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RIBBON REVERSE MECHANISM

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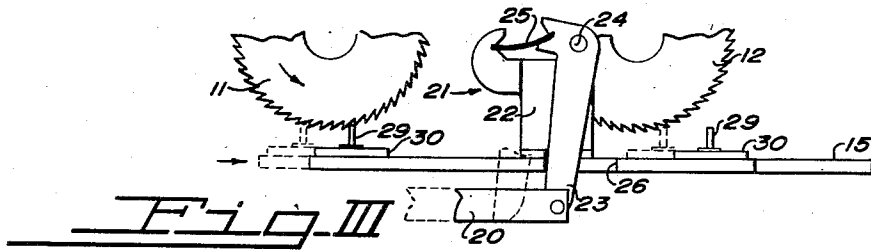
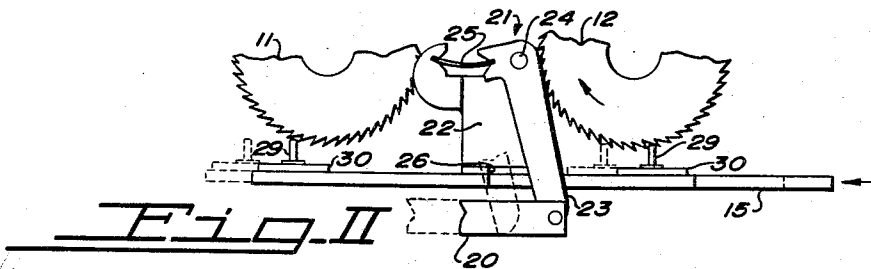
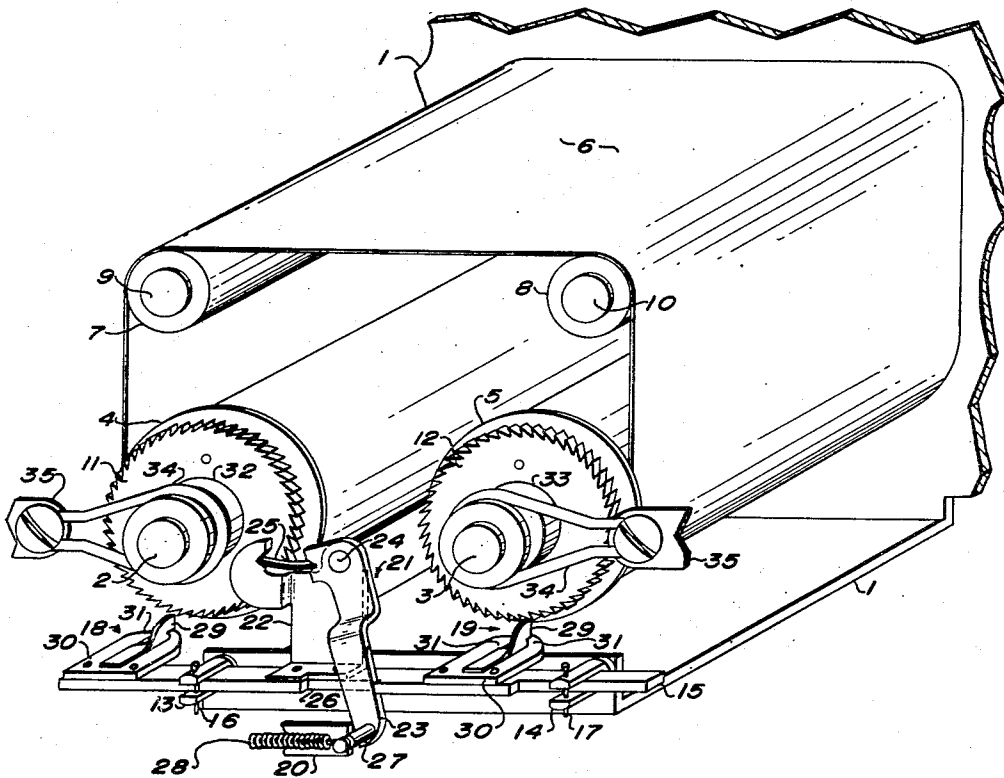


Fig. I

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RIBBON REVERSE MECHANISM

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This invention relates to a reversing mechanism for an inked ribbon of a printing device.

The principal object of this invention is to provide a mechanism for automatically reversing the rotation of a pair of spools alternately serving as supply and take-up spools for an inked ribbon.

Another object of the invention is to change a reciprocating motion of a driving member into rotation of one or the other of the spools.

A further object is to provide a compact reversing mechanism for a pair of spools on which an inked ribbon is alternately wound and unwound.

Other objects and advantages will be apparent from the following description in which reference is had to the accompanying drawings.

According to the invention a longitudinal reciprocated bar passing tangent to driving ratchet wheels of a pair of inked ribbon spools has its operating stroke automatically shiftable between two position in the first of which a first pawl on the bar drives a first one of the ratchet wheels and in the second of which a second pawl on the bar drives the second ratchet wheel. The bar is preferably driven through an over-center spring toggle or detent mechanism adapted to automatically shift the position of the stroke when the required driving effort exceeds a preset limit. Thus the spools, which alternately serve as supply and take up spools, are automatically reversed whenever the ribbon tightens as an end of the ribbon is reached.

A preferred embodiment of the invention is illustrated in the accompanying drawings.

In the drawings:

Figure I is an oblique view of a preferred form of the improved drive mechanism for a pair of spools which alternately serve as supply and take-up spools for an inked ribbon.

Figure II is a simplified elevational view showing the position of the ribbon drive mechanism when it is conditioned to wind the ribbon onto the right hand spool.

Figure III is a view similar to Figure II showing the ribbon drive mechanism conditioned to drive the left hand spool.

These specific figures and the accompanying description are intended merely to illustrate the invention and not to limit its scope.

Referring to Figure I, a frame 1 has mounted therefrom a pair of axles 2 and 3 on which are rotatably journaled a pair of spools 4 and 5 respectively. Adapted to be wound and unwound alternately on the spools 4 and 5 is an inked ribbon 6. Since inked ribbons are commonly used in conjunction with printing devices it will be understood that the ribbon 6 passes through an area where it cooperates with printing mechanism to make an imprint of a type on an imprint receiving element. In Figure I the ribbon 6 is merely shown as passing over a pair of guide rolls 7 and 8 journaled on axles 9 and 10 respectively mounted from the frame 1.

Pinned to the spools 4 and 5 respectively are a pair of

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ratchet wheels 11 and 12 the teeth of which are arranged so that they are driven in opposite directions. The reason for this will be apparent later. Reciprocably slidable in a pair of slotted guide posts 13 and 14 mounted from a flange of the frame 1 is a slidable bar 15. The slotted guide posts 13 and 14 are generally parallel to the axes of the spools 4 and 5. The slidable bar 15 is retained in the slots of the guide posts 13 and 14 by means of cotter pins 16 and 17. Pawl assemblies 18 and 19 mounted near opposite ends of the slidable bar 15 are adapted to cooperate with the ratchet wheels 11 and 12 respectively to drive the wheels.

Reciprocation of the slidable bar 15 within a specified range of travel is effected by a reciprocating arm 20 operated in conjunction with the printing mechanism of the printing device. The arm 20 is adapted to engage a portion of a toggle mechanism 21 which is mounted from the slidable bar 15. The toggle mechanism 21 comprises a bracket 22 fixed to the slidable bar 15, an arm 23 pivotally mounted to the bracket 22 by means of a pivot pin 24, and a bowed spring 25 the ends of which engage in opposed V-notches in the bracket 22 and the arm 23. A downwardly extending portion of the arm 23 is movable within limits defined by the ends of a notched-out portion 26 of the bar 15.

As shown in Figure I, the reciprocating arm 20 engages a pin 27 extending laterally from the bottom of the arm 23. The pin 27 is urged into engagement with the reciprocating arm 20 by means of an extended coil spring 28 which has its other end fixed to framework of the printing device. Reciprocation of the arm 20 to the left as viewed in Figure I causes the spring 28 to pull the toggle mechanism 21 and the slidable bar 15 on which it is mounted along with the arm 20. When the reciprocating arm 20 returns to the position shown in Figure I, it will be understood that the arm 20 moves the toggle mechanism and slidable bar back to its original position. During this reciprocation, one of the pawl assemblies 18 and 19 rotates its spool slightly so as to advance the ribbon 6. The pawl assemblies 18 and 19 are each comprised of a flat spring pawl 29 twisted near its center so as to provide an end portion lying in a plane which is radial with respect to the adjacent spool. One end of each spring pawl 29 is fixed to a bracket 30 which is supported on the slidable bar 15. Each bracket 30 has a pair of inwardly opposed fingers 31 which act both to limit and guide that end of the flat spring pawl 29 not attached to the bracket 30. When one of the pawls 29 is driving its respective ratchet wheel, the opposed fingers 31 act to prevent the pawl from bending backward. After the pawl 29 has driven the ratchet wheel and is returning to its original position, the fingers 31 permit the pawl 29 to move radially with respect to the ratchet wheel as the pawl glides back over the teeth of the ratchet wheel.

The slidable bar 15 and the toggle mechanism 21 are driven through a definite prescribed stroke which is less than the total range of travel of the slidable bar 15. When the toggle mechanism 21 is actuated the stroke of the slidable bar 15 is shifted from one end of its range of travel to the other end. In reference to Figures II and III, it will be apparent that while the length of the stroke is the same in both cases, the position shifts and the total range of travel of the slidable bar 15 is from the left end of the dotted lines as shown in Figure II to the right end of the solid lines as shown in Figure III.

As is illustrated in Figure II, with the arm 23 of the toggle mechanism 21 at the right end of the notched-out portion 26, the slidable bar 15 and the toggle mechanism 21 are reciprocable from the position shown in solid lines to the position shown in dotted lines and back. The slidable bar 15 moves from right to left and then back to the

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right in response to reciprocation of the arm 20. The left flat spring pawl 29 as shown both in solid and dotted lines can be seen as being unable to engage with its ratchet wheel 11. The ratchet wheel 11 in this case is not driven, and the spool 4 rigidly attached to the ratchet wheel 11 therefore acts as a supply roll for the ribbon 6. The right end pawl 29 moves with the slidable bar 15 from the position shown in solid lines to the position shown in dotted lines and back. During the leftward portion of the stroke the right end pawl 29 rotates the ratchet wheel 12 clockwise and advances the ribbon 6 by winding it onto the spool 5. When the toggle mechanism 21 is conditioned as shown in Figure II the line of force of the bowed spring 25 is directed below the center of the pivot 24 thereby tending to retain the arm 23 against the right end of the notched-out portion 26.

The bowed spring 25 acts as a compression link between the bracket 22 and the arm 23 of the toggle mechanism. The force exerted by the spring 25 tending to keep the arm against one end or the other of the notched-out portion 26 is slightly greater than the force required to drive the spool on which the ribbon 6 is being wound. During operation the spring force can therefore only be overcome when the pawl 29 doing the driving can no longer rotate its ratchet wheel, such for instance as is the case when the ribbon tightens as it reaches its end on the supply roll. When the tension in the ribbon 6 increases, the pawl 29 driving the ratchet wheel of the take-up spool prevents the slidable bar 15 from reciprocating. The reciprocating arm 20 continues to move however, and in so doing actuates the toggle mechanism 21 to shift the stroke of the slidable bar 15 to wind the ribbon 6 on what formerly was the supply spool.

Similar to the arrangement in Figure II, the slidable bar 15 and toggle mechanism 21, as illustrated in Figure III, are movable from the position shown in solid lines to the position shown in dotted lines and back. The length of the stroke of the reciprocating arm is still the same as before, but the slidable bar, when the arm 23 of the toggle mechanism was snapped to its alternate position, moved to the other end of its range of travel. The left end pawl 29 instead of the right end pawl now engages with its ratchet wheel. When the reciprocating arm 20 moves leftwardly, the left end pawl 29 glides over the teeth of the ratchet wheel 11 from the position shown in solid lines to the position shown in dotted lines. On the return stroke, the pawl 29 drives the ratchet wheel 11 and the spool 4 attached thereto in a counter-clockwise direction. The ribbon 6 is now being wound onto the spool 4 and is being unwound from the spool 5 since the spool 5 no longer is being driven by the right pawl 29.

Fixed respectively to the ratchet wheels 11 and 12 are a pair of hubs 32 and 33. The hubs are grooved to each receive a spring 34 which acts as a friction brake for the spools. The springs 34 are looped around the hubs 32 and 33 and have their opposite ends attached to portions 35 of the frame 1. The springs 34 maintain the ribbon 6 under proper tension to present it in the printing station without too much slack and prevent the driven spool from backing up during the return stroke of the bar 15.

Almost any type of toggle mechanism can be substituted for the toggle mechanism 21 to shift the stroke of the slidable bar from one end of its range of travel to the other. Similarly, the reciprocating arm 20 can be arranged so as to merely engage the pin 27 of the arm 23 or it can be pivotally connected to that arm. If the stroke of the slidable bar is shorter than the stroke of the reciprocating arm 20 and the arm 20 disengages from the toggle mechanism when it moves to the left, then the arrangement shown in Figure I would be suitable. If the length of stroke of the reciprocating arm and the slidable bar 15 is the same, then the reciprocating arm can be pivotally connected to the arm 23 of the toggle mechanism 21 as shown in Figures II and III.

Various modifications in details of construction of the

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parts may be made without departing from the spirit and scope of the invention.

Having described the invention, I claim:

1. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of spools alternately serving as supply and take-up spools for the ribbon, a reciprocable slidable bar, a ratchet wheel on each of the spools, a pair of resilient pawls fixed on the bar and cooperating with the ratchet wheels, there being one pawl only for each of the ratchet wheels, the pawls being so spaced on the bar that one pawl drives one of the ratchet wheels at one end of the range of travel of the bar and the other pawl drives the other of the ratchet wheels at the other end of the range of travel of the bar, means for driving the bar through a stroke less than its range of travel, a friction brake for each of the ratchet wheels for preventing the driven ratchet wheel from backing up during the return stroke of the bar, and means responsive to the tension in the ribbon for shifting the stroke of the reciprocable bar from one end of its range of travel to the other end of its range of travel.

2. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of spools alternately serving as supply and take-up spools for the ribbon, a reciprocable slidable bar, a ratchet wheel on each of the spools, a pair of resilient pawls fixed on the bar and cooperating with the ratchet wheels, there being one pawl only for each of the ratchet wheels, the pawls being so spaced on the bar that one pawl drives one of the ratchet wheels at one end of the range of travel of the bar and the other pawl drives the other of the ratchet wheels at the other end of the range of travel of the bar, means for driving the bar through a stroke less than its range of travel, a friction brake for each of the ratchet wheels for preventing the driven ratchet wheel from backing up during the return stroke of the bar, and means responsive to the tension in the ribbon for shifting the stroke of the reciprocable bar from one end of its range of travel to the other end of its range of travel, the means for shifting the stroke of the reciprocable bar comprising a spring loaded toggle mechanism.

3. In a printing device, in combination, a ribbon carrying a marking medium, a pair of spools alternately serving as supply and take-up spools for the ribbon, a reciprocable member, cooperating means on the spools and the reciprocable member for changing the reciprocating movement of the member to rotation of the spools, the cooperating means being adapted to drive a first of the spools at one end of its range of travel and to drive the second of the spools at the other end of its range of travel, means for driving the reciprocable member through a stroke less than its range of travel, and means responsive to the tension in the ribbon for shifting the stroke of the reciprocable member from one end of its range of travel to the other end of its range of travel, the means for shifting the stroke of the reciprocable member comprising a toggle mechanism including a bracket fixed to the reciprocable member, an arm pivotally mounted to the bracket and a spring compressed between the bracket and the arm.

4. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of spools alternately serving as supply and take-up spools for the ribbon, a reciprocable slidable bar, a ratchet wheel on each spool, a pair of resilient pawls fixed on the bar and cooperating with the ratchet wheels, there being one pawl only for each ratchet wheel, the pawls being so spaced on the bar that one pawl drives one of the ratchet wheels at one end of the range of travel of the bar and the other pawl drives the other of the ratchet wheels at the other end of the range of travel of the bar, means for driving the bar through a stroke less than its range of travel, a friction brake for each of the ratchet wheels for preventing the driven ratchet wheel from backing up during the return stroke of the bar, and means responsive to the tension in the ribbon for shifting the stroke of the reciprocable bar from one end of its range of travel to the other end of its range of travel.

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cable bar from one end of its range of travel to the other end of its range of travel, the means for shifting the stroke of the reciprocable bar comprising a toggle mechanism including a bracket fixed to the reciprocable bar, an arm pivotally mounted to the bracket and a spring compressed between the bracket and the arm.

5. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of alternately drivable spools on which the ribbon is adapted to be wound, a reciprocable member having a range of travel of limited length, the member having a stroke of less than the range of travel and being arranged to be shifted whereby the stroke may take place at either end of the travel, a ratchet wheel on each of the spools, a pair of resilient pawls fixed on the reciprocable member and arranged to drive one ratchet wheel when the stroke of the member takes place at one end of the travel and to drive the other ratchet wheel when the stroke takes place at the other end of the travel, a friction brake for each of the ratchet wheels for preventing the driven ratchet wheel from backing up during the return stroke of the reciprocable member, means for shifting the stroke of the member when the ribbon tightens on one spool to cause the ribbon to be reversed and wound onto the other spool, and means cooperating with the shifting means for reciprocating the reciprocable member.

6. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of alternately drivable spools on which the ribbon is adapted to be wound, a reciprocable member having a range of travel of limited length, the member having a stroke of less than the range of travel and being arranged to be shifted whereby the stroke may take place at either end of the travel, a ratchet wheel on each of the spools, a pair of resilient pawls fixed on the reciprocable member and arranged to drive one ratchet wheel when the stroke of the member takes place at one end of the travel and to drive the other ratchet wheel when the stroke takes place at the

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other end of the travel, a spring loaded toggle mechanism for shifting the stroke of the member when the ribbon tightens on one spool to cause the ribbon to be reversed and wound onto the other spool, and means cooperating with the toggle mechanism for reciprocating the reciprocable member.

7. In a ribbon feeding and reversing mechanism, in combination, a ribbon, a pair of alternately drivable spools on which the ribbon is adapted to be wound, a reciprocable member having a range of travel of limited length, the member having a stroke of less than the range of travel and being arranged to be shifted whereby the stroke may take place at either end of the travel, a ratchet wheel on each spool, a pair of resilient pawls fixed on the reciprocable member and arranged to drive one ratchet wheel when the stroke of the member takes place at one end of the travel and to drive the other ratchet wheel when the stroke takes place at the other end of the travel, means for shifting the stroke of the member when the ribbon tightens on one spool to cause the ribbon to be reversed and wound onto the other spool, the means for shifting comprising a toggle mechanism including a bracket fixed to the reciprocable member, an arm pivotally mounted to the bracket and a spring compressed between the bracket and the arm, and means cooperating with the means for shifting for reciprocating the reciprocable member.

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