Aug. 28, 1934. C. G. KRANZ 1,971,568

INK RIBBON FEED AND REVERSING MECHANISM

Filed March 13, 1930 3 Sheets-Sheet 1

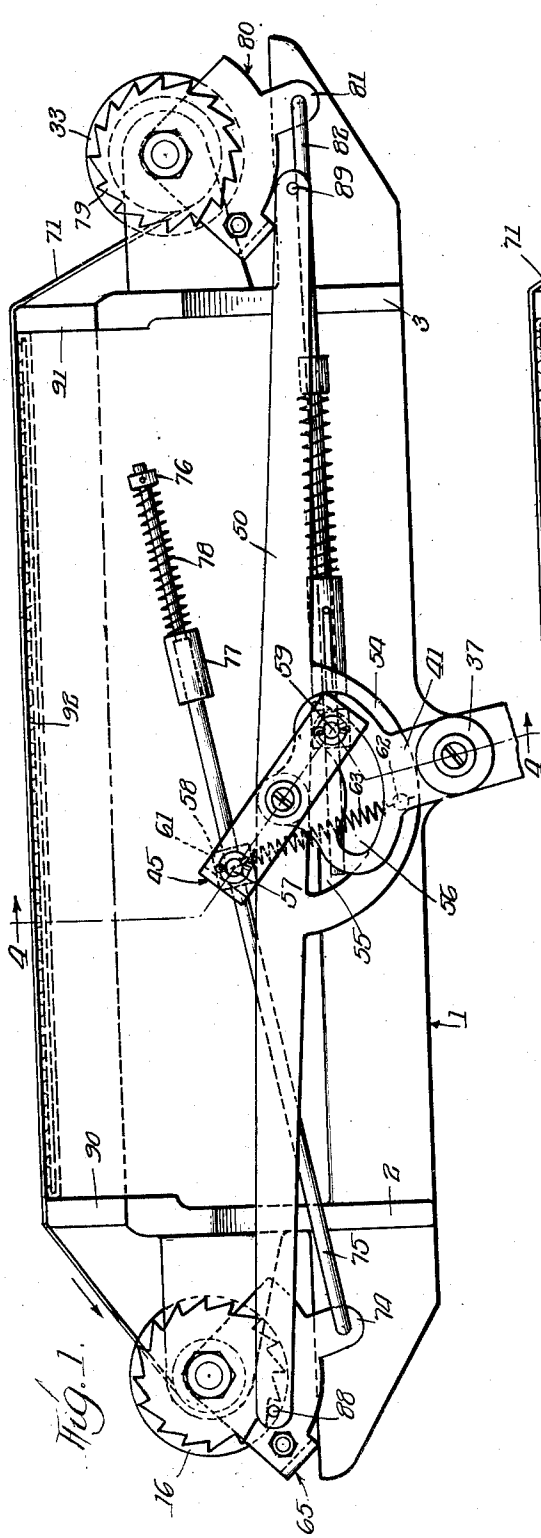


Fig. 1.

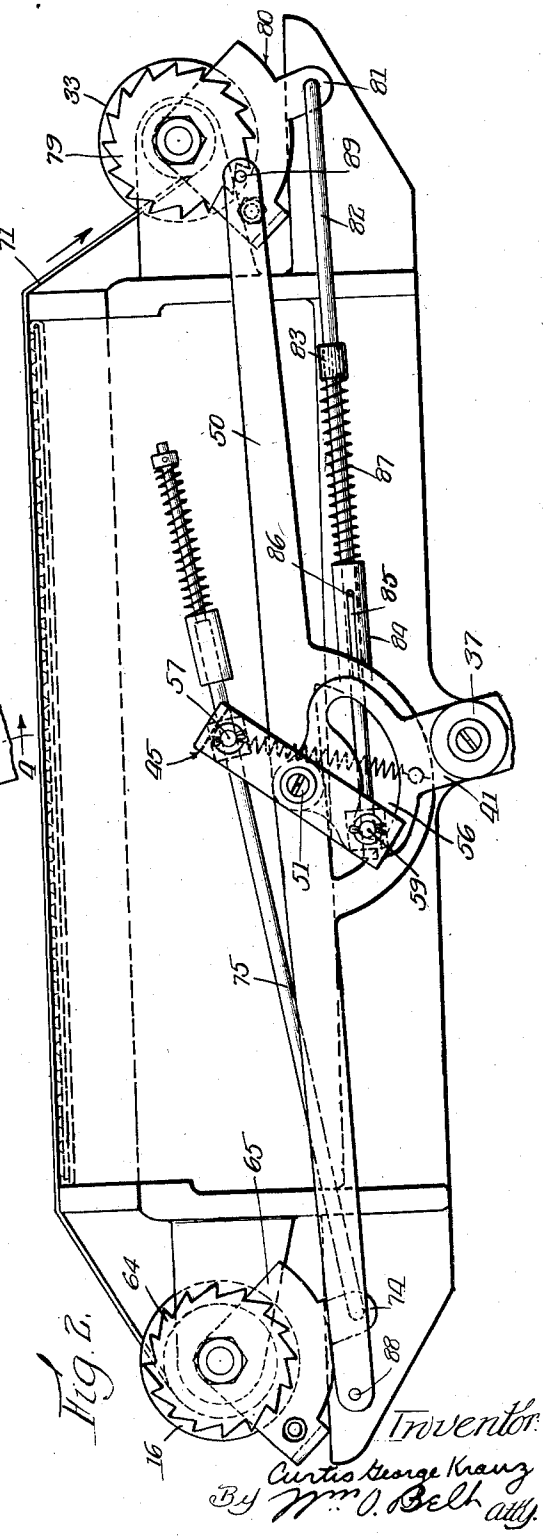


Fig. 2.

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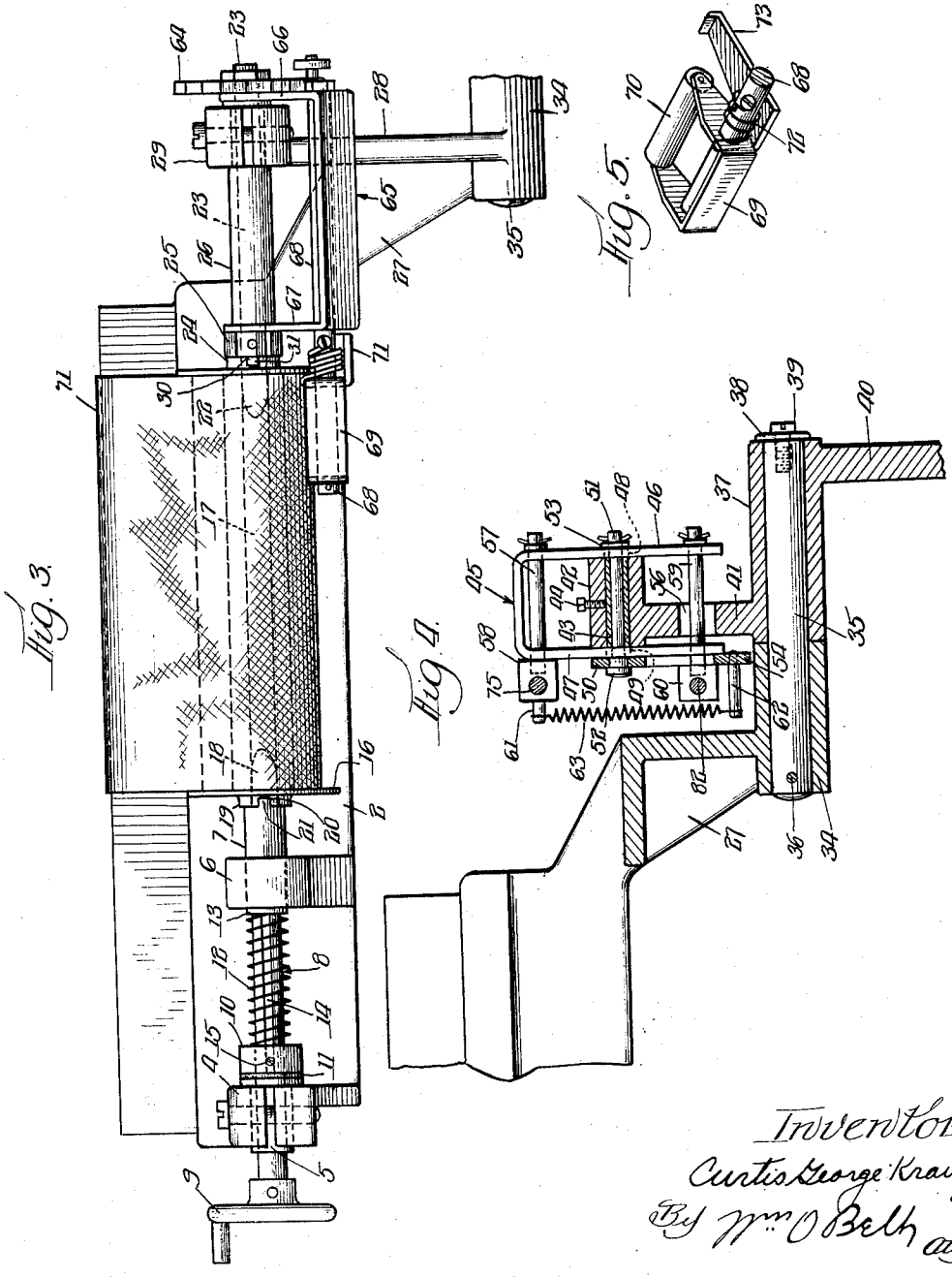


Fig. 3.

Fig. 4.

Fig. 5.

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Fig. 6.

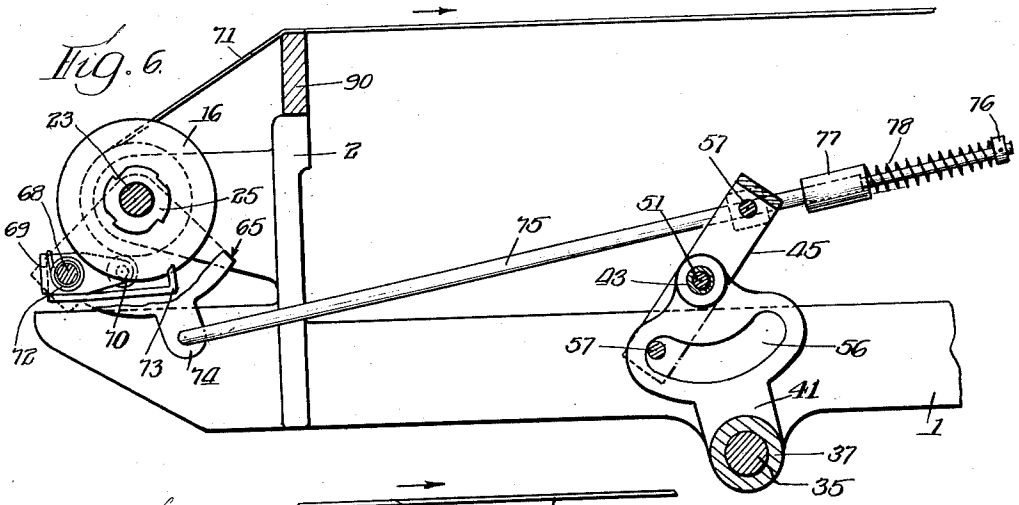


Fig. 7.

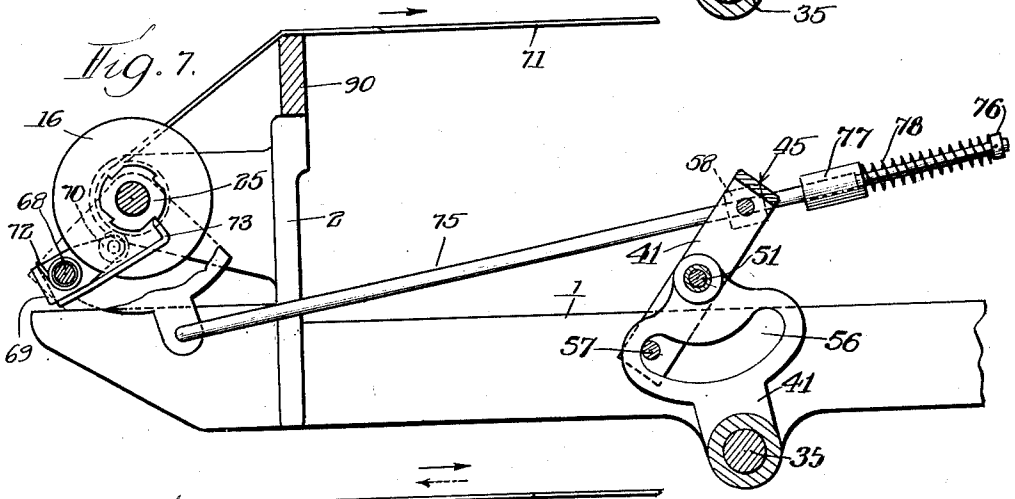
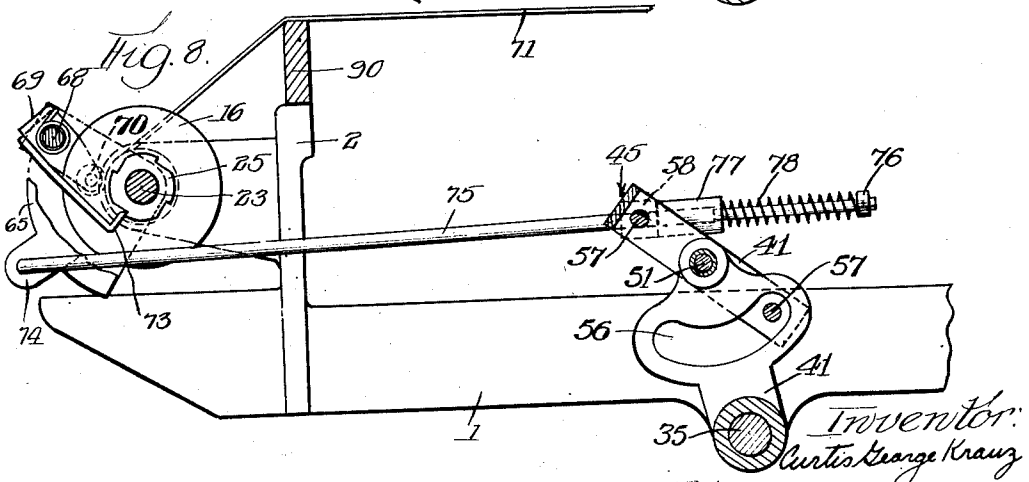


Fig. 8.



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Patented Aug. 28, 1934 1,971,568

UNITED STATES PATENT OFFICE

1,971,568

INK RIBBON FEED AND REVERSING MECHANISM

Curtis George Kranz, Chicago, Ill., assignor to Addressograph Company, Chicago, Ill., a corporation of Delaware

Application March 13, 1930, Serial No. 435,524

14 Claims. (Cl. 101—336)

This invention relates to an ink ribbon feed and reversing mechanism for printing machines and the like and one of the objects thereof is to provide an apparatus of this character which can easily be applied to or built as a part of the printing machine of the kind disclosed, for example, in my copending application Serial No. 434,694, filed March 10, 1930.

Other objects of the invention are to provide an ink ribbon feed and reversing mechanism which winds the ribbon on a spool at one side of the printing bed of the machine while unwinding it from a spool at the other side of said printing bed; imparts a step by step movement to the ribbon to cause such winding and unwinding; automatically reverses the direction of winding when all of the ribbon has been unwound from one spool; and causes operation of the automatic reversing in a rapid manner in synchronism with the step by step movement, and delays such action until all of the ribbon has been unwound.

A selected embodiment of the invention is illustrated in the accompanying drawings, and therein:

Fig. 1 is an elevational view showing the parts as arranged for winding in one direction;

Fig. 2 is a similar view showing the parts arranged for winding in the other direction;

Fig. 3 is a side view;

Fig. 4 is a sectional view taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a perspective detail view of a pawl and a follower employed in the device; and

Figs. 6, 7 and 8 are sectional detail views illustrating the steps in the reversing operation.

Referring to the drawings, 1 generally indicates the frame having side rails 2 and 3. As best illustrated in Fig. 3, a split bearing 4 extends outwardly from the side rail 2 and a bushing 5 is clamped therein. A bearing 6 is also carried by the side rail 2 in which the enlarged portion 7 of the shaft 8 is journaled, said shaft also being journaled in the bushing 5, and at the end thereof outwardly of the bushing 5 a hand wheel 9 is fixed. A collar 10 is disposed about the shaft 8 and carries a friction face 11 which abuts a flange on the inner end of the bushing 5. A spring 12 is disposed about the shaft 8 between the shoulder 13, at the juncture of the enlarged section 7 with the main extent of the shaft 8, and the collar 10. Into a slot 14 in the shaft 8 a screw 15, mounted in the collar 10, is extended. The action of the spring 12 against the shoulder 13 forces the shaft 8 inwardly toward the spool 16 having an axial opening 17 therein into which a projection 18 on the end of the enlarged section 7 is extended. The hub 19 of the spool 16 has a diametrical slot 20 therein into which a key 21 at the end of the shaft section 7 is fitted. At the opposite end of the spool 16 the forward end 22 of the shaft 23 extends into the axial bore 17 and the hub 24 at this end of the spool abuts the ratchet 25 pinned to the shaft 23 at the end of the sleeve 26 disposed around the shaft 23. A bracket 27 depends from the frame 1 and on a rib 28 thereof a split bearing 29 is provided in which the shaft 23 is rotatable. In a diametrical slot 30 in the outer face of the hub 24 is seated a key 31 on the ratchet 25. In the foregoing manner the spool 16 is supported from the rail 2 and in a similar manner the spool 33 is supported from the rail 3.

In the bracket 27 is a bearing 34, Fig. 4, and a stud shaft 35 is mounted in this bearing and held against rotation by the pin 36. A bearing 37 is mounted on the shaft 35 and one end of the bearing 37 abuts the bearing 34 and the opposite end is engaged by a washer 38 secured to the outer end of the shaft 35 by the screw 39 thus retaining the bearing 37 on the shaft 35. Depending from the bearing 37 is an arm 40 to which a reciprocating movement is adapted to be imparted in a suitable manner such as, for example, that disclosed in my referred to copending application although it is to be understood that any suitable means might be employed. Extending upwardly from the bearing 37 is an arm 41 and, if desired, both the arms 40 and 41 may be formed unitary with the bearing 37. At the upper end of the arm 41 is a bearing 42 having an axial bore therein in which a sleeve 43 is mounted, said sleeve being held against rotation by the screw 44. A substantially U-shaped bracket generally indicated by 45 includes arms 46 and 47. At substantially midpoint in the arms 46 and 47 are openings 48 and 49 in which the ends of the sleeve 43 are journaled. An elongated arm 50 is provided having an opening therein through which the shaft 51 is extended to retain said arm 50 between the enlarged head 52 on the shaft 51 and the arm 47. A washer 53 is mounted on the shaft 51 outwardly of the arm 46 and is suitably retained in position to prevent displacement of the arm 46 from the sleeve 43, the foregoing arrangement serving to retain the bracket 45 from displacement. The shaft 51 extends through the arm 50 substantially midway between the ends thereof and a segment 54 depends from the arm 50 below the opening through which the shaft 51

extends and has an opening 55 therein. A segmental slot 56 is formed in the arm 41 and the openings 55 and 56 are in alinement. A shaft 57 has a block 58 secured thereto at one end thereof and the shaft 57 is mounted in the arms 46 and 47 adjacent the bight portion of the bracket 45 and said shaft is suitably held against lateral displacement. A shaft 59 has a block 60 at one end thereof and said shaft is mounted in the arms 46 and 47 adjacent the outer ends thereof and is suitably held against displacement. Extending from the block 58 is a pin 61. A pin 62 extends from the lower portion of the segment 54. Extended between the pins 61 and 62 is a spring 63. This arrangement provides an over-center device as the pin 62 is disposed substantially in vertical alinement with the shaft 51, whereas the pin 61 will be disposed from alinement therewith as the bracket 45 is to be disposed in one or the other of the angular positions shown in Figs. 1 and 2.

Fixed to the shaft 23 outwardly of the bearing 29 is a ratchet 64. A substantially U-shaped bracket 65 has the arm 66 thereof rotatably mounted on the shaft 23. The arm 67 of the bracket 65 is disposed between the end of the sleeve 26 and the ratchet 25 and is rotatable on the shaft 23. Mounted in the arms 66 and 67 adjacent the bight portion of the bracket 65 is a shaft 68. A frame 69 is rotatably mounted on the shaft 68 and carries a roller 70. The frame 69 is alined with the spool 16 and the roller 70 engages the portion of the ribbon 71 wound on the spool 16, said roller being urged into engagement with said ribbon by the spring 72 disposed about the shaft 68 with one end connected to said shaft and the opposite end acting on the bracket 69. A pawl 73, carried by the frame 65, is alined with the ratchet 25. To a lug 74 on the bracket 65 one end of a rod 75 is pivotally connected. The rod 75 is extended through a bore in the block 58. At the outer end of the rod 75, a collar 76 is fixed and a sleeve 77 is slidable on said rod 75. An expansion spring 78 is disposed about the rod 75 between the collar 76 and the sleeve 77 and normally urges said sleeve away from said collar toward the block 58. An arrangement similar to the foregoing is associated with the spool 33 and includes the ratchet 79, similar to the ratchet 64, a bracket 80 similar to the bracket 65, from which bracket 80 a lug 81 depends to which one end of a rod 82 is pivotally connected. The rod 82 is extended through an opening in the block 60. Secured on the rod 82 is a collar 83. A sleeve 84 is slidable on the rod 82 and has a slot 85 therein into which extends a pin 86 carried by the rod 82. A spring 87 is disposed about the rod 82 between the collar 83 and the sleeve 84 and urges the sleeve toward the block 60, the engagement of the pin 86 with the end of the slot 85 limiting this action. At opposite ends of the arm 50, in alinement with the ratchets 64 and 79, are pins 88 and 89.

On the frame 1, in spaced apart relation, are guide bars 90 and 91, disposed at the upper ends of the rails 2 and 3. The portion of the ribbon between the spools 16 and 33 is directed over the guide bars 90 and 91 and is preferably brought into taut condition. In use, a suitable printing device 92 is disposed below the ribbon 71 between the guide bars 90 and 91, being supported by a suitable printing bed.

In use, the ribbon 71 is directed from, for example, the spool 16 to the spool 33 to be windable on said spool 33. The hand wheel 9 on the end of the shaft structure supporting the spool 33 will be rotated until the ribbon is in taut condition and the ribbon will be maintained in this taut condition by the engagement of the friction faces 11, associated with both spools, with the flanges on the bushings 5, the springs 12 bringing about this frictional engagement. The bracket 45 and the arm 50 will be disposed in the positions illustrated in Fig. 2. Therefore, when the arm 40 is moved in the direction of the spool 16 the arm 50 is moved toward the spool 33 by reason of the mounting thereof at the upper end of the arm 41 which is on the opposite side of the center of the pivot from the arm 40. As the arm 50 is so moved the pin 89 engages the tooth of the ratchet 79 and imparts movement to said ratchet and, therefore, to the shaft 23 connected to said ratchet which turns the ratchet 25 and, by reason of the seating of the key 31 in the slot 30 in the hub 24 of the spool 33, it is manifest that said spool is turned to wind the ribbon 71 thereon. When the arm 40 moves in the other direction the arm 50 moves over the teeth of the ratchet 79 without imparting any movement thereto, said arm being free to so pivot by reason of the mounting thereof on the shaft 51. The foregoing operation will be repeated upon each reciprocation of the arm 40 and, therefore, a step by step movement will be imparted to the ribbon 71. As best illustrated in Fig. 6, the roller 70 will be engaging the ribbon wound on the spool 16, but as continued movement is imparted to the ribbon 71 the quantity thereof wound on the spool 16 will be reduced and, therefore, the roller 70 and consequently the frame 69 and the pawl 73 will pivot inwardly toward the ratchet 25, being so urged by the spring 72. At a time just prior to the complete unwinding of the ribbon from the spool 16 the pawl 73 will seat in a tooth of the ratchet 25, as illustrated in Fig. 7, thus connecting the frame 65 to the shaft 23. As further step by step movement is imparted to the spool 33, the bracket 65 will eventually be moved into the position in Fig. 8, thus manifestly causing the lug 74 to be moved from the position shown in Fig. 6 into the position shown in Fig. 8. As the lug moves from the first of these positions to the second the rod 75 is moved and the sleeve 77 is brought into engagement with the block 58. The arrangement is so coordinated that just at the time all of the ribbon is unwound from the spool 16 the sleeve 77 will engage said block and sufficiently compress the spring 78 to cause movement of the bracket 45 past a vertical plane through the shaft 51 and as soon as the bracket passes this vertical plane the tensioned spring 63 will move the bracket 45 with a snap movement into the position illustrated in Figs. 1 and 8, thus moving the shaft 59 from engagement with the end of the slot 56 nearest the spool 16 into engagement with the end of said slot nearest the spool 33. Therefore, by reason of the difference in inclination of the spring 63 the arm 50 will be pivoted about the shaft 51 to move the pin 89 from engagement with the teeth of the ratchet 79 and to move the pin 88 into engagement with the teeth of the ratchet 64. Therefore, as further reciprocation is imparted to the arm 50 the ratchet 64 will be moved to cause motivation of the spool 16 and consequent winding of the ribbon 71 on this spool and unwinding of the ribbon from the spool 33. The roller 70 on the bracket 80 will move inwardly in the manner described to eventually bring

about connection between the pawl 73 and ratchet 25 associated with this spool, and when the bracket 80 is connected in the manner in which the frame 65 is connected the sleeve 84 will move into engagement with the block 60, and when the spring 87 is compressed the bracket 45 will be moved back over-center into the position illustrated in Fig. 2 which will change the inclination of the arm 50 to move the pin 88 from association with the ratchet 64 and to move the pin 89 back into association with the ratchet 79. Positioning of the brackets 64 and 80 in positions similar to that shown in Fig. 8 causes a reversal in the direction of movement, and it is apparent that the roller 70 and the frame 69 will be moved outwardly as the quantity of ribbon wound on the particular spool is increased. However, as the direction of movement imparted to the particular spool is in the direction opposite to the direction of movement prior to reversal, it is apparent that the brackets 65 and 80 will be moved back into the positions similar to that shown in Fig. 6 and, after attaining these positions, further movement will not result and the teeth of the ratchets will merely move over the pawls and this will continue until a sufficient quantity of ribbon is wound on the spools to move the roller 70 outward sufficiently to disengage the pawls from the ratchets.

The ribbons may be wound or unwound manually by properly manipulating either of the hand wheels 9 depending upon the direction in which it is desired to wind. If it is desired to remove one of the spools, the shaft 8 is moved forwardly to withdraw the projection 18 from the axial bore 17 and, after this has been done, the other end of the spool may be freed by withdrawing it from the projection 22.

From the foregoing description it is manifest that I have provided an ink ribbon feed and reversing mechanism which may be expeditiously installed in the printing machine disclosed in my referred to copending application and it is also apparent that this device may be used in connection with other printing machines by providing a connection for reciprocating the member 40. It is also manifest that this device will wind a ribbon on one spool while unwinding it from another and the device will automatically function to reverse the direction of winding when all the ribbon has been unwound from one spool.

While I have illustrated and described a selected embodiment of my invention, it is to be understood that this is capable of variation and modification without departing from the purview of my invention as set forth in the following claims:

I claim:

1. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, movement receiving means connected to said spools, means for imparting movement to said movement receiving means to rotate said spools, toothed means connected to said spools, and means operable by the amount of ribbon wound on said spools and including a part adapted to be connected to said toothed means to be movable with said spools when a predetermined amount of ribbon is wound thereon to reverse the direction of movement imparted to said movement receiving means.

2. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, movement receiving means connected to said spools, moving means alternately engageable with the movement receiving means on the respective spools to rotate said spools in opposite directions, a toothed member connected to each of said spools, and means operable by the amount of ribbon stored on one of the spools and adapted to be selectively connected to said toothed members to be movable with said spools when a predetermined amount of ribbon is stored on one of the spools to disengage the moving means from the movement receiving means on one spool and engage it with the movement receiving means on the other spool to effect reversal of the direction of rotation of the spools.

3. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, movement receiving means connected to said spools, moving means alternately engageable with the movement receiving means on the respective spools to rotate said spools in opposite directions, a toothed member connected to each of said spools, and means operable by the amount of ribbon stored on one of the spools and adapted to be selectively connected to said tooth members to be movable with said spools when a predetermined amount of ribbon is stored on the spool with which the means is to be connected to be movable therewith to disengage the moving means from the movement receiving means on the other spool and engage it with the moving means on the spool containing the predetermined amount of ribbon to effect reversal of the direction of rotation of the spools.

4. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, means for moving said ratchets to rotate said spools, means including an over-center device for alternately engaging the moving means with said ratchets, and means adapted to be connected to said spools when a predetermined amount of ribbon is stored thereon to be movable therewith and including yieldable portions selectively engageable with said over-center device to operate the same and reverse the engagement of said moving means.

5. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, means for moving said ratchets to rotate said spools and including an arm having ratchet engaging portions thereon, means including an over-center device for alternately engaging said portions with said ratchets, and means adapted to be connected to said spools when a predetermined amount of ribbon is stored thereon to be movable therewith and including yieldable portions selectively engageable with said over-center device to operate the same and reverse the engagement of said portions with said ratchets.

6. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, an over-center device having means for alternately engaging said portions on said arm with said ratchets, means for operating said over-center device, said last named means including followers for engaging the ribbon wound on said spools, and toothed members connected to said spools, said followers including arms selectively engageable with said toothed members when the diameter of the ribbon wound on one

or the other of said spools is reduced in a predetermined amount to thereby actuate said over-center device to effect reversal of the winding of said ribbon on said spools.

7. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, an over-center device having means for alternately engaging said portions on said arm with said ratchets, and means for operating said over-center device, and including parts yieldingly engageable with said over-center device to effect reversal thereof, and toothed members connected to said spools and followers engageable with the ribbon wound on said spools, said followers including arms adapted to be selectively engaged with said toothed members when the diameter of the ribbon wound on one or the other of said spools is reduced to a predetermined dimension.

8. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, means for reciprocating said supporting means to move said ratchets to impart a step-by-step movement to said spools, a bracket pivotally mounted on said support, yieldable means connecting said arm and said bracket, means including follower devices engaging the ribbon wound on said spools for moving said bracket to alternately engage said portions on said arms with said ratchets to reverse the direction of said step-by-step movement, and means including yieldable portions and connecting said follower devices to said bracket.

9. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, means for reciprocating said supporting means to move said ratchets to impart a step-by-step movement to said spools, a bracket pivotally mounted on said support, yieldable means connecting said arm and said bracket, and means for moving said bracket to alternately engage said portions on said arms with said ratchets to reverse the direction of said step-by-step movement, said moving means including followers engaging the ribbon wound on said spools, frames movable relative to said spools for supporting said followers, means for connecting said frames to said spools for movement therewith, and means for alternately connecting said frames with said bracket.

10. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, means for reciprocating said supporting means to move said ratchets to impart a step-by-step movement to said spools, a bracket pivotally mounted on said support, yieldable means connecting said arm and said bracket, frames movable relative to said spools, followers on said frames engaging the ribbon wound on said spools, means for urging said followers into said engagement, means controlled by said followers for connecting said frames to said spools, and means for connecting said frames to said bracket for moving said bracket to disengage one of the portions on said arm from one of said ratchets while engaging the other of said portions on said arm with the other of said ratchets.

11. An ink ribbon feed and reversing mechanism comprising a pair of ribbon spools rotatably mounted on a frame, ratchets connected to said spools, an arm having ratchet engaging portions thereon, means for pivotally supporting said arm, means for reciprocating said supporting means to move said ratchets to impart a step-by-step movement to said spools, a bracket pivotally mounted on said support, yieldable means connecting said arm and said bracket, frames movable relative to said spools, followers on said frames engaging the ribbon wound on said spools, means for urging said followers into said engagement, means controlled by said followers for connecting said frames to said spools, and arms having yielding portions thereon for connecting said frames to said bracket for moving said bracket to disengage one of the portions on said arm from one of said ratchets while engaging the other of said portions on said arm with the other of said ratchets.

12. An ink ribbon device including a pair of spaced apart spools having movement receiving ratchets connected thereto, a supporting member pivotally mounted between said spools and having an arcuate slot therein, an arm having ratchet engaging means at the ends thereof, means mounting the medial portion of said arm on said supporting member, an over-center device including a bracket pivotally mounted on said supporting member, said arm having a portion thereon providing an arcuate slot aligned with the first-named arcuate slot and said pin extending through said arcuate slot in said portion on said arm, said over-center device including a spring adapted to hold said pin in alternate positions at the ends of said slots, and means including devices connected to said bracket on opposite sides of the pivot therefor and respectively extending to said spools to cooperate therewith to effect movement of said over-center device to move said pin from corresponding ends of said slots to the opposite ends of said slots to disengage one of the ratchet engaging means on said arm with one of said ratchets and to engage the other of the ratchet engaging means with the other of the ratchets.

13. An ink ribbon device including a pair of spaced apart spools having movement receiving ratchets connected thereto, a supporting member pivotally mounted between said spools, means carried by said supporting member and alternately engageable with said ratchets to impart movement first to one spool and then to the other to alternately wind a ribbon on one spool as it is unwound from the other, a bracket pivotally mounted on said supporting member, a connecting device secured to said bracket on one side of the pivotal mounting thereof and including a yieldable part, another connecting device secured to said bracket on the other side of the pivotal mounting thereof and including a yieldable part, a spring connected to said bracket, means connecting said bracket to said means alternately imparting movement to said ratchets and adapted to limit action of said spring to hold said means in alternate positions, and means associated with said spools and having said connecting devices respectively connected thereto and adapted to selectively engage the yieldable parts on said connecting devices with said bracket to move said

bracket into alternate positions when a predetermined amount of ribbon is wound on one or the other of said spools to effect a reversal of the direction of winding of the ribbon on said spools.

14. An ink ribbon device including a pair of spaced apart spools having movement receiving ratchets connected thereto, a supporting member pivotally mounted between said spools, means carried by said supporting member and alternately engageable with said ratchets to impart movement first to one spool and then to the other to alternately wind a ribbon on one spool as it is unwound from the other, a bracket pivotally mounted on said supporting member, a connecting device secured to said bracket on one side of the pivotal mounting thereof, another connecting device secured to said bracket on the other side of the pivotal mounting thereof, a spring connected to said bracket, means connecting said bracket to said means alternately imparting movement to said ratchets and adapted to limit action of said spring to hold said means in alternate positions, and means associated with said spools and having said connecting devices respectively connected thereto and adapted to operate said connecting devices to move said bracket into alternate positions when a predetermined amount of ribbon is wound on one or the other of said spools to effect a reversal of the direction of winding of the ribbon on said spools, said connecting devices having yieldable portions engaging said bracket to effect said movement thereof when the yieldable portions are tensioned in a predetermined amount.

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