Sept. 29, 1959 W. GROSSE 2,906,203

APPARATUS FOR FEEDING AND GUIDING RIBBONS IN TYPING AND PRINTING MACHINES

Filed Oct. 13, 1958 4 Sheets-Sheet 1

FIG. 1

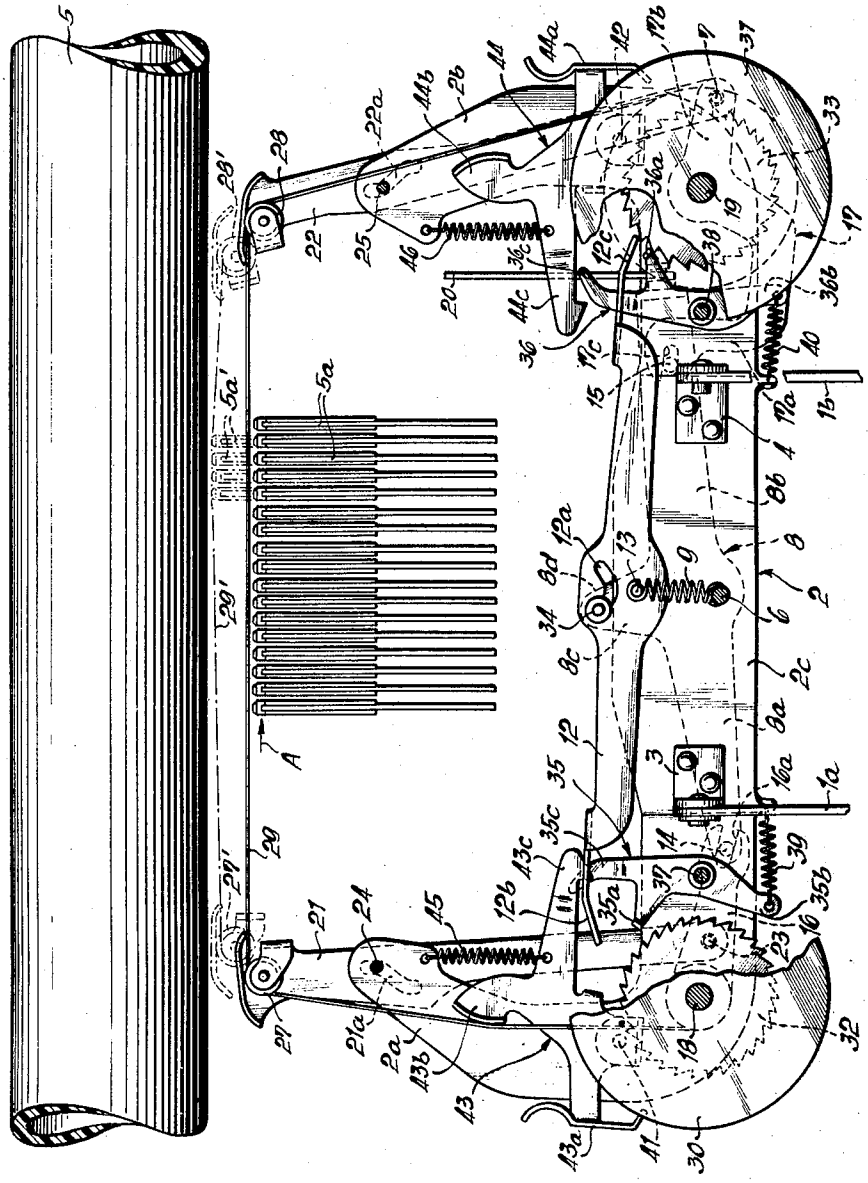

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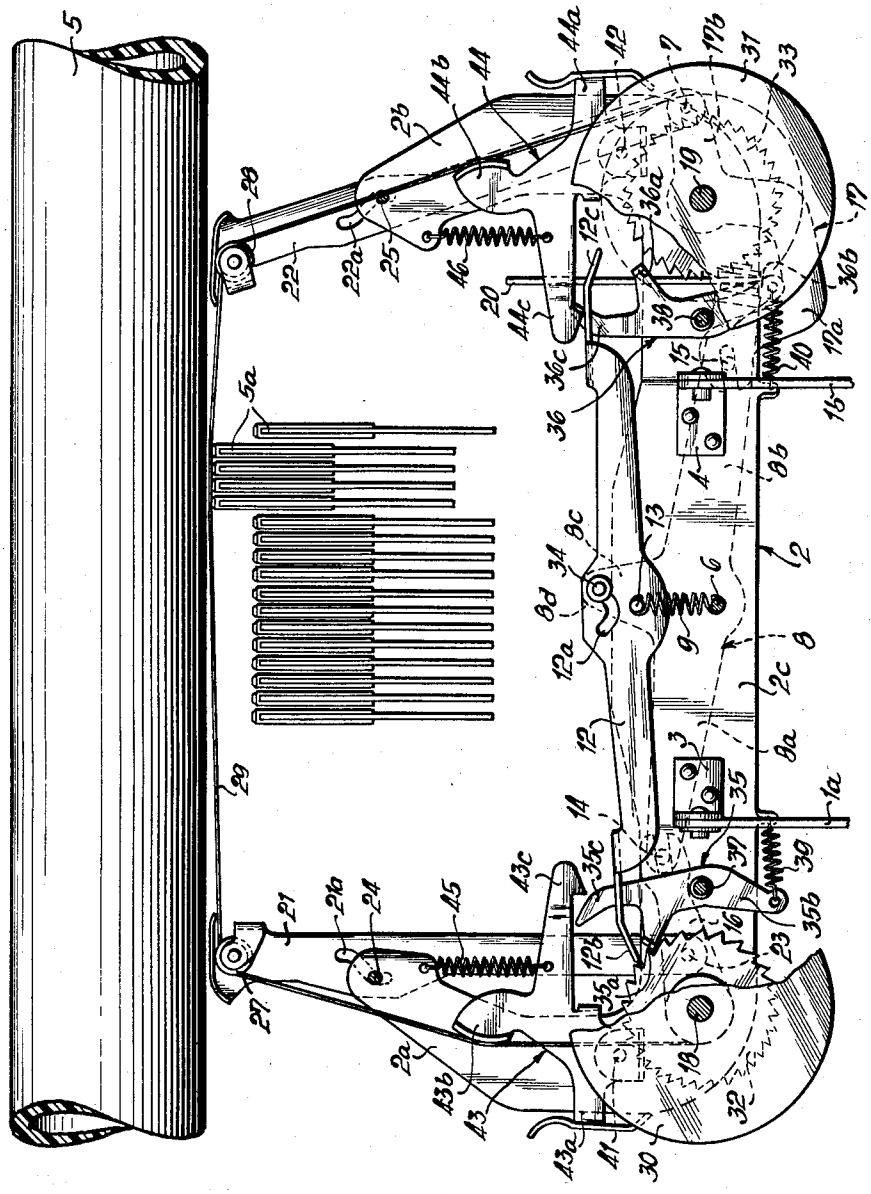
FIG. 2



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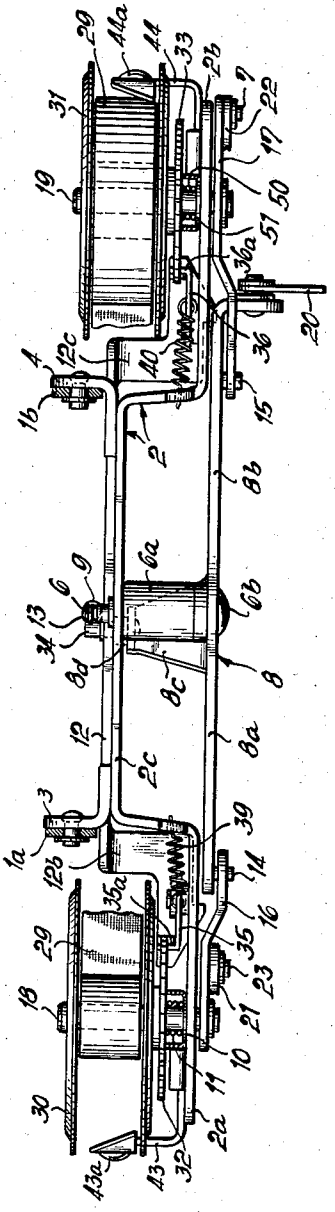
4 Sheets-Sheet 3

FIG. 3



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APPARATUS FOR FEEDING AND GUIDING RIBBONS IN TYPING AND PRINTING MACHINES

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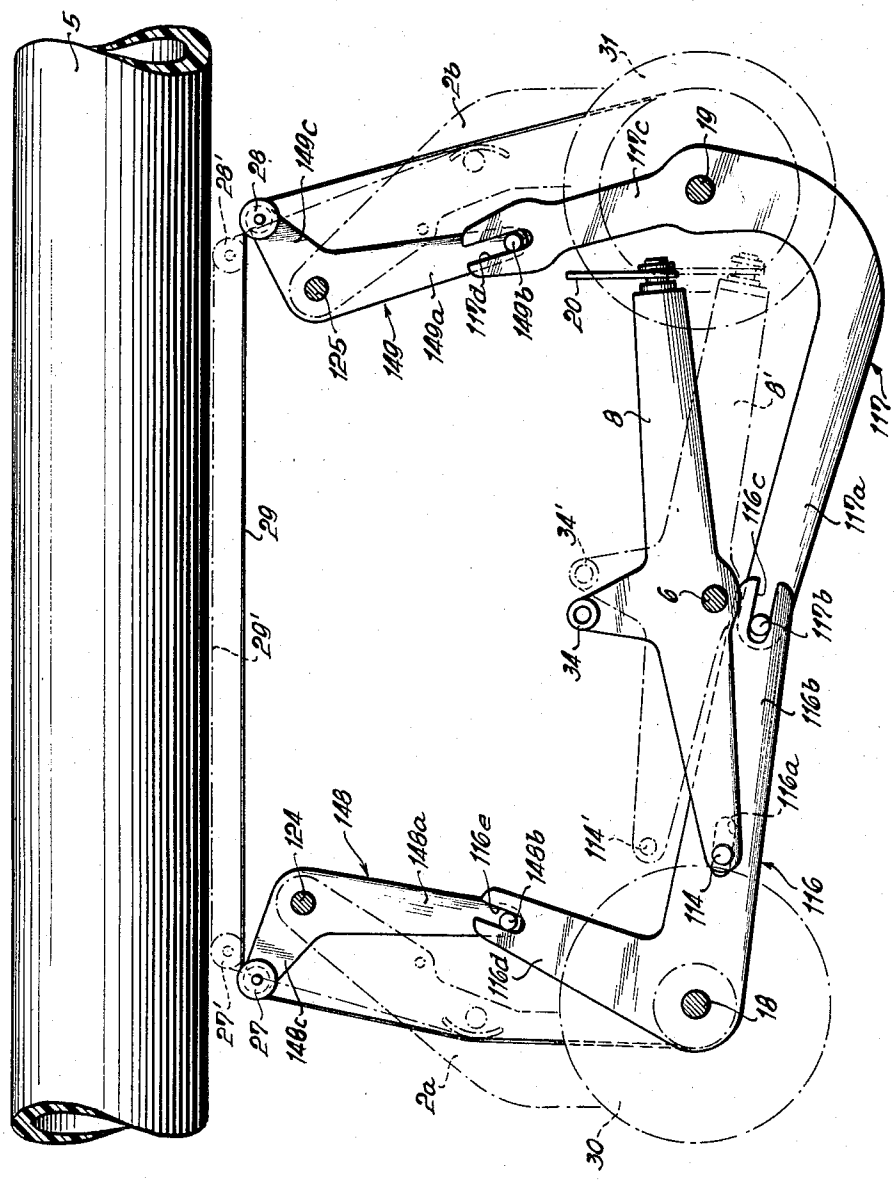
FIG. 4



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United States Patent Office

2,906,203

Patented Sept. 29, 1959

2,906,203

APPARATUS FOR FEEDING AND GUIDING RIBBONS IN TYPING AND PRINTING MACHINES

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Application October 13, 1958, Serial No. 766,835

17 Claims. (Cl. 101—336)

The present invention relates to apparatus for feeding and guiding ink ribbons in typing and printing machines, such as calculating machines, typewriters and the like.

Ribbon feeding devices of known construction are constructed with a view to hold the ribbon quite close to the mantle of the paper roller in a calculating machine or the like and, consequently, the danger of damaging or smudging the inserted sheets or cards is ever present. The likelihood that the inserted material which is to receive impressions by the type carriers of calculating machines or the like may come into contact with the ink ribbon is further increased if the sheets or cards are inserted in front of the paper roller, whereby the cards may become entangled with the component parts of the ribbon feeding mechanism.

An important object of the present invention is to provide an apparatus for guiding and feeding the ribbons in calculating machines, typewriters and the like which is so constructed as to provide ample space for the insertion of paper sheets or cards into the machine without contacting the ink ribbon.

Another object of the invention is to provide a combined ribbon guiding and feeding mechanism for typewriters and other typing and printing machines whose operation is fully automatic in that it is synchronized with the movement of type carriers toward and away from the paper roller.

A further object of the invention is to provide a ribbon feeding mechanism which is so constructed as to positively prevent undue stretching of the ribbon when the latter is brought into contact with one or more type carriers.

A still further object of the instant invention is to provide a ribbon guiding and feeding device of the characteristics above set forth which is so constructed as to permanently maintain the ribbon under requisite tension without permitting slackening thereof either in working or in idle position.

A yet further object of the invention is to provide a ribbon guiding, feeding and reversing appartus which may be conveniently installed in typing or printing machines of known construction.

An additional object of the invention is to provide a ribbon guide means which is relatively simple in construction, reliable in operation, which occupies little space, and which permits insertion of a considerable number of paper sheets or cards into position adjacent to the mantle of the paper roller.

With the above objects in view, the invention resides essentially in the provision of a series of articulately connected levers and guide elements so connected with the mechanism of a typing or printing machine that a portion of the ribbon which is parallel with the axis of the paper roller is automatically moved toward and into close proximity of the paper roller's mantle whenever a key of the machine is depressed to move the corresponding type carrier into contact with the ribbon and against the mantle of the paper roller. The entire mechanism

is preferably mounted on a single carrier and comprises a main actuating lever articulately connected with a rod or bar reciprocable by the mechanism of the printing or typing machine. The main actuating lever operates, over suitable articulate connectiions, a pair of spaced rods, bars or levers each of which constitutes guide and support means for a deflecting member in such manner that the depression of one or more keys brings about synchronized movements of deflecting members in a direction toward the mantle of the paper roller. The ink ribbon which is mounted for travel between a pair of spaced spools is led about the deflecting members and thus advances toward the paper roller whenever a key is depressed to move a type carrier against the ribbon intermediate the deflecting rollers. The guide bars or levers on which the deflecting members are mounted are so controlled in their movements toward and away from the paper roller that their movement toward the paper roller is a composite movement consisting of a pivotal displacement of the guide bars or levers toward each other and toward the paper roller. In this manner, the tension of the ink ribbon remains unchanged because, as soon as the key of a typing or printing machine is released, the main actuating lever automatically returns into its original position to cause return movements of guide bars or levers in directions away from each other and away from the paper roller.

The main actuating lever is further connected with a ribbon feeding and reversing mechanism having its main component part preferably formed as a rocker arm defining a pair of pawls to cooperate alternately with the ratchet wheels connected with the spools in which the ends of the ink ribbon are anchored. The reversal of direction in which the ribbon travels is brought about automatically, preferably by the ribbon itself. To that end, the ribbon is contacted by a pair of spring biased swingable sensing or feeling elements whose swinging movements occur in response to changes in pressure with which the ribbon bears thereagainst, and which are adapted to engage with the rocker arm whenever the supply of ribbon on the one or the other spool is exhausted. The respective feeling or sensing element then prevents the rocker arm from following the rocking movements of the main actuating lever and shifts the rocker arm into a position in which another of its pawls causes stepwise advance of ribbon in opposing direction from the supply onto the take-up spool.

Additional features of the invention reside in the provision of spring biased lock pawls which, in rhythm with the advancing pawls of the rocker arm, move into such positions as to prevent uncontrolled unwinding of the ribbon from its spools by engaging with the respective ratchet wheel; in the provision of means for holding the spools on their shaft, preferably forming part of the feeling or sensing elements; in the provision of preferably resilient braking means for the spools; and in the provision of means for maintaining the ribbon under requisite tension without, however, unduly stretching same.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of two specific embodiments when read in connection with the accompanying drawings in which:

Fig. 1 is top plan view of the ribbon guiding and feeding apparatus in idle position with certain component parts partly broken away;

Fig. 2 is a similar view of the assembly in working position;

Fig. 3 is front elevational view of the apparatus; and

Fig. 4 is top plan view of a modified ribbon guiding and feeding device.

Referring now in greater detail to the drawings, and first to Figs. 1 and 3, the ribbon guiding, feeding and reversing apparatus therein shown comprises a pair of holders 1*a*, 1*b* for a main supporting member or carrier 2 connected thereto by means of angle sheet irons 3, 4, respectively. Carrier 2 is U-shaped; it consists of a median zone 2*c* and of two arms 2*a*, 2*b*, the latter extending toward the customary paper roller 5. Median zone 2*c* of the carrier is bent out of and above the plane of arms 2*a*, 2*b*, as is best shown in Fig. 3, and supports a pin or stud 6 which latter extends beyond the upper surface and the undersurface of carrier zone 2*c*. The lower portion of stud 6 beneath the carrier zone 2*c* supports a spacing element or sleeve 6*a* which determines the position of an operating or main actuating lever 8 swingably mounted on the lower end 6*b* of the stud. As shown in Fig. 3, the lower end 6*b* of member 6 may be deformed in rivet fashion to maintain the lever 8, in cooperation with sleeve 6*a*, in a plane adjacent to and beneath the plane of carrier arms 2*a*, 2*b*. The upper end of stud 6 which extends above the carrier zone 2*c* is connected with one terminal of a helical spring 9 the other terminal of which is connected with the pin 13 of a rocker arm 12 mounted above the upper face of carrier zone 2*c*. Arm 8*a* of actuating lever 8 carries a pin or pivot axle 14, and a similar pivot axle 15 is mounted on the other arm 8*b* of said lever. The latter further comprises a central projection or nose 8*c* which is bent upwardly from its general plane, member 8*c* being formed with a platform-shaped end portion 8*d* supporting a pivot pin 34 which extends into a V-shaped cutout or closed slot 12*a* provided in the central portion of rocker arm 12 facing the paper roller 5.

Adjacent to its respective arms 2*a*, 2*b*, carrier 2 supports a pair of bearing elements or shafts 18, 19 swingably supporting levers 16, 17, respectively. Lever 16 is formed with an open cutout or slot 16*a* for reception of pivot axle 14. The arm 17*a* of other lever 17 defines an open slot 17*c* receiving the right-hand pivot axle 15.

The right-hand arm 8*b* of actuating lever 8 is articulately connected with a rod or bar 20 which is connected to and is reciprocable by the mechanism of a typewriter, calculating machine or any other type of typing or printing apparatus on which the improved ribbon guiding and feeding means is mounted. Whenever a key (not shown) of, say, a calculating machine is depressed, the corresponding type carrier 5*a* is moved from its full-line position into the phantom-line position 5*a'*, and the rod 20 is displaced simultaneously in a direction away from the paper roller 5 to rock the actuating lever 8 about its stud 6. When the key is released, the corresponding type carrier or carriers 5*a* are automatically returned into their full-line positions simultaneously with return movement of rod 20 which latter thus rocks the actuating lever 8 in anticlockwise direction. Hence, lever 8 is rocked clockwise when a type carrier 5*a* moves toward the mantle of paper roller 5, and anticlockwise when the type carrier is in a position distant from the roller.

In the embodiment of Figs. 1 and 3, the left-hand member 16 is a one-armed lever in contrast to the right-hand member 17 which latter is two-armed. Intermediate shaft 18 and open slot 16*a*, lever 16 carries a pivot pin 23 connected with a guide bar 21. A similar guide bar 22 is connected with a pivot pin 7 carried by the arm 17*b* of lever 17. Guide bars 21, 22 extend toward the paper roller 5 and are provided with closed guide slots 21*a*, 22*a*, respectively, receiving pins 24, 25 which latter are carried by respective arms 2*a*, 2*b* of the main supporting element 2. The slots 21*a*, 22*a* are of such configuration as to move the free ends of guide bars 21, 22, respectively, toward each other when said guide bars are pivoted by respective levers 16, 17 in directions toward the roller 5. Levers 16 and 17 are pivoted by pins 14, 15 on the arms of main actuating lever 8 when the latter is rocked by rod 20. The free ends of guide bars 21, 22 support respective deflecting rollers 27, 28 for the ink ribbon 29. One end of the ribbon is anchored in a spool 30 mounted on shaft 18, the ribbon thereupon passing about deflecting roller 27 to extend longitudinally of and in parallelism with the axis of paper roller 5 and passing about the right-hand deflecting roller 28 to have its other end anchored in the right-hand spool 31 mounted on shaft 19.

As best shown in Fig. 3, shaft 18 whose lower end is riveted or otherwise fastened to carrier 2 supports a bearing spacer 10 receiving an expansion spring 11 whose upper end bears against a ratchet wheel 32 non-rotatably but releasably connected with the spool 30, e.g. by means of pin-shaped followers or the like. Ratchet wheel 32 is freely rotatable about shaft 18 and is braked by spring 11 which latter thus prevents unintentional rotation of spool 30 except when the ratchet wheel 32 is positively driven. The right-hand shaft 19 carries a bearing spacer 51 receiving a braking spring 50 which latter acts against the underside of a second ratchet wheel 33 releasably but non-rotatably coupled with the right-hand spool 31. The braking effect of resilient elements 11, 50 upon respective ratchet wheels 32, 33 is important as it prevents excessive unwinding of ribbon 29 from that spool which feeds the ribbon and permits the latter's travel over the deflecting rollers 27, 28 toward the take-up spool only when the latter is positively driven by its ratchet wheel.

In the position of ribbon guiding and feeding means shown in Fig. 1, the drum of right-hand spool 31 takes up the ribbon 29 from the unwinding left-hand spool 30, i.e. the ribbon travels in the direction of arrow A.

As before stated, the platform-shaped portion 8*d* at the upper end of projection 8*c* forming part of actuating lever 8 is connected with a pin 34 extending into the V-shaped slot 12*a* in rocker arm 12. Depending upon which of the spools 31, 31 is driven, pin 34 is received in the one or the other end of slot 12*a*. It will be noted that the pin 13 on actuating lever 8 is adjacent to the center of slot 12*a* whereby the resilient element 9 retains the member 34 in either end of the slot unless the rocker arm is moved with a force greater than that of resilient member 9. The ends 12*b*, 12*c* of rocker arm 12 are bent into a plane at right angles to the latter's main plane and are formed with sharp edges adapted to engage with the teeth of ratchet wheels 32, 33, respectively. Thus, ends 12*b*, 12*c* constitute a pair of pawls for causing rotation of spool 30 or 31 depending upon the position of rocker arm 12, i.e. in which end of slot 12*a* the pin 34 is located. In addition, pawls 12*b*, 12*c* may also cooperate with one arm of three-armed locking levers 35, 36, respectively, which latter are pivotally mounted on respective pins or pivot axles 37, 38 supported by the carrier 2. Arms 35*a*, 36*a* of respective locking levers 35, 36 are formed as lock pawls for the ratchet wheels 32, 33, respectively. In Fig. 1, lock pawl 36*a* is shown in engagement with the teeth of right-hand ratchet wheel 33 and thus permits stepwise advance of the latter only in the clockwise direction by the end portion 12*c* of rocker arm 12. Arm 35*b* of locking lever 35 is connected with one terminal of a helical spring 39 whose second terminal is anchored in a suitable lug forming part of carrier 2. A similar coil spring 40 is anchored at the right-hand side of carrier 2 and is connected with the arm 36*b* of locking lever 36. Springs 39, 40 constantly tend to pivot levers 35, 36 in such directions as to move respective lock pawls 35*a*, 36*a* into engagement with the teeth of ratchet wheels 32, 33, respectively. The third set of arms 35*c*, 36*c* forming part of respective locking levers 35, 36 is urged by springs 39, 40 against the bent end portions 12*b*, 12*c* of rocker arm 12. Depending upon the position of member 12, one of ratchet wheels 32, 33 and hence one of spools 30, 31 is released by the pawls 12*b*,

35*a* or 12*c*, 36*a* to permit unwinding of the ribbon 29 from the released spool onto the other spool which latter, at such times, is positively driven either by pawl 12*b* or 12*c* and is prevented from rotation in opposing direction by one of lock pawls 35*a*, 36*a*.

Carrier 2 further supports a pair of pivot pins 41, 42 swingably mounting sensing elements or feelers 43, 44, respectively. Feeler 43 is constantly biased in anticlockwise direction by a resilient element 45 operating between its arm 43*c* and the arm 2*a* of carrier 2. A similar resilient element 46 operates between arm 44*c* of feeler 44 and the right-hand arm 2*b* of the carrier. Arms 43*a*, 44*a* are bent at right angles from the general planes of respective feelers 43, 44 and extend between the upper and lower flanges of spools 30, 31, respectively to hold the latter in proper position on respective shafts 18, 19. Arms 43*b*, 44*b* of respective feelers 43, 44, too, are bent from the latter's general planes and bear against portions of ribbon 29 between spool 30 and deflecting roller 27 on the one hand, and between spool 31 and the right-hand deflecting roller 28 on the other hand. The arms 43*c*, 44*c* of feelers 43, 44, respectively, may engage with suitably shaped portions on the ends 12*b*, 12*c*, respectively, of rocker arm 12. Feelers or sensing elements 43, 44 constitute means for reversing the direction in which ribbon is advanced between spools 30 and 31.

The means for lifting or lowering spools 30, 31 with or relative to carrier 2 in order to bring a differently colored strip of ribbon 29 into contact with the types on type carriers 5*a* are not shown as they may be of any suitable design. It is preferred to bring about changes in the color of impression caused by a multi-colored ribbon by lifting or lowering the entire assembly inclusive of carrier 2 relative to the longitudinal axis of paper roller 5.

The improved ribbon guiding, feeding and reversing apparatus operates as follows:

It is assumed that the mechanism is installed in a calculating machine and that a selected key of the latter is depressed to move the corresponding type carrier 5*a* against the mantle of paper roller 5 from its full-line position into its phantom-line position 5*a*'. Rod 20 is moved at the same time in a direction away from the roller 5, reference being had to Fig. 1, to pivot the actuating lever 8 in clockwise direction about the stud 6. This movement of lever 8 causes swinging movements of levers 16 and 17 in anticlockwise direction and simultaneous movements of respective guide bars 21, 22 in a direction toward the paper roller 5. The bars 21, 22 are guided by pins 24, 25 sliding in slots 21*a*, 22*a*, respectively, in such manner that they move toward each other while advancing toward the member 5. In other words, guide bars 21, 22 describe slight angular movements in clockwise and anticlockwise direction, respectively, due to the specific configuration of their respective slots 21*a*, 22*a*. This causes movement of deflecting rollers 27, 28 into their phantom-line positions 27', 28', respectively, simultaneously with the movement of a selected type carrier 5*a* into its phantom-line position 5*a*'. The advance of deflecting rollers 27, 28 toward the paper roller 5 prevents stretching or expansion of ribbon 29 because the shortest distance from spool 30 to spool 31 and vice versa over the deflecting rollers remains unchanged. When the key of calculating machine controlling a selected type carrier 5*a* is released, the mechanism of calculating machine moves rod 20 in a direction toward the paper roller 5 thus causing simultaneous return movement of all elements constituting the ribbon guide and feeding means back into their position shown in full and broken lines in Fig. 1. It will be seen that the portion of ribbon 29 between deflecting rollers 27, 28 describes a back-and-forth movement from phantom-line position 29' immediately adjacent to the mantle of paper roller 5 into the full-line position at a selected distance from the paper roller without, however, being subjected to any stretching because of such back-and-forth movement.

As before mentioned, rocker arm 12 is held by spring 9 in such position that one end of its closed slot 12*a* receives the sliding pin 34. In Fig. 1, the pin is received in the left-hand end of slot 12*a*. Thus, when the actuating lever 8 is swung about stud 6, rocker arm 12 moves from left to right as the spring 9 prevents movements of pin 34 in its slot 12*a*, whereby the pawl-shaped end 12*c* engages with a tooth of ratchet wheel 33 and rotates the latter in clockwise direction to cause advance of ribbon 29 from supply spool 30 onto the take-up spool 31. Lock pawl 36*a* of locking lever 36 prevents rotation of ratchet wheel 33 in anticlockwise direction while the braking spring 11 (see Fig. 3) prevents excessive unwinding of the ribbon from the drum of otherwise freely rotatable feeding or supply spool 30. This arrangement causes the ribbon 29 to remain under requisite tension.

While the ribbon 29 is being fed from spool 30 to be stored in stepwise fashion on the drum of take-up spool 31, feeler or sensing element 43 performs a stepwise angular movement about its pivot axle 41 in clockwise direction against the force of spring 45. This angular movement is brought about by the tensioned ribbon 29 whose inclination between the drum of spool 30 and the periphery of deflecting roller 27 changes as the diameter of annular supply of ribbon on the drum of spool 30 diminishes. The ribbon 29 acts against the arm 43*b* of feeler 43 and causes the latter to pivot into such position in which its arm 43*c* positively engages with the end portion or pawl 12*b* of rocker arm 12 to thus prevent the latter from following rocking movements of actuating lever 8 under the influence of rod 20. This brings about movement of pin 34 from the left-hand end into the right-hand end of V-shaped closed slot 12*a*. The first half of such movement of pin 34 occurs against and the other half with the help of the force accumulated in spring 9 which latter then retains pin 34 in the right-hand end of slot 12*a* until the ribbon 29 is unwound from spool 31 and the hook-shaped arm 44*c* of feeler 44 engages with the right-hand end or pawl 12*c* of rocker arm 12. The position of parts when the pin 34 is in the right-hand end of slot 12*a* is illustrated in Fig. 2. The pawl 12*b* at the left-hand end of rocker arm 12 is now in operative engagement with ratchet wheel 32 and advances the latter in stepwise fashion whenever one or more type carriers 5*a* are moved toward the paper roller 5, as is also shown in Fig. 2. A comparison of Fig. 1 with Fig. 2 will show that the three-armed lever 36 whose arm or lock pawl 36*a* was in engagement with the teeth of ratchet wheel 33 while the latter was rotated by pawl 12*c* of rocker arm 12 is removed from said ratchet wheel simultaneously with movement of pin 34 from the left-hand end into the right-hand end of slot 12*a*, this being due to the engagement of arm 36*c* with the pawl 12*c*. On the other hand, pawl 12*b* engaging with hook-shaped arm 35*c* of lever 35 causes the latter's lock pawl or arm 35*a* to move into locking position with respect to the teeth of left-hand ratchet wheel 32. This completes the switching over of reversing mechanism for ribbon 29 and the latter is thereupon fed from spool 31 to be taken up in stepwise fashion by the left-hand spool 30.

The novel ribbon guiding, feeding and reversing means is capable of a great number of modifications within the spirit and scope of the present invention. One modification is shown somewhat schematically in Fig. 4. The main actuating lever 8 is articulately connected with a modified lever 116 which latter is formed with a closed slot 116*a* for reception of pin 114 carried by member 8. The arm 116*b* of lever 116 is formed with an open slot 116*c* which receives the slide pin 117*b* on arm 117*a* of a second lever 117. Thus, the latter, corresponding functionally to member 17 of Figs. 1 to 3, need not be directly connected with the main actuating lever 8 but may perform its rocking movements about shaft 19

under the influence of lever **116** when the latter is pivoted by main actuating lever **8**.

While it is possible, in a manner analogous to that shown in Figs. 1 to 3, to connect levers **116**, **117** with a pair of guide bars corresponding to deflecting-roller-supporting elements **21**, **22**, the latter may be replaced by a pair of two-armed guide levers **148**, **149** which are shown in Fig. 4. Lever **116** is formed with a second arm **116***d* having an open slot or recess **116***e* for reception of a pin **148***b* carried by arm **148***a* of guide lever **148**. The latter is pivotable about a pivot axle **124** carried by the arm **2***a* of carriage **2** (shown only partially and in phantom lines for the sake of clarity) and includes a second arm **148***c* on which the deflecting roller **27** for the ribbon **29** is mounted. Lever **116** pivots about shaft **18** which also supports the spool **30** and certain other elements analogous to those described in connection with Figs. 1 to 3 but not shown in Fig. 4.

The arm **117***c* of lever **117** is formed with an open slot **117***d* for reception of a pin **149***b* carried by the arm **149***a* of guide lever **149**. The latter pivots about an axle **125** mounted on the arm **2***b* of the carrier and is formed with a second arm **149***c* supporting the right-hand deflecting roller **28**. When the bar **20** is moved in a direction away from paper roller **5**, lever **8** causes levers **116**, **117** to move deflecting rollers **27**, **28** and hence the ribbon **29** into their respective phantom-line positions **27'**, **28'** and **29'**. Pin **34** and lever **8** are then in phantom-line positions **34'** and **8'**, respectively. Other component parts, save for the spool **31** and those mentioned hereinbefore, are not shown in Fig. 4 as they are analogous with and serve the purposes of parts described in connection with Figs. 1 to 3.

Both embodiments of my invention permit convenient insertion of a plurality of paper sheets or of relatively thick cards or the like into the space between the mantle of paper roller **5** and the ribbon **29** without the danger that the inserted material would take up any ink from the ribbon during such insertion. The novel arrangement also permits very clean impressions on the inserted sheets or cards due to the forward movement of ribbon **29** whenever one or more keys are depressed without, however, bringing about undue stretching of the ribbon.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

1. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a pair of spaced deflecting means in contact with the ribbon intermediate said paper roller and said spools; a pair of articulatable guide means for supporting said deflecting means; and a connection between said mechanism and each of said guide means for articulating the latter in such manner that the deflecting means are moved toward each other and toward said paper roller when at least one of said type carriers is moved toward said paper roller.

2. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced pivot pins connected with said member; a pair of spaced guide bars each having an elongated closed slot receiving one of said pivot pins; a deflecting roller mounted on each of said guide bars in the proximity of said paper roller with said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; and means for articulately connecting each of said guide bars with said mechanism in such manner that said guide bars slide toward said paper roller when at least one of said type carriers is moved toward the paper roller, the configuration of said slots being such that the guide bars are moved toward each other simultaneously with their movement toward said paper roller whereby the tension between said deflecting rollers and the ribbon remains unchanged.

3. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced levers each articulately supported on said supporting member and each having an arm extending toward said paper roller; a deflecting roller mounted on each of said arms, said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; and an articulate connection between each of said levers and said mechanism for moving said arms toward each other and toward said paper roller when at least one of said type carriers is moved toward the paper roller, the movement of said levers being such that the tension between said deflecting rollers and said ribbon remains unchanged.

4. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced pivot pins connected with said member; a pair of spaced guide bars each having an elongated closed slot receiving one of said pivot pins; a deflecting roller mounted on each of said guide bars in the proximity of said paper roller with said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; a pair of levers each articulately connected with one of said guide bars and pivotally mounted on said supporting member; an actuating lever pivotally carried by said supporting member and articulately connected with each of said levers; and an articulate connection between said mechanism and said actuating lever for rocking the latter when at least one of said type carriers is moved toward said paper roller whereby said guide bars are actuated by the respective levers to slide toward said paper roller, the configuration of said slots being such that the guide bars move toward each other simultaneously with their movement toward said paper roller to maintain the tension between said deflecting rollers and the ribbon unchanged.

5. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced first levers each articulately supported on said supporting member and each having an arm extending toward said paper roller; a deflecting roller mounted on each of said arms, said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; an actuating lever pivotally carried by said supporting member; a pair of

second levers each articulately connected with said actuating lever and each articulately connected with one of said first levers; and an articulate connection between said actuating lever and said mechanism for rocking the actuating lever when at least one of said type carriers is moved toward said paper roller whereby the arms of said first levers are moved toward each other and toward said paper roller to maintain the tension between the deflecting rollers and the ribbon unchanged.

6. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced first levers each articulately supported on said supporting member and each having an arm extending toward said paper roller; a deflecting roller mounted on each of said arms, said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; an actuating lever pivotally carried by said supporting member; a pair of second levers articulately connected with each other, each articulately connected with one of said first levers, and one thereof articulately connected with said actuating lever; and an articulate connection between said mechanism and said actuating lever for rocking the actuating lever when at least one of said type carriers is moved toward the paper roller whereby the arms of said first levers are moved toward each other and toward said paper roller to maintain the tension between the deflecting rollers and the ribbon unchanged while advancing the ribbon into close proximity of the paper roller.

7. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; a pair of spaced pivot pins connected with said member; a pair of spaced guide bars each having an elongated closed slot receiving one of said pivot pins; a deflecting roller mounted on each of said guide bars in the proximity of said paper roller with said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; and means for articulately connecting each of said guide bars with said mechanism in such manner that said guide bars slide toward said paper roller when at least one of said type carriers is moved toward the paper roller and that the guide bars slide away from the paper roller when the type carriers are moved away from said last mentioned roller, the configuration of said slots being such that the guide bars are moved toward each other simultaneously with their movement toward said paper roller and away from each other simultaneously with their movement away from the paper roller whereby the tension between said deflecting rollers and the ribbon remains unchanged.

8. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a supporting member; ribbon feeding means connected with said supporting member and comprising a pair of pawls, a pair of ratchet wheels each connected for rotation with one of said spools, and a rocker arm connected with said pawls in such manner that one of the latter is in contact with one of said ratchet wheels when the other pawl is distant from the other ratchet wheel; a pair of spaced pivot pins connected with said member; a pair of spaced guide bars each having an elongated closed slot receiving one of said pivot pins; a deflecting roller mounted on each of said guide bars in the proximity of said paper roller with said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; and means for articulately connecting each of said guide bars and said rocker arm with said mechanism in such manner that said guide bars slide toward said paper roller when at least one of said type carriers is moved toward the paper roller, the configuration of said slots being such that the guide bars are moved toward each other simultaneously with their movement toward said paper roller whereby the tension between said deflecting rollers and the ribbon remains unchanged.

9. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each of which is anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a pair of spaced deflecting rollers in contact with the ribbon intermediate said paper roller and said spools at a distance from said paper rollers; a pair of articulatable guide members each supporting one of said deflecting rollers; and a connection between said mechanism and said guide members for articulating the latter in such manner that the deflecting rollers are moved toward each other and toward said paper roller when at least one of said type carriers is moved toward said paper roller, and that the deflecting rollers are moved away from each other and away from the paper roller when the type carriers are moved away from the paper roller, the movements of the deflecting rollers being such that the tension of the ribbon remains unchanged.

10. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each of which is anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a substantially U-shaped supporting member having a pair of arms each extending from one of said spools toward said paper roller; a pair of pivot pins each connected with one arm of said supporting member intermediate one of said spools and the paper roller; a pair of guide bars each having an elongated closed slot receiving one of said pins; a deflecting roller mounted on each of said guide bars in the proximity of said paper roller with said ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide bars; a main actuating lever rockably mounted on said supporting member and articulately connected with each of said levers; and means for connecting the actuating lever with said mechanism in such manner that said last mentioned lever is rocked simultaneously with movements of said type carriers toward and away from the paper roller, the rocking movements of the actuating lever being such that said slots slide along said pins together with said guide bars and with said deflecting members toward said paper roller when at least one type carrier moves toward the paper roller, and away from the paper roller when the type carriers move away from the paper roller, the configuration of said slots being such that the deflecting rollers move toward each other and toward said paper roller or away from each other and away from the paper roller in response to rocking movements of said actuating lever.

11. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for mov-

ing said type carriers, a pair of spaced spools, and a ribbon having two ends each of which is anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a substantially U-shaped supporting member having a pair of arms each extending from one of said spools toward said paper roller; a pair of first levers each pivotably mounted on one of said arms and each having an arm extending toward said paper roller; a deflecting roller mounted on each of said last mentioned arms with the ribbon passing from one of said spools about one of said deflecting rollers toward and about the other deflecting roller and to the other spool; a pair of second levers each pivotable mounted on said supporting member, articulately connected with each other and each articulately connected wtih one of said first levers; a main actuating lever rockably mounted on said supporting member and articulately connected with one of said second levers; and a connection between said mechanism and said actuating lever, the apparatus operating in such manner that, when at least one of said type carriers is moved toward the paper roller the actuating lever is rocked in a direction to pivot said second levers and said first levers whereby to move the deflecting rollers toward each other and toward the paper roller, and when the type carriers are moved away from the paper roller the actuating lever is rocked in a direction to cause movements of the deflecting rollers away from each other and away from the paper roller, the pivotal movements of said first levers being such that the tension between the ribbon and said deflecting rollers remains unchanged.

12. In a machine of the character described having a paper roller, a plurality of type carriers movable toward and away from the roller, and a mechanism for moving the type carriers, a ribbon guiding and feeding apparatus which comprises, in combination: a supporting member; a pair of spaced shafts on said member; a spool rotatably mounted on each shaft; a ratchet wheel connected for rotation with each spool; a pair of guide means articulately mounted on said suporting member and each extending toward the roller; a deflecting member mounted on each of said guide means in the proximity of the roller; a ribbon having an end anchored in each of said spools, extending about said deflecting members and defining a plurality of convolutions at least on one of said spools; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide means; an actuating lever mounted on said supporting member and articulately connected with said levers; an operative connection between said mechanism and said actuating lever for rocking the latter when said type carriers are moved toward and away from the roller; a rocker arm defining a pair of pawls and a substantially V-shaped slot having two ends; a pivot pin mounted on said actuating lever and extending into said slot; resilient means connected with said supporting member and with said rocker arm for constantly urging the pin into one end of said slot whereby one of said pawls engages with one of said ratchet wheels; and a pair of sensing elements pivotally mounted on said suporting member, each sensing element comprising a first arm in contact with the ribbon passing between one spool and one deflecting member and between the other spool and the other deflecting member, respectively, and a second arm adapted to engage with the rocker arm when the respective sensing element is pivoted by the ribbon acting against its first arm as the number of said convolutions on one of said spools is reduced, the apparatus operating in such manner that, when at least one type carrier is moved toward the roller the actuating lever pivots said levers and the latter pivot said guide means to move the deflecting members toward each other and toward the roller, the actuating lever also moving the rocker arm whereby one of said pawls engages with the respective ratchet wheel and rotates one of said spools in stepwise fashion to take up the ribbon from the other spool and, when the number of convolutions on the other spool is reduced the secon arm of the respective feeling element engages with said rocker arm to move the latter along said pin a distance from one to the other end of said slot against the force of said resilient means whereby the other of said pawl engages with the other ratchet wheel and turns the respective spool in reverse direction.

13. In a machine of the character described having a paper roller, a plurality of type carriers movable toward and away from the roller, and a mechanism for moving the type carriers, a ribbon guiding and feeding apparatus which comprises, in combination: a supporting member; a pair of spaced shafts on said member; a spool rotatably mounted on each shaft; a ratchet wheel connected for rotation with each spool; a pair of guide means articulately mounted on said supporting member and each extending toward the roller; a deflecting member mounted on each of said guide means in the proximity of the roller; a ribbon having an end anchored in each of said spools, extending about said deflecting members and defining a plurality of convolutions at least on one of said spools; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide means; an actuating lever mounted on said supporting member and articulately connected with said levers; an operative connection between said mechanism and said actuating lever for rocking the latter when said type carriers are moved toward and away from the roller; a rocker arm defining a pair of pawls and a substantially V-shaped slot having two ends; a pivot pin mounted on said actuating lever and extending into said slot; resilient means connected with said supporting member and with said rocker arm for constantly urging the pin into one end of said slot whereby one of said pawls engages with one of said ratchet wheels; a second pair of levers pivotally mounted on said supporting member each adjacent to one of said spools, each of said last mentioned levers having a first arm engaging with the rocker arm, a second arm defining a lock pawl and so located as to engage with the ratchet wheel engaged by the pawl of said rocker arm, and a spring biased third arm; and a pair of sensing elements pivotally mounted on said supporting member, each sensing element comprising a first arm in contact with the ribbon passing between one spool and one deflecting member and between the other spool and the other deflecting member, respectively, and a second arm adapted to engage with the rocker arm when the respective sensing element is pivoted by the ribbon acting against its first arm as the number of said convolutions on one of said spools is reduced, the apparatus operating in such manner that, when at least one type carrier is moved toward the roller the actuating lever pivots said first mentioned levers and the latter pivot said guide means to move the deflecting members toward each other and toward the roller thereby maintaining the tension of the ribbon unchanged, the actuating lever also moving the rocker arm whereby one of said first mentioned pawls and one of said lock pawls engages with the respective ratchet wheel and the one first mentioned pawl rotates one of said spools in stepwise fashion to take up the ribbon from the other spool and, when the number of convolutions on the other spool is reduced the second arm of the respective feeling element engages with said rocker arm to move the latter along said pin a distance from one to the other end of said slot against the force of said resilient means whereby the other of said first mentioned pawls and the other of said lock pawls engages with the other ratchet wheel and the other first mentioned pawl turns the respective spool in reverse direction.

14. In a machine of the character described having a paper roller, a plurality of type carriers movable toward and away from the roller, and a mechanism for moving the type carriers, a ribbon guiding and feeding apparatus which comprises, in combination: a supporting member;

a pair of spaced shafts on said member; a spool rotatably mounted on each shaft; a ratchet wheel connected for rotation with each spool; a pair of guide means articulately mounted on said supporting member and each extending toward the roller; a deflecting member mounted on each of said guide means in the proximity of the roller; a ribbon having an end anchored in each of said spools, extending about said deflecting members and defining a plurality of convolutions at least on one of said spools; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide means; an actuating lever mounted on said supporting member and articulately connected with said levers; an operative connection between said mechanism and said actuating lever for rocking the latter when said type carriers are moved toward and away from the roller; a rocker arm defining a pair of pawls and a substantially V-shaped slot having two ends; a pivot pin mounted on said actuating lever and extending into said slot; resilient means connected with said supporting member and with said rocker arm for constantly urging the pin into one end of said slot whereby one of said pawls engages with one of said ratchet wheels; and a pair of spring biased sensing elements pivotally mounted on said supporting member, each sensing element comprising a first arm in contact with the ribbon passing between one spool and one deflecting member and between the other spool and the other deflecting member, respectively, a second arm adapted to engage with the rocker arm when the respective sensing element is pivoted by the ribbon acting against its first arm as the number of said convolutions on one of said spools is reduced, and a third arm for holding the respective spool on its shaft, the apparatus operating in such manner that, when at least one type carrier is moved toward the roller the actuating lever pivots said levers and the latter pivot said guide means to move the deflecting members toward each other and toward the roller, the actuating lever also moving the rocker arm whereby one of said pawls engages with the respective ratchet wheel and rotates one of said spools in stepwise fashion to take up the ribbon from the other spool and, when the number of convolutions on the other spool is reduced the second arm of the respective feeling element engages with said rocker arm to move the latter along said pin a distance from one to the other end of said slot against the force of said resilient means whereby the other of said pawls engages with the other ratchet wheel and turns the respective spool in reverse direction.

15. In a machine of the character described having a paper roller, a plurality of type carriers movable toward and away from the roller, and a mechanism for moving the type carriers, a ribbon guiding and feeding apparatus which comprises, in combination: a U-shaped supporting member having a pair of arms extending toward said roller; a pair of spaced shafts on said member; a spool rotatably mounted on each shaft; a ratched wheel connected for rotation with each spool; a pair of guide means each articulately mounted on one arm of said supporting member and each extending toward the roller; a deflecting member mounted on each of said guide means in the proximity of the roller; a ribbon having an end anchored in each of said spools, extending about said deflecting members and defining a plurality of convolutions at least on one of said spools; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide means; an actuating lever mounted on said supporting member and articulately connected with said levers; an operative connection between said mechanism and said actuating lever for rocking the latter when said type carriers are moved toward and away from the roller; a rocker arm defining a pair of pawls and a substantially V-shaped slot having two ends; a pivot pin mounted on said actuating lever and extending into said slot; resilient means connected with said supporting member and with said rocker arm for constantly urging the pin into one end of said slot whereby one of said pawls engages with one of said ratchet wheels; and a pair of spring biased sensing elements pivotally mounted on said supporting member, each sensing element comprising a first arm in contact with the ribbon passing between one spool and one deflecting member and between the other spool and the other deflecting member, respectively, and a second arm adapted to engage with the rocker arm when the respective sensing element is pivoted by the ribbon acting against its first arm as the number of said convolutions on one of said spools is reduced, the apparatus operating in such manner that, when at least one type carrier is moved toward the roller the actuating lever pivots said levers and the latter pivot said guide means to move the deflecting members toward each other and toward the roller, the actuating lever also moving the rocker arm whereby one of said pawls engages with the respective ratchet wheel and rotates one of said spools in stepwise fashion to take up the ribbon from the other spool and, when the number of convolutions on the other spool is reduced the second arm of the respective feeling element engages with said rocker arm to move the latter along said pin a distance from one to the other end of said slot against the force of said resilient means whereby the other of said pawls engages with the other ratchet wheel and turns the respective spool in reverse direction.

16. In a machine of the character described having a paper roller, a plurality of type carriers movable toward and away from the roller, and a mechanism for moving the type carriers, a ribbon guiding and feeding apparatus which comprises, in combination: a supporting member; a pair of spaced shafts on said member; a spool rotatably mounted on each shaft; a ratchet wheel connected for rotation wtih each spool; resilient braking means operating between said supporting member and each of said ratchet wheels; a pair of guide means articulately mounted on said supporting member and each extending toward the roller; a deflecting member mounted on each of said guide means in the proximity of the roller; a ribbon having an end anchored in each of said spools, extending about said deflecting members and defining a plurality of convolutions at least on one of said spools; a pair of levers pivotally mounted on said supporting member and each articulately connected with one of said guide means; an actuating lever mounted on said supporting member and articulately connected with said levers; an operative connection between said mechanism and said actuating lever for rocking the latter when said type carriers are moved toward and away from the roller; a rocker arm defining a pair of pawls and a substantially V-shaped slot having two ends; a pivot pin mounted on said actuating lever and extending into said slot; resilient means connected with said supporting member and with said rocker arm for constantly urging the pin into one end of said slot whereby one of said pawls engages with one of said ratchet wheels; and a pair of sensing elements pivotally mounted on said supporting member, each sensing element comprising a first arm in contact with the ribbon passing between one spool and one deflecting member and between the other spool and the other deflecting member, respectively, and a second arm adapted to engage with the rocker arm when the respective sensing element is pivoted by the ribbon acting against its first arm as the number of said convolutions on one of said spools is reduced, the apparatus operating in such manner that, when at least one type carrier is moved toward the roller the actuating lever pivots said levers and the latter pivot said guide means to move the deflecting members toward each other and toward the roller, the actuating lever also moving the rocker arm whereby one of said pawls engages with the respective ratchet wheel and rotates one of said spools in stepwise fashion to take up the ribbon from the other spool and, when the

number of convolutions on the other spool is reduced the second arm of the respective feeling element engages with said rocker arm to move the latter along said pin a distance from one to the other end of said slot against the force of said resilient means whereby the other of said pawls engages with the other ratchet wheel and turns the respective spool in reverse direction.

17. In a machine of the character described having a paper roller, a plurality of type carriers adapted to move toward and away from said roller, a mechanism for moving said type carriers, a pair of spaced spools, and a ribbon having two ends each of which is anchored in one of said spools, a ribbon guiding apparatus which comprises, in combination: a pair of spaced deflecting rollers in contact with the ribbon intermediate said paper roller and said spools at a distance from said paper roller; a supporting member; a pair of articulatable guide members mounted on said supporting member and each supporting one of said deflecting rollers; and an articulate connection between said mechanism and said guide members for articulating the latter in such manner that the deflecting rollers are moved toward each other and toward said paper roller when at least one of said type carriers is moved toward said paper roller, and that the deflecting rollers are moved away from each other and away from the paper roller when the type carriers are moved away from the paper roller, the movements of the deflecting rollers being such that the tension of the ribbon remains unchanged.

No references cited.