that the opening 17 of the rear wall 12 of the frame K is of a size sufficient to permit the unit assembly, including the cage M, the assembled spools L, and the tension collars 42 to 49, to be readily positioned into the frame K or removed therefrom; and that after the cage M has been removed from said frame K the spools L may be readily removed from the cage by withdrawing the shaft 30 therefrom, or spools may be readily threaded onto the shaft, as shown in Figure 5, and the front end of the shaft engaged in the opening 28 of the front wall 26 of the cage.

10 In order to swing the rock arm 59 upon swinging of the carriage return lever E, and thereby effect a locking of the spools L against ribbon feeding rotation, a lever 66 is pivoted as at 67 to the depending arm 14 of the spool frame K. This lever 66 extends laterally under the rock arm 59 and a pin 68 which is fixed to the lever projects under the rock arm and is adapted to swing the latter upwardly upon upward swinging movement of the lever. The free end of the lever 66 is connected to the lower end of a link 69 whose upper end is connected to a forwardly extending rock arm 70 fixed to a horizontal shaft 71 journaled on the carriage B. A second rock arm 72 which is fixed to and depends from the rock shaft 71 is connected to the rear end of a forwardly extending link 73, and the front end of this link is connected to one arm of a bell crank lever 74 which is pivoted on the left hand side of the carriage adjacent the carriage return lever E, the bell crank lever 74 being actuated by said lever E through the medium of a cam head 75 fixed to said lever E.

45 The cam head 75 is provided with peripheral cam surfaces which function, when the carriage return lever E is swung to the right, to swing the collating frame D forwardly and the platen C rearwardly, actuate the ribbon feeding means 9, increase the spool tensions to effect a locking of the spools L against feeding rotation, and to line space the work sheets H.

50 The carbon strips or ribbons N after leaving the spools L slide over a horizontal rod 76 extending in parallelism with the axis of the spools and secured at one end to the front wall 11 of the spool frame K. The ribbons then respectively pass around vertical rollers 77 arranged in a line extending fore and aft of the machine and mounted on a bracket 78 attached to the left hand side of the carriage B. The ribbons then extend forwardly and thence past the platen C as previously stated. A cover 79 for the rollers 77 is pivoted to swing about a vertical axis 80 on the bracket

78 to cover and uncover the rollers 77 thereby not only retaining the ribbons against working up and off the rollers as well as keeping foreign ingredients from contacting the rollers, but also permitting of ready access to the rollers when it is desired to thread the ribbons therearound.

From the foregoing, it will be seen that the constant tensions on the ribbons prevent the occurrence of any slack thereon.

10 In the operation of the invention, the work sheets H are loaded into the machine and the carbon strips or ribbons N are interleaved therewith in front of the platen C and the free ends of the ribbons are engaged between the feed rolls 10, 10 of the feeding means 9, after which the lead-in ends of the work sheets are clamped to the truck J. The operator then writes a line on the work sheets. The carriage return lever E is then swung to the right, prior to returning the carriage, and during the first part of the swinging movement of the lever, the collating frame D is swung forwardly and the platen C rearwardly to relieve the normal tight contact relation between the work sheets and the platen. The ribbon feeding means 9 is actuated simultaneously with the forward movement of the collating frame, and thus the carbon ribbons N are fed against the individual tensioning means which are constantly applied to the ribbon spools. Prior to the completion of the operation of said feeding means, increased tension is applied to the spool tensioning means in order to lock the spools against feeding rotation, thereby permitting the last part of the movement of the feeding means to stretch the ribbons fully taut whereby they will not be dragged upwardly with the work sheets during the line spacing movement thereof. During the last part of the swinging movement of the carriage return lever to the right, the truck J is moved upwardly along the collating frame for the desired distance to properly line space the work sheets. The operator then, by a continued pressure on the lever toward the right, returns the carriage to its initial or desired position, and upon release of the lever the previously moved parts, except the truck J, will return to their normal positions.

I claim:—

1. In a typewriting machine, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, means directly engaging one face of the disc for tensioning the spool against feeding rotation, and means for actuating the ribbon feeding means and concomitantly increasing the tension of the tensioning means to lock the spool against feeding rotation.

2. In a typewriting machine, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, and spring pressed brake shoes cooperating with the op-



posite faces of the disc for tensioning the spool against feeding rotation.

3. In a typewriting machine, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, and means directly engaging one face of the disc for tensioning the spool against feeding movement comprising a shaft located beyond the periphery of the disc and disposed in parallelism with the axis of the spool, and a pair of spring pressed collars journaled on the shaft and cooperating with the opposite faces of the disc for normally tensioning the spool against feeding rotation.

4. In a typewriting machine, the combination with a plurality of ribbon spools individually rotatable about a common axis and each including a disc, a ribbon feeding means, means mounted upon a common support located beyond the peripheries of the discs and cooperating with one face of each disc for tensioning the spools against feeding rotation, and means for actuating the ribbon feeding means and concomitantly increasing the tension of the tensioning means to lock the spool against feeding rotation.

5. In a typewriting machine, the combination with a plurality of ribbon spools individually rotatable about a common axis and each including a disc, a shaft located beyond the peripheries of the discs and disposed in parallelism with the axis of said spools, and a plurality of pairs of spring pressed collars mounted on said shaft for respectively engaging the opposite faces of the discs for tensioning the spools against feeding rotation.

6. In a manifolding typewriter, the combination with a rotatable ribbon spool, of ribbon feeding means, means for normally tensioning the spool against feeding movement, and means for actuating the ribbon feeding means and for concomitantly operating the tensioning means for increasing the tension to effect a locking of the spool against feeding rotation.

7. In a manifolding typewriter, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, means directly cooperating with the disc for tensioning the spool against feeding movement, and means for actuating the ribbon feeding means and for concomitantly operating the tensioning means for increasing the tension to effect a locking of the spool against feeding rotation.

8. In a manifolding typewriter, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, frictional means cooperating with the peripheral portion of the disc for tensioning the spool against feeding movement, and means for actuating the ribbon feeding means and for concomitantly operating the tensioning means for increasing the tension to effect a

locking of the spool against feeding rotation.

9. In a manifolding typewriter, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, means directly cooperating with the disc for tensioning the spool against feeding movement comprising a pair of spring pressed brake shoes cooperating with the opposite faces of the disc for normally tensioning the spool against feeding rotation, and means for increasing the tension of said brake shoes against the disc to effect a locking of the spool against feeding rotation.

10. In a manifolding typewriter, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, a shaft located beyond the periphery of the disc and disposed in parallelism with the axis of the spool, a pair of spring pressed collars journaled on the shaft and cooperating with the opposite faces of the disc for normally tensioning the spool against feeding rotation, and means for increasing the tension of said collars against the disc to effect a locking of the spool against feeding rotation.

11. In a manifolding typewriter, the combination with a rotatable ribbon spool, of ribbon feeding means, means for normally tensioning the spool against feeding movement, and cam-actuated means cooperating with the tensioning means for increasing the tension to effect a locking of the spool against feeding rotation, and means for actuating the ribbon feeding means and for concomitantly operating the cam-actuated means.

12. In a manifolding typewriter, the combination with a rotatable ribbon spool including a disc, of ribbon feeding means, a shaft located beyond the periphery of the disc and disposed in parallelism with the axis of the spool, a pair of spring pressed collars journaled on the shaft and cooperating with the opposite faces of the disc for normally tensioning the spool against feeding rotation, and cam-actuated means mounted on the shaft and cooperating with said collars to effect a locking of the spool against feeding rotation.

13. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith and including front and rear walls, the rear wall being formed with an opening, and a cage having a plurality of ribbon spools rotatably mounted therein and removably mounted as a unit through said opening in said spool frame.

14. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith and including front and rear

walls, the rear wall being formed with an opening, and a cage having a plurality of ribbon spools rotatably mounted therein and removably mounted as a unit through said opening in said spool frame, said cage comprising a rectangular frame including front and rear vertical walls, and centering means cooperating with the front walls of the spool frame and cage.

15. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith and including front and rear walls, the rear wall being formed with an opening, and a cage having a plurality of ribbon spools rotatably mounted therein and removably mounted as a unit through said opening in said spool frame, said cage comprising a rectangular frame including front and rear vertical walls and a bottom wall, centering means cooperating with the front walls of the spool frame and cage, and clamping means cooperating with the bottom wall of the cage and with the spool frame.

16. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a rectangular cage removably mounted in said spool frame and including front and rear walls respectively formed with alined openings, a shaft removably mounted in the openings, and a plurality of ribbon spools removably mounted on the shaft between the front and rear walls of the cage.

17. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a rectangular cage removably mounted in said spool frame and including front and rear walls respectively formed with alined openings, a shaft removably mounted in the openings, a plurality of ribbon spools removably mounted on the shaft between the front and rear walls of the cage, and means cooperating between the rear wall of the cage and the shaft for retaining the latter against longitudinal movements relative to the cage.

18. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a rectangular cage removably mounted in said frame and including front and rear walls respectively formed with alined openings, a shaft removably mounted in the openings and provided with an annular groove adjacent the rear wall of the cage, a plurality of ribbon spools removably mounted on the shaft between the front and rear walls of the cage, and a latch pivoted on the

rear wall of the cage for cooperation with the groove of the shaft to retain the latter against longitudinal movements relative to the cage.

19. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a rectangular cage removably mounted in said frame and including front and rear walls respectively formed with alined openings, a shaft removably mounted in the openings and provided with an annular groove adjacent the rear wall of the cage, a plurality of ribbon spools removably mounted on the shaft between the front and rear walls of the cage, a latch pivoted on the rear wall of the cage for cooperation with the groove of the shaft to retain the latter against longitudinal movements relative to the cage, and a spring connecting the latch and the rear wall of the cage for yieldably retaining the latch in operative position.

20. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a cage mounted on said spool frame, a ribbon spool rotatably mounted in the cage, ribbon feeding means mounted on the carriage, means mounted on the cage for tensioning the spool against feeding rotation, said cage, spool, and tensioning means being removably mounted as a unit on said spool frame, and manually operable means for actuating the ribbon feeding means and for concomitantly effecting a locking of the spool against feeding rotation.

21. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements, a ribbon spool frame fixed to the carriage to move therewith, a cage mounted on said spool frame, a ribbon spool rotatably mounted in the cage, ribbon feeding means mounted on the carriage, means mounted on the cage for tensioning the spool against feeding rotation, said cage, spool, and tensioning means being removably mounted as a unit on said spool frame, and manually operable means for actuating the ribbon feeding means and for effecting a locking of the spool against feeding rotation prior to the completion of the operation of said ribbon feeding means.

22. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a cage removably mounted on said spool frame, a shaft removably mounted on said cage, a plurality of ribbon spools journaled on said shaft, and means

for guiding the ribbons forwardly along the other side of the platen, thence lengthwise of and past the platen, and thence to said feeding means.

23. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a cage removably mounted on said spool frame, a shaft removably mounted on said cage, and a plurality of ribbon spools journaled on said shaft, means for guiding the ribbons past the platen to said feeding means, and releasable means for retaining said shaft against longitudinal movement relative to the cage.

24. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith and including front and rear walls, the rear wall being formed with an opening, a cage having a plurality of ribbon spools rotatably mounted therein and removably mounted as a unit through said opening in said spool frame, and means for guiding the ribbons forwardly along the other side of the platen, thence lengthwise of and past the platen, and thence to said feeding means.

25. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a rectangular cage removably mounted in said frame and including front and rear walls respectively formed with aligned openings, a shaft removably mounted in the openings and provided with an annular groove adjacent the rear wall of the cage, a plurality of ribbon spools removably mounted on the shaft between the front and rear walls of the cage, a latch pivoted on the rear wall of the cage for cooperation with the groove of the shaft to retain the latter against longitudinal movements relative to the cage, and means for guiding the ribbons past the platen to said feeding means.

26. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located

the carriage to move therewith, a plurality of ribbon spools rotatably supported on said spool frame and each including a disc, means for guiding the ribbons forwardly along the other side of the platen, thence lengthwise of and past the platen, and thence to the feeding means, a shaft mounted on the spool frame and disposed in parallelism with the axis of the spools, and means mounted on the shaft and frictionally engaging one face of each disc for tensioning the spools against feeding rotation.

27. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a plurality of ribbon spools rotatably supported on said spool frame and each including a disc, means for guiding the ribbons past the platen to the feeding means, a shaft mounted on the spool frame and disposed in parallelism with the axis of the spools, and a plurality of spring pressed collars mounted on the shaft and frictionally engaging the opposite faces of the discs for tensioning the spools against feeding rotation.

28. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a plurality of ribbon spools rotatably supported on said spool frame and each including a disc, means for guiding the ribbons past the platen to the feeding means, means mounted on the spool frame and frictionally engaging one face of each disc for tensioning the spools against feeding rotation, and manually operable means for actuating the ribbon feeding means and for concomitantly increasing the tension of the tension means to effect a locking of all spools against ribbon feeding rotation.

29. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage at one side of the platen, a ribbon spool frame located in rear of the main frame and connected to the carriage to move therewith, a plurality of ribbon spools rotatably supported on said spool frame and each including a disc, means for guiding the ribbons past the platen to the feeding means, means mounted on the spool frame and frictionally engaging one face of each disc for tensioning the spools against feeding rotation, and manually operable

means for actuating the ribbon feeding means and for increasing the tension of the tension means prior to the completion of the operation of the ribbon feeding means to effect a locking of all spools against ribbon feeding rotation.

30. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage, a ribbon spool rotatably mounted on the carriage and including a disc, means for frictionally engaging one face of the disc for tensioning the spool against feeding movement thereof, and manually operable means for actuating the ribbon feeding means and for concomitantly increasing the tension of the tensioning means to lock the spool against feeding rotation.

31. In a manifolding typewriter, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a ribbon feeding means mounted on the carriage, a ribbon spool rotatably mounted on the carriage and including a disc, means for frictionally engaging one face of the disc for tensioning the spool against feeding movement thereof, and manually operable means for actuating the ribbon feeding means and for increasing the tension of the tensioning means prior to the completion of the operation of the ribbon feeding means to lock the spool against feeding rotation.

32. In a typewriting machine, the combination with a rotatable ribbon spool including a disc, of a ribbon feeding means, a shaft located beyond the periphery of the disc and disposed in parallelism with the axis of the spool, a spring pressed brake shoe supported on the shaft and directly engaging the disc for tensioning the spool against feeding rotation, and means for actuating the ribbon feeding means and concomitantly increasing the tension of the brake shoe against the disc for locking the spool against feeding rotation.

33. In a typewriting machine, the combination with a main frame element, of a carriage element mounted thereon for letter space movements and including a platen, a table connected to and extending rearwardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on one of the elements and located in rear of the main frame element and below the table, and a cage containing a ribbon spool removably mounted as a unit in said spool frame.

34. In a typewriting machine, the combination with a main frame element, of a carriage element mounted thereon for letter space movements and including a platen, a table connected to and extending rearward-

ly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on one of the elements and located in rear of the main frame element and below the table, a rectangular and open sided cage removably mounted in said spool frame and including front and rear walls, a shaft mounted for withdrawal in the front and rear walls of the cage, and a ribbon spool detachably mounted on the shaft and removable from the cage through one side thereof upon removal of the shaft.

35. In a typewriting machine, the combination with a main frame element, of a carriage element mounted thereon for letter space movements and including a platen, a table connected to and extending rearwardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on one of the elements and located in rear of the main frame element and below the table, a rectangular and open sided cage removably mounted in said spool frame and including front and rear walls, a shaft mounted for withdrawal in the front and rear walls of the cage, a latch pivoted on the rear wall of the cage and cooperating with the shaft to retain the latter in spool supporting position, and a ribbon spool detachably mounted on the shaft and removable from the cage through one side thereof upon removal of the shaft.

36. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a table connected at its forward end to the carriage and extending rearwardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on the carriage to move therewith and located in rear of the main frame and below the table, and a cage containing a ribbon spool removably mounted as a unit in said spool frame.

37. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a table connected at its forward end to the carriage and extending rearwardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on the carriage to move therewith and located in rear of the main frame and below the table, a cage containing a ribbon spool removably mounted as a unit in said spool frame, and a track mounted on the main frame and located in rear thereof and below the ribbon spool frame for supporting the latter and the rear end of the table during movement of the carriage.

38. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a table connected at its forward end to the carriage and extending rear-

wardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on the carriage to move therewith and located in rear of the main frame and below the table, a rectangular and open sided cage removably mounted in said spool frame and including front and rear walls, a shaft mounted for withdrawal in the front and rear walls of the cage, and a ribbon spool detachably mounted on the shaft and removable from the cage through one side thereof upon removal of the shaft.

39. In a typewriting machine, the combination with a main frame, of a carriage mounted thereon for letter space movements and including a platen, a table connected at its forward end to the carriage and extending rearwardly from the carriage for guiding work sheets forwardly to the platen, a ribbon spool frame fixedly mounted on the carriage to move therewith and located in rear of the main frame and below the table, a rectangular and open sided cage removably mounted in said spool frame and including front and rear walls, a shaft mounted for withdrawal in the front and rear walls of the cage, a ribbon spool detachably mounted on the shaft and removable from the cage through one side thereof upon removal of the shaft, a track mounted on the main frame and located in rear thereof and below the ribbon spool frame for supporting the latter, and supporting arms respectively disposed on opposite sides of the ribbon spool cage and connecting the spool frame with the rear end of the table.

In testimony whereof, I have hereunto subscribed my name.

WILLIAM O. MICHELSEN.

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