Jan. 28, 1930. H. E. HUBBARD ET AL 1,744,965

INK RIBBON FEED AND REVERSING MECHANISM

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Fig. 1

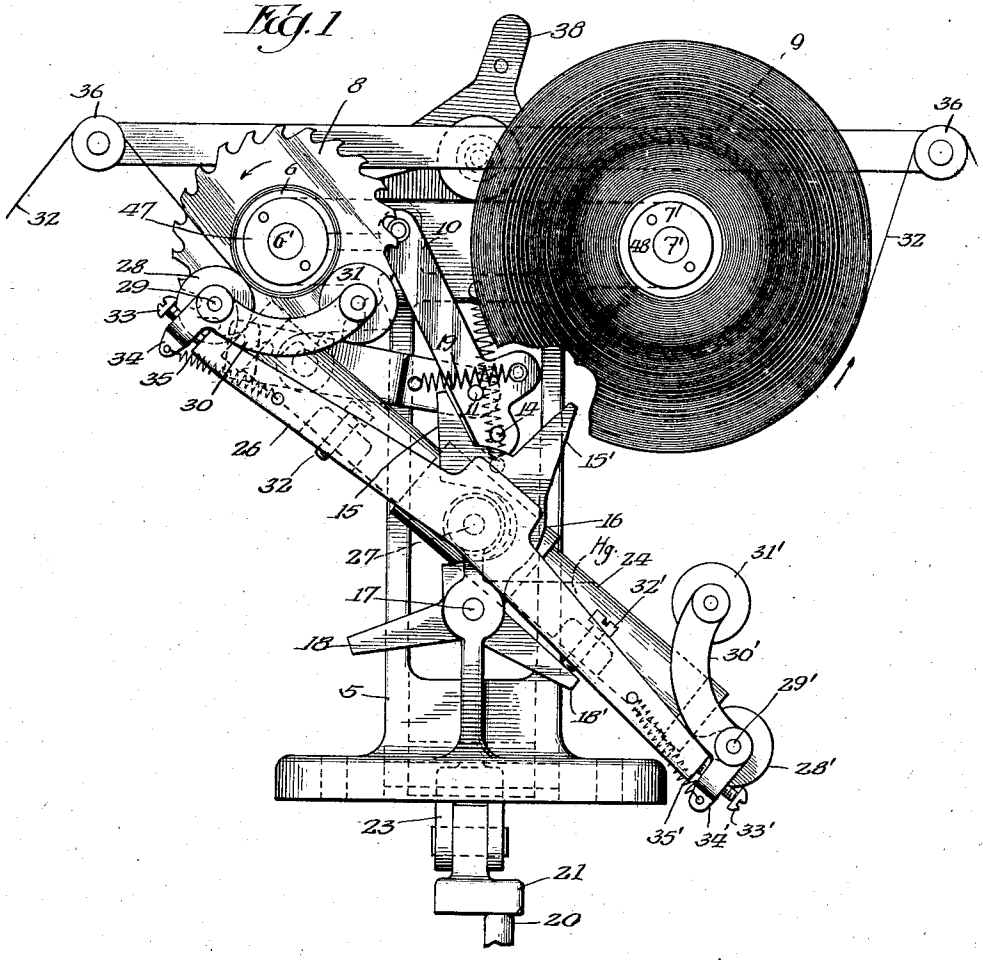
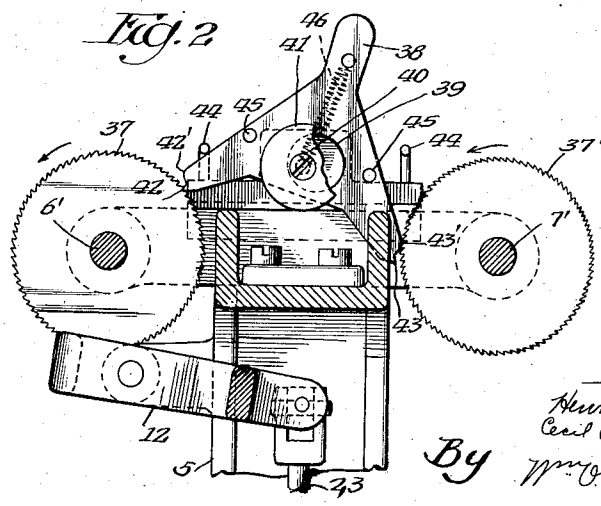


Fig. 2



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INK RIBBON FEED AND REVERSING MECHANISM

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Fig. 3

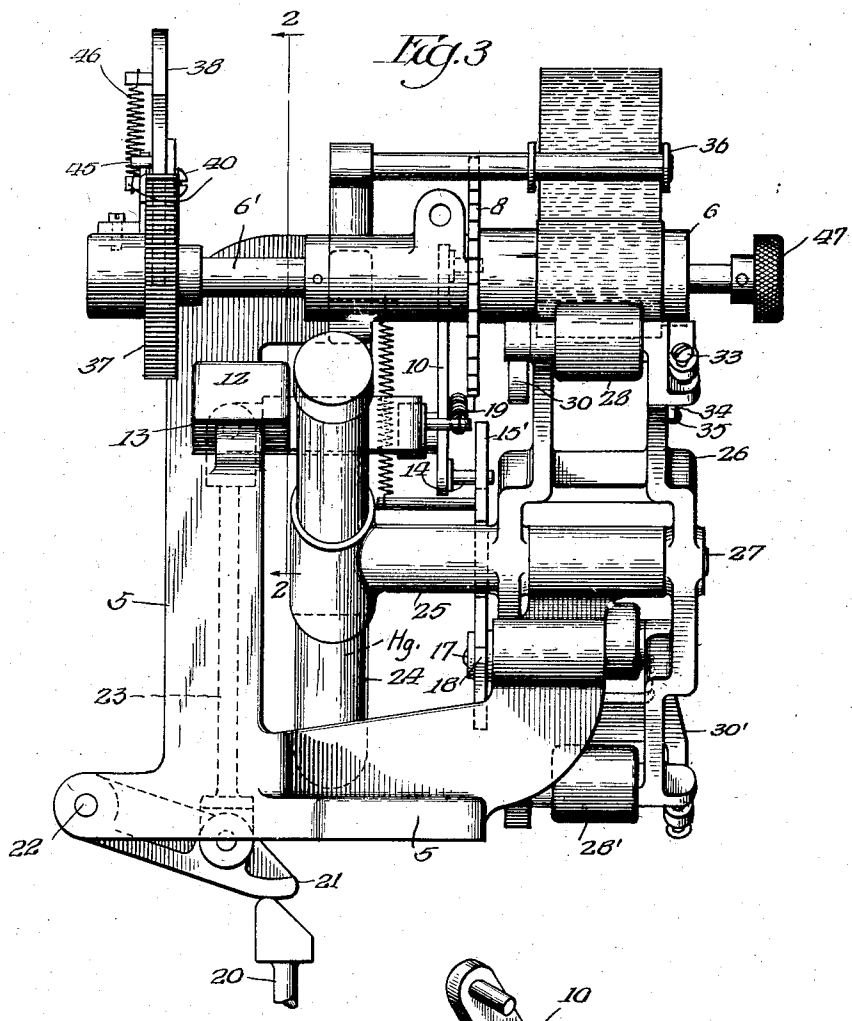
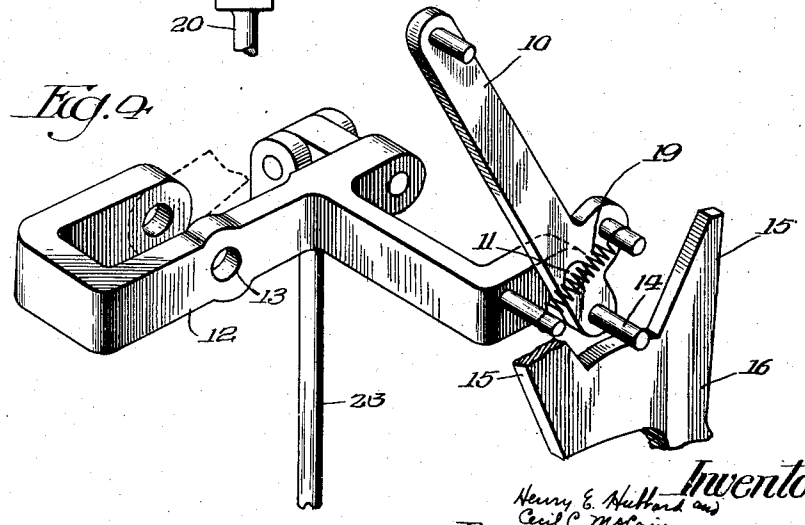


Fig. 4



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UNITED STATES PATENT OFFICE

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INK-RIBBON FEED AND REVERSING MECHANISM

Application filed March 22, 1928. Serial No. 263,768.

This invention relates to ribbon feed and reversing mechanism for machines of the class disclosed in our application Serial No. 252,166, filed February 26, 1928, and for other machines to which it is or may be adapted.

The object of the invention is to provide a simple and novel automatic mechanism for feeding and reversing the feed of an ink ribbon and comprising a unit which can be readily and easily applied to a machine, as shown for example in our co-pending application, with its operative parts conveniently disposed for inspection when required.

Further objects of the invention are to enable the use of a ribbon of considerable length; to avoid stretching the ribbon and to maintain it in proper operative condition; to avoid the use of friction for retarding the supply roll and to provide a positive lock for controlling the operation of the supply roll; and to utilize the weight of a load of fluid in a pivoted tube adapted to be operated by the ribbon as it is wound on the takeup spool for effecting reversal of the ribbon.

With these and other objects in view the invention consists of the novel mechanism shown in a selected embodiment in the accompanying drawings in which:

Fig. 1 is a front elevation of the mechanism

Fig. 2 is a sectional view on the line 2—2 of Fig. 3.

Fig. 3 is an end elevation of the mechanism.

Fig. 4 is a detail perspective view of parts of the mechanism.

Referring to the drawings 5 is a main frame which can be mounted upon an addressing or other machine for which it is or may be adapted. Two ribbon spools 6 and 7 are mounted on shafts 6′, 7′ to revolve freely on the frame and they alternate as supply and takeup spools. Ratchet wheels 8 and 9, rigid with the spools 6 and 7, are adapted to be operated by a pawl 10 pivoted at 11 on a shifter lever 12, which is pivoted at 13 on the main frame 5. A pin 14 on the pawl is arranged between the arms 15, 15′ of the shifter 16 which is pivoted at 17 on the main frame and is provided with the arms 18, 18′. When the shifter 16 is swung on its pivot one of the arms 15, 15′ will engage the pin 14 and shift the pawl from operative relation to the ratchet 8 or the ratchet 9. A spring 19 attached to the pawl 10 and to the lever 12 holds the pawl in the operative position to which it is shifted by the shifter 16.

Intermittent feeding movement is imparted to the pawl from a driving rod 20 reciprocated by the machine to which the mechanism is attached, for imparting an intermittent movement to one of the spools to take up the ribbon. The driving rod operates a lever 21 pivoted at 22 on the main frame and connected by a link 23 with the shifter lever 12. This shifter lever has a uniform reciprocating movement, during the operation of the machine, and it causes the pawl to move the takeup spool a step at each cycle of operation, and this is true whether the pawl engages the ratchet 8 or the ratchet 9.

The shifter is operated by a load of mercury Hg contained in a tubular holder 24 which is supported in the arm 25 of a shifter frame 26 which is pivoted at 27 on the main frame. Bearing rollers 28, 28′ are mounted in fixed position on the shafts 29, 29′ supported by the shifter frame at the ends thereof. Brackets 30, 30′ are pivotally mounted on the shafts 29, 29′ and carry trip rollers 31, 31′ at their outer ends.

Fig. 1 shows the spool 7 containing almost a full supply of ribbon 32 and acting as a supply spool, and the spool 6 with a few turns of the ribbon thereon and acting as a takeup spool. The rollers 28 and 31 are in contact with the ribbon on the spool 6 and as the ribbon is wound on this spool the shifter frame will be swung on its pivot, and the tube will swing with the frame. The roller 28 will swing out of contact with the ribbon but the roller 31 will remain in contact with the ribbon until the tube swings past its level, whereupon the load of mercury or other fluid in the tube will flow to the end of the tube which has been up and swing the tube on its pivot to the reverse position to that shown in Fig. 1. The shifter frame will swing with the tube and carry the roller 31 away from the ribbon on the spool 6 and at the same time carry the roller 31′ into contact with the ribbon on the spool 7. As the ribbon is unwound from spool

7 and onto spool 6 the tube and the shifter frame will continue to swing in a reverse direction to that shown in Fig. 1 and finally the screw 32 will engage the arm 18 and cause the arm 15′ to engage pin 14 and swing the pawl 10 away from ratchet 8 and into operative relation to ratchet 9, whereupon spool 6 will act as the supply spool and spool 7 will act as the takeup spool. This operation is repeated automatically as the ribbon is wound up on the takeup spool.

The trip rollers 31, 31′ may be adjusted for operation by the set screws 33, 33′ operating through lugs 34, 34′ against the ends of the shifter frame, and springs 35, 35′ hold the brackets 30, 30′ with the screws 33, 33′ in engagement with the ends of the shifter frame. The ribbon travels over the guide rollers 36 supported on the main frame beyond the spools which are arranged in parallel position above the shifter frame and mercury tube.

Toothed wheels 37, 37′ are rigidly mounted on the spool shafts 6′, 7′ and a lock lever 38 is loosely mounted on the main frame being provided with an enlarged opening 39 to receive a screw 40 which is provided with a washer 41 and threadedly engages the main frame 5, Fig. 2. The lock lever has a dog 42 to engage the toothed wheel 37 and a dog 43 to engage the toothed wheel 37′. Adjacent these dogs there are shoulders 42′ and 43′. Stop pins 44 on the frame and 45 on the lock lever limit the adjusting movement of the lock lever. A spring 46 is attached to the lock lever and to the screw 40 to hold the lock lever in down position but permitting the lock lever to be raised manually to clear both toothed wheels so that the wheels can be manually operated by means of the knurled handles 47, 48. The ribbon is drawn from the supply spool by the pawl and ratchet operation of the takeup spool and because of the length of the ribbon between the spools there may be a tendency to stretch the ribbon at times which will produce a slight reverse movement of the takeup spool when the pawl is retracted from the ratchet. To prevent this a dog of the lock lever constantly engages the toothed wheel on the takeup spool shaft and the shoulder adjacent the other dog of the lock lever is then constantly engaging the toothed wheel on the supply spool shaft.

Referring to Figs. 1 and 2, when the takeup spool is actuated by the pawl and ratchet the dog 42 will ride over the teeth of the wheel 37 and the teeth of the wheel 37′ will pass freely by the shoulder 43′; but if the takeup spool tends to reverse movement when the pawl 10 is retracted from the ratchet 8 the dog 42 engaging the teeth of wheel 37 will lock the spool against reverse movement. This insures a complete feeding movement of the ribbon at each cycle of operation of the mechanism since the supply spool turns freely and the takeup spool is locked against reverse movement during its takeup operation. When the pawl 10 is shifted from ratchet 8 to ratchet 9 it will, on its first operation, positively turn the spool 7, its shaft 7′ and the toothed wheel 37′ to the right, Figs. 1 and 2, and cause the lock lever to rise by engagement with the shoulder 43′ and the dog 43 until it is shifted in its position with the dog 43 in operative engagement with the teeth of wheel 37′ and the shoulder 42′ in operative relation to the teeth of wheel 37, the enlarged opening 39 permitting this adjustment of the lock lever on the relatively small diameter pin 40.

The invention provides a mechanism of simple and novel construction for automatically feeding and reversing the feed of an ink ribbon; it comprises a complete unit which can be readily mounted upon and easily detached from an addressing or other machine; it maintains the ribbon in a properly taut condition, not stretched to tension, for printing operation; and it insures a positive feed and a positive lock for maintaining the ribbon in condition for efficient service. Friction means heretofore commonly employed for retarding supply spools are objectionable because of the difficulty experienced in maintaining a constant degree of friction at all times and under all conditions. This invention avoids the use of friction for retarding the supply spool and also for retarding the takeup spool against undesired reverse movement while operating as a takeup spool. Positive locking means are provided for preventing the takeup spool from being turned reversely while operating as a takeup spool and this positive locking means overcomes any tendency of the ribbon to stretch because each feeding operation is a positive feed of the takeup spool with the supply spool turning freely and hence there is no occasion for the ribbon being stretched to tension.

We have shown the invention in a form found to be satisfactory for the purpose it is intended, but we are aware that changes in the form, construction and arrangement of parts may be made to adapt the invention for different machines and for other purposes without departing from the invention or sacrificing any of the advantages thereof and we reserve the right to make all such changes as fall within the scope of the following claims:

We claim:

1. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising

a pivoted tube, and a fluid load in the tube adapted to flow from one end to the other end of the tube.

2. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, and means engaging the ribbon on the spools alternately for moving the tube past its balance center.

3. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, and rollers on the ends of the shifter frame engaging the ribbon on the spools alternately for moving the tube past the balance center.

4. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, and a pair of rollers at each end of the shifter frame adapted to engage the ribbon on the spools alternately for moving the tube past its balance center.

5. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, shafts mounted on the shifter frame at the ends thereof, rollers mounted on the shafts, brackets supported on the shafts, and rollers supported on the brackets at the top of the shifter frame and between the ends thereof, the pairs of rollers at the ends of the shifter frame being adapted to engage the ribbon on the spools alternately for moving the tube past its balance center.

6. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, shafts mounted on the shifter frame at the ends thereof, rollers mounted on the shafts, brackets supported on the shifter, rollers supported on the brackets at the top of the shifter frame and between the ends thereof, the pairs of rollers at the ends of the shifter frame being adapted to engage the ribbon on the spools alternately for moving the tube past its balance center, screw devices engaging the brackets and the ends of the shifter frame for adjusting the rollers carried by the brackets, and springs engaging the shifter frame and the brackets for holding the brackets in adjusted position.

7. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, and means for shifting the pawl into operative engagement with one or the other ratchet wheel and comprising a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a pivoted shifter frame rigid with the tube, a pair of rollers at each end of the shifter frame for engaging the ribbon on the spool adjacent thereto, one roller of each pair being located opposite the end of the frame and the other roller being located above the frame, the end roller having temporary engagement only with the ribbon and the upper roller having continual engagement with the ribbon until the tube is moved past its balance center.

8. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a movable shifter adapted to be operated when the tube moves past its balance center and the fluid load shifts from one end to the other end of the tube, and means on the shifter engaging the pawl for shifting the pawl into operative engagement with one or the other ratchet wheel.

9. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl

for operating said ratchet wheels, means for operating the pawl, a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, and a shifter freely movable relative to the pawl during any movement of the tube not controlled by the flow of fluid therein and adapted to be moved quickly when the fluid shifts from one end to the other end of the tube to quickly shift the pawl from operative engagement with one ratchet wheel to operative engagement with the other ratchet wheel.

10. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, a movable shifter adapted to operatively engage the pawl, and means on opposite sides of the pivot center of the shifter frame for alternately engaging and operating the shifter to shift the pawl from operative engagement of one ratchet wheel to operative engagement with the other ratchet wheel.

11. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, ratchet wheels rigid with said spools, a pawl for operating said ratchet wheels, means for operating the pawl, a pivoted tube, a fluid load in the tube adapted to flow from one end to the other end of the tube, a shifter frame rigid with the tube, rollers at the ends of the shifter frame for engaging the ribbon on the spool operating as the takeup spool, and means for shifting the pawl from the ratchet wheel of the spool which has been operating as a takeup spool into operative engagement with the ratchet wheel of the spool which has been operating as the supply spool, said means comprising a shifter and said shifter being controlled in its movement to remain inoperative while the shifter frame and tube are slowly moving on their pivot due to the winding of the ribbon on the spool then operating as the takeup spool and adapted to be operated when the flow of the fluid from one end to the other end of the tube swings the tube and shifter frame on their pivot and carries the rollers at the other end of the shifter frame into engagement with the ribbon on the spool which has been operating as a supply spool.

12. An ink ribbon feed and reversing mechanism comprising a main frame, a pair of ribbon spools revolubly mounted in parallel relation on the frame, ratchet wheels rigid on the ends of the spools, a pawl arranged between the ratchet wheels for operatively engaging said wheels alternately, means for imparting a feeding movement to the pawl and means for shifting the pawl from one ratchet wheel to the other and comprising a tube and a shifter frame pivoted together on the main frame, a fluid load in the tube adapted to flow from one end to the other end of the tube, and a shifter adapted to be operated by the shifter frame when the fluid load flows from one end to the other end of the tube.

13. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, a pair of toothed wheels rigid with the ribbon spools, means for operating the spools alternately, and a lock lever loosely mounted relative to the toothed wheels and adapted to prevent reverse movement of the spools during their relative winding and unwinding movements.

14. An ink ribbon feed and reversing mechanism comprising a frame, a pair of ribbon spools revolubly mounted on the frame, a pair of toothed wheels rigid with the ribbon spools, means for operating the spools alternately, and a lock lever loosely mounted relative to the toothed wheels and having dogs for engagement with the toothed wheels and shoulders back of the dogs for engagement with the toothed wheels.

15. An ink ribbon feed and reversing mechanism comprising a frame, pair of ribbon spools revolubly mounted on the frame, a pair of toothed wheels rigid with the ribbon spools, means for operating the spools alternately, a lock lever, a pair of arms on the lock lever arranged in operative relation to the toothed wheels, each of said arms having a dog and a shoulder for alternate engagement with a toothed wheel, a pivot for said lock lever on the frame, and an enlarged pivot opening for the lock lever to permit said lock lever to be withdrawn from operative engagement with both toothed wheels.

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