July 9, 1935. H. L. SHALLCROSS 2,007,729

TYPEWRITER RIBBON INKING MACHINE

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Fig. 9.

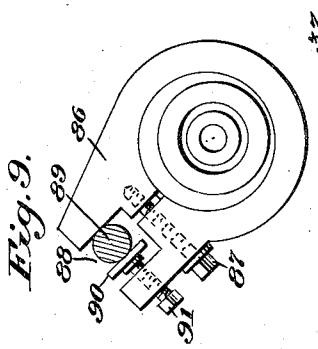

Fig. 1.

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TYPEWRITER RIBBON INKING MACHINE

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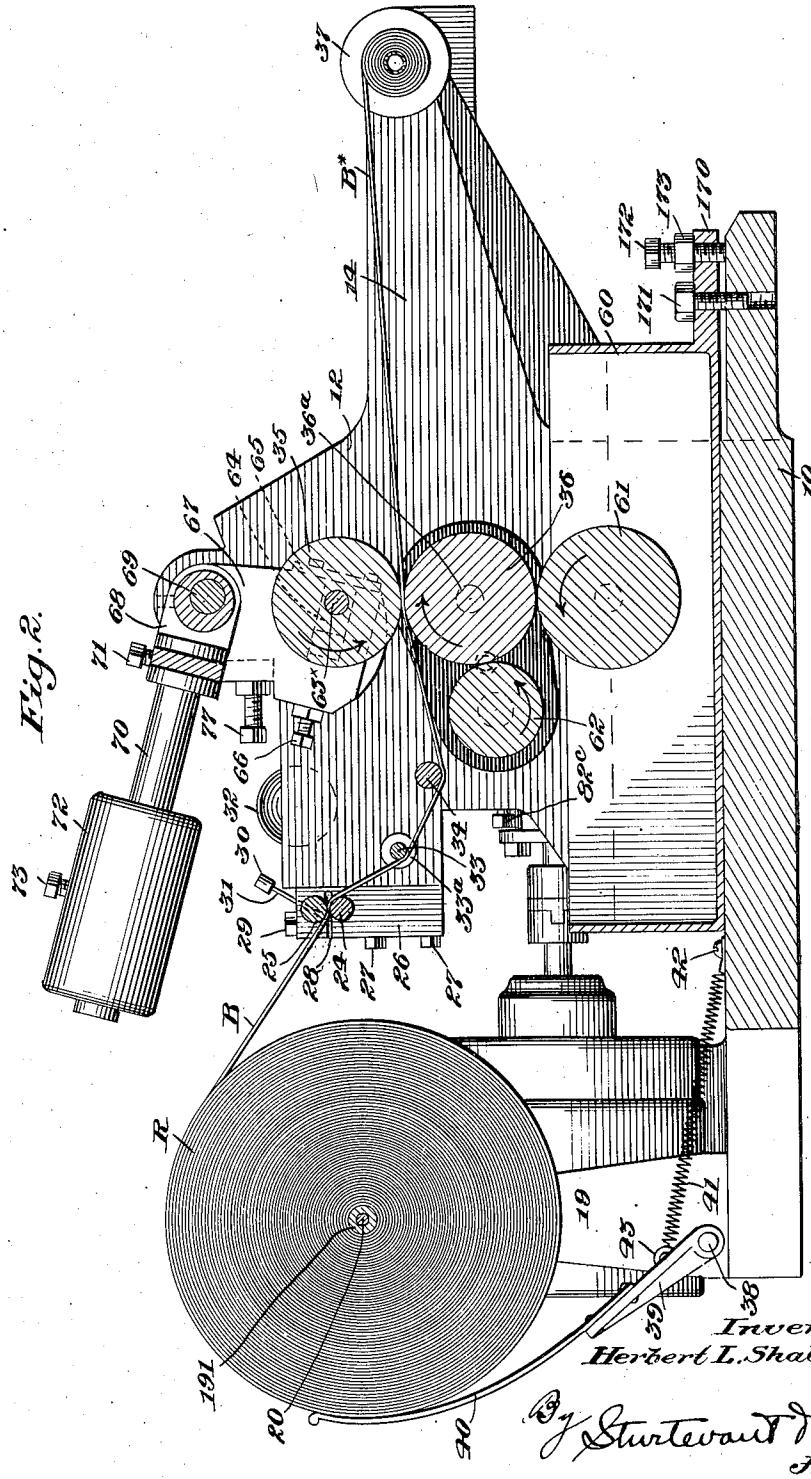
Fig. 2.



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TYPEWRITER RIBBON INKING MACHINE

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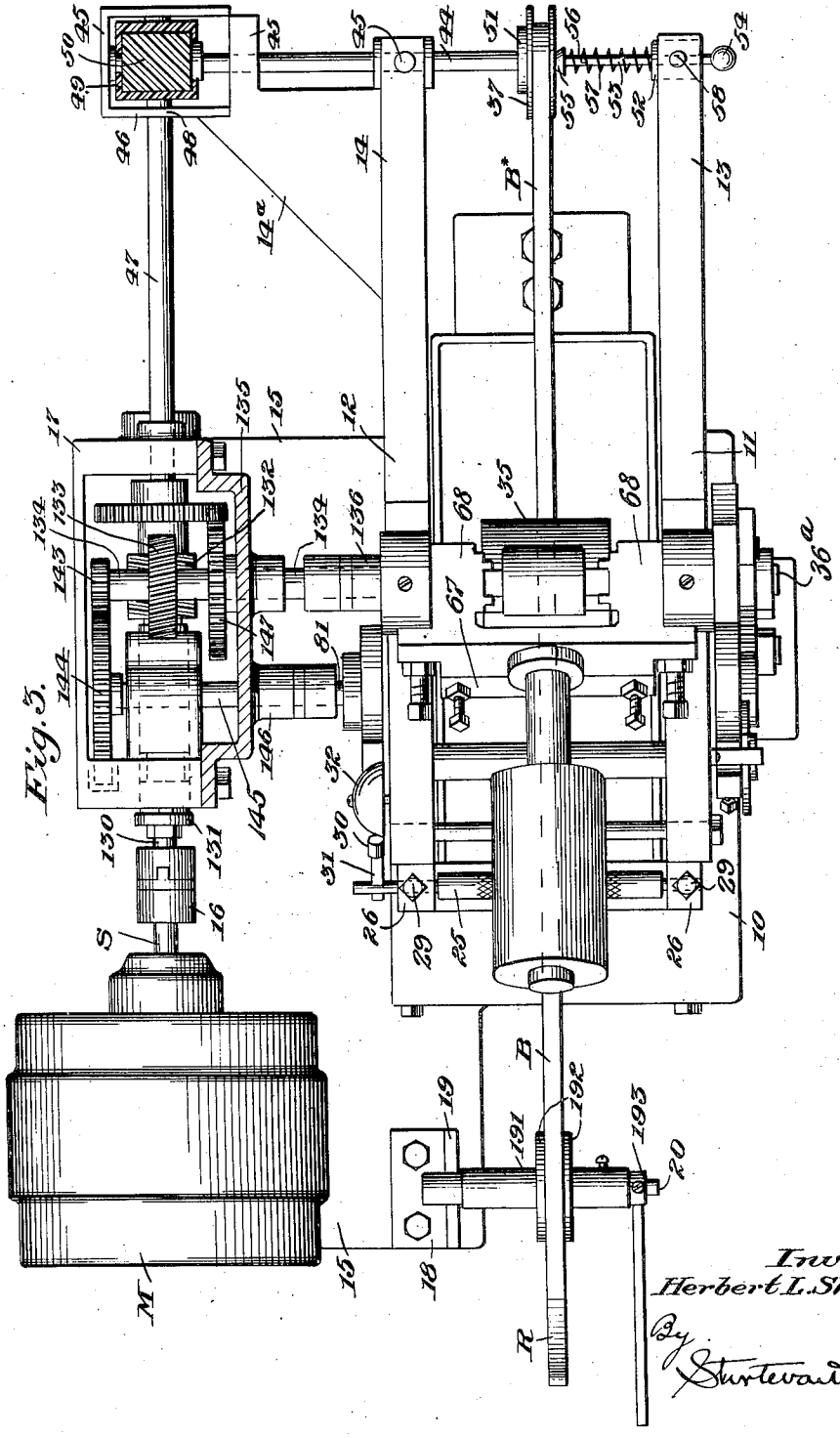

Fig. 5.

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TYPEWRITER RIBBON INKING MACHINE

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Fig. 4.

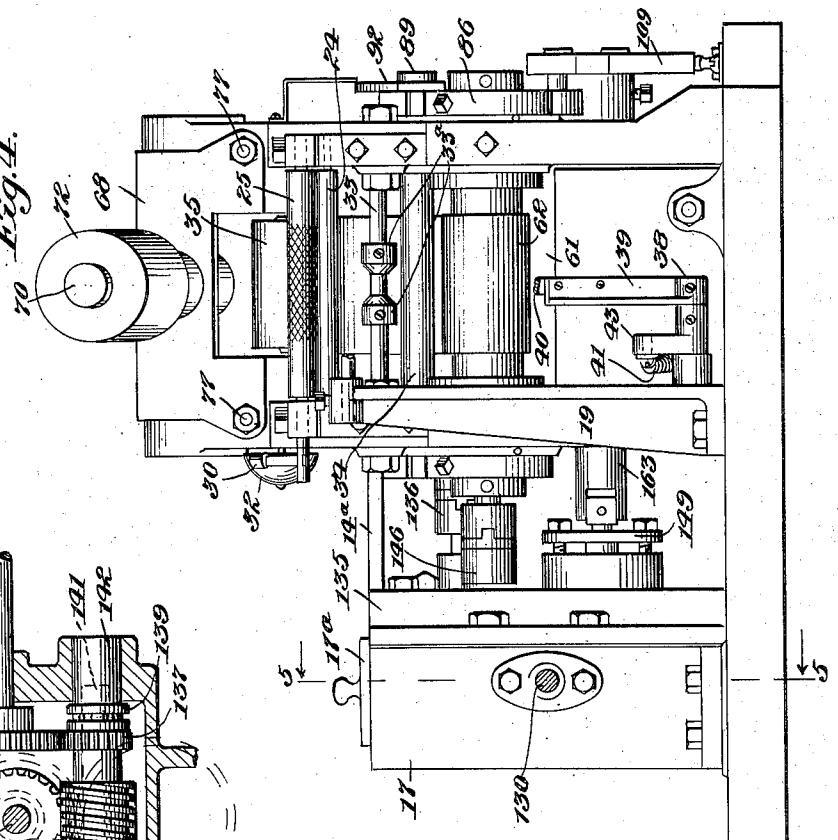


Fig. 5.

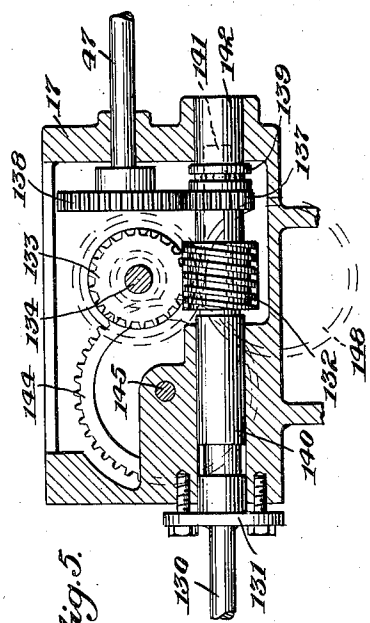
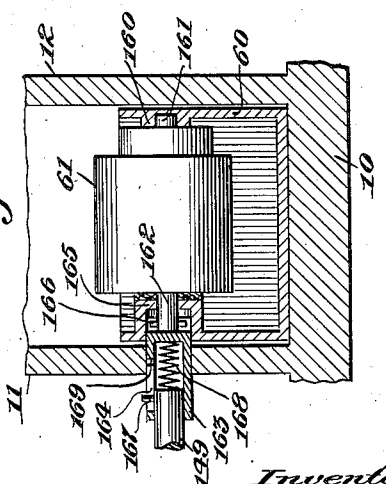


Fig. 6.



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TYPEWRITER RIBBON INKING MACHINE

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Fig. 7.

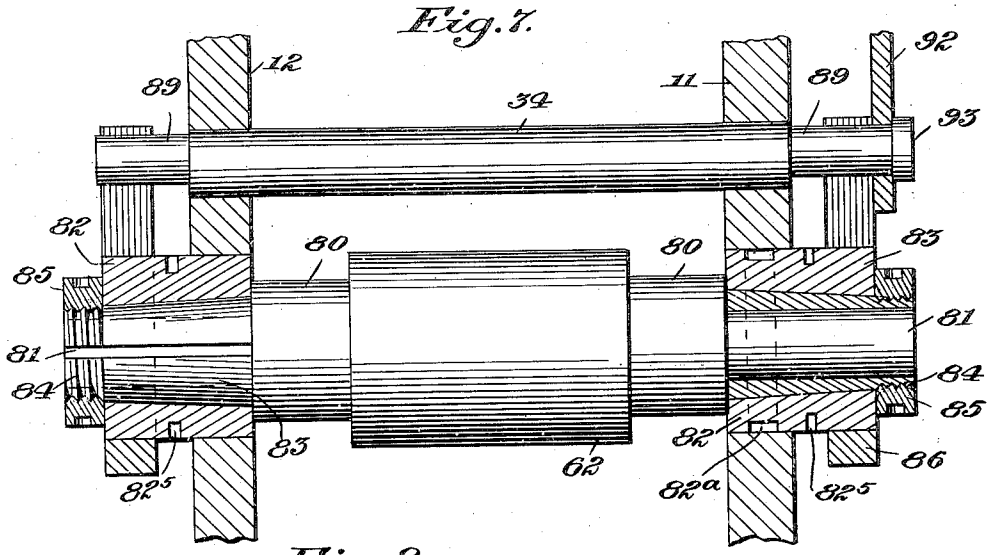


Fig. 8.

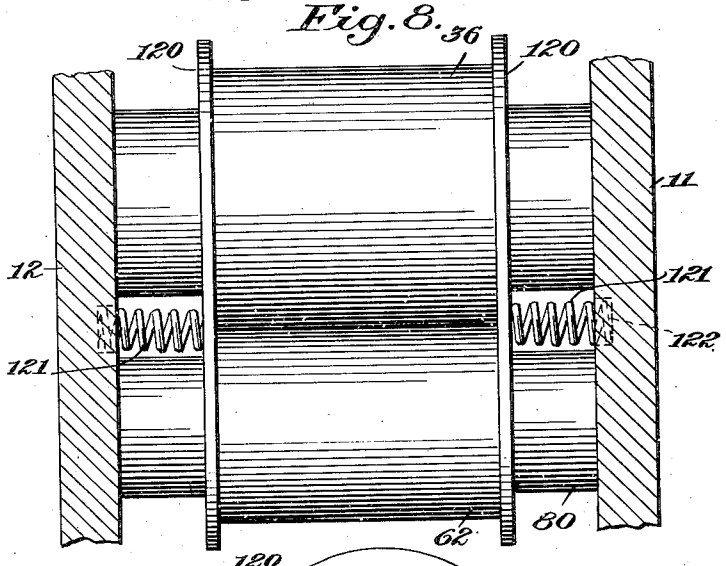
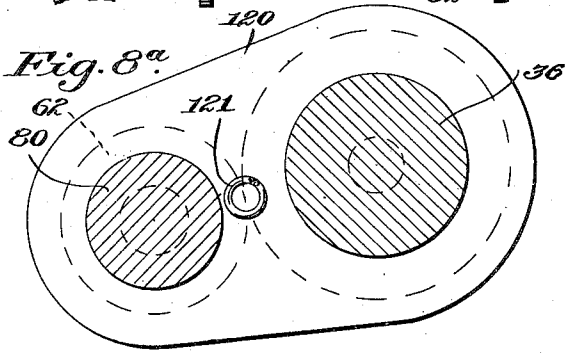


Fig. 8a.



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TYPEWRITER RIBBON INKING MACHINE

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Fig. 13.

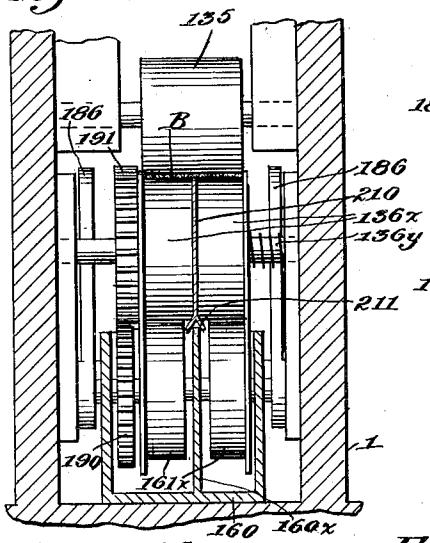


Fig. 10.

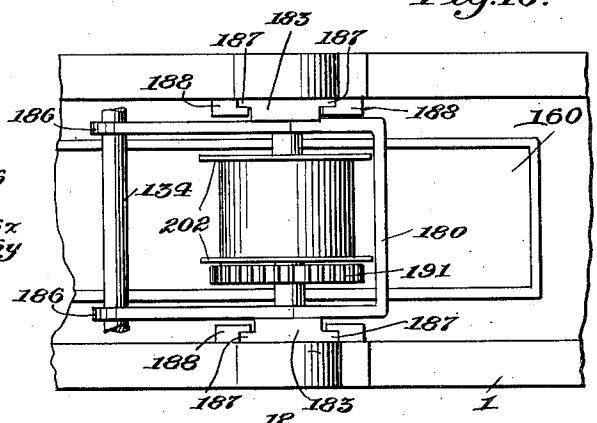


Fig. 12.

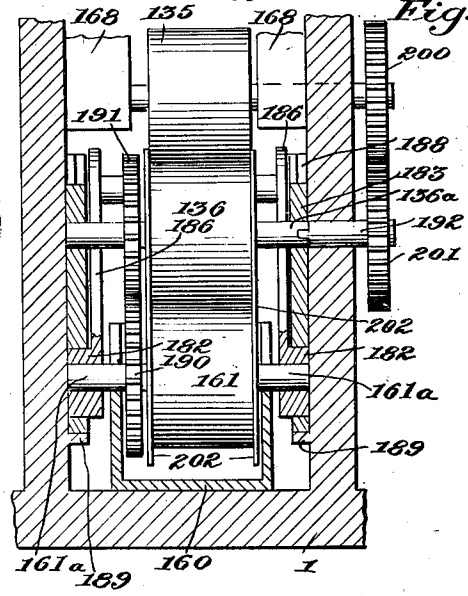


Fig. 11.

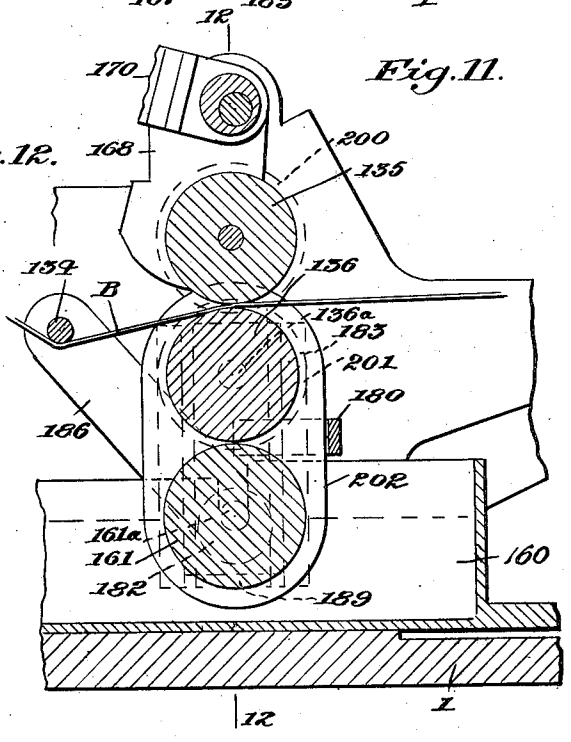
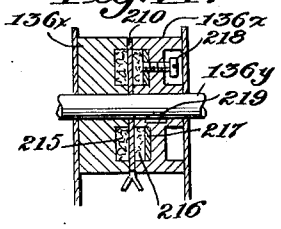


Fig. 14.



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Patented July 9, 1935 2,007,729

UNITED STATES PATENT OFFICE

2,007,729

TYPEWRITER RIBBON INKING MACHINE

Herbert L. Shallcross, Philadelphia, Pa., assignor to The Shallcross Company, Philadelphia, Pa., a corporation of Delaware

Application August 14, 1929, Serial No. 385,883

10 Claims. (Cl. 91—50)

This invention relates to certain improvements in ribbon inking machines.

It has heretofore been proposed to provide a long, narrow tape with ink in various manners, the tape thereafter being employed in a typewriter by the transmission of its ink under type impression to a piece of paper. In most such processes, it has been attempted to apply an indefinite quantity of ink to the ribbon: and thereafter to force out the excess of ink by squeezing or wringing the ribbon. Such squeezing and wringing has caused a compression of the fibres, which later hinders the proper delivery of ink from the ribbon: and weakens it by the bending at acute angles.

According to the present invention, a carefully regulated and predetermined quantity of ink is delivered to the tape; and the tape itself is not compressed, but merely is guided in engagement with the ink delivering roll. Means are provided for carefully regulating the quantity of ink to be delivered to the ribbon: and for guiding the ribbon with respect to the inking roll.

Means further are provided for stopping the machine after the inking of a pre-determined length of ribbon.

A further feature of the invention is the provision of means for indicating the passage of a knot or splice of the tape through the machine. It will be understood that high grade ribbons must be free from knots or splices from end to end, and that ribbons having such knots and splices are lower quality and sold separately.

A particular feature of the invention is the provision of take-up means for winding the inked ribbon, by which the spool to receive the ribbon is easily and quickly inserted in and removed from the machine as needed, so that the capacity in output of the machine is maintained at a maximum.

Another feature of the invention is the provision of a brake on the feed spool for the ribbon which is self-adjusting according to the quantity of tape on the supply roll.

Another important feature of the invention is the provision of micrometric adjustments for the regulating system which determines the quantity of ink to be applied to the tape.

Another feature of the invention is the provision of an ink fountain which may be leveled within the machine: and which may be withdrawn and replaced without disassembly of the machine: even though the ink supply or feed roll is located within this tank.

Another feature of the invention is the provision of self-alining couplings between the power mechanism and the inking system so that the parts may be operated at high speed without irregularities caused by vibration.

A further feature of the invention is the provision of end plates or guides alongside of the ink carrying rollers for preventing the accumulation of ink on the end surfaces of these rollers and the later delivery irregularly to the ribbon.

Another feature of this invention is the provision of inking rolls in sets whereby it is possible to carefully aline the inking and stripping rolls at the factory: and to insert and replace these in the machine without the necessity of adjustment by a skilled mechanic: in particular so that this may be done in short order or quick time when it is desired to change from ink of one color to ink of another.

A further feature of the invention is the provision of means whereby two-color ribbons may be manufactured in the same machine frame and by the same major elements as are employed for the purpose of ribbons of a single color.

With these objects in view, illustrative examples of the invention are set forth on the accompanying drawings, in which:

Figure 1 is a side elevation of a ribbon inking machine.

Fig. 2 is a longitudinal vertical section through this machine.

Fig. 3 is a plan view of the machine, with the cover of the transmission housing removed to show the connections.

Fig. 4 is an end elevation of the machine from the said roll, this roll and the motor being removed for greater clearness.

Fig. 5 is a section on the line 5—5 of Fig. 4, through the transmission box in a vertical plane along the axis of the motor shaft and the take-up shaft.

Fig. 6 is a transverse section through the machine showing the driving connection for the ink feed roll.

Fig. 7 is a detail in section showing the mounting for the strip roll and the adjacent adjustment shaft.

Fig. 8 is a vertical sectional view showing the inking roll, the supply feeding roll therefor and the controlling plates at the ends of said rolls.

Fig. 8*a* is a view partly in section and partly in side elevation showing said rolls and one of said plates.

Fig. 9 is a detail in side elevation showing the means for adjusting the position of the stripper roll.

Fig. 10 is a plan of a portion of the machine, showing a modified form in which the rolls are mounted in independent brackets.

Fig. 11 is a view of the form of Fig. 10, in a vertical section through the machine at right angles to the axis of these rolls.

Fig. 12 is a transverse vertical section of the device of Fig. 10.

Fig. 13 is a section corresponding to Fig. 12, but of a further modified form for the presentation of ribbons in two colors.

Fig. 14 is a detail diametral section through the ink applying roll.

The ribbon inking machine according to this invention comprises a base upon which is supported an ink fountain and a plurality of rollers which receive between them a blank tape which, during its passage over and between these rollers, receives a measured coating of ink, and then passes to a reeling device. An electric motor is mounted upon the base for the purpose of positively driving the various rollers in timed relation to each other. Means are provided for obtaining a very precise and accurate regulation of the thickness of the layer of ink which is to be deposited upon the blank ribbon, and for determining the amount and direction of the pressure to be exerted upon the ribbon.

In the drawings, the heavy base plate 10 is provided with the upstanding side standards 11, 12, which in turn have the projecting arms 13, 14 thereon to support the take-up device. On a lateral offset portion 15 of the base is mounted the electric driving motor M, which by means of a driving shaft S and the alining joint 16 drives a transmission gearing contained within a casing 17 which is supported rigidly upon the offset portion 15 of the base.

Fastened rigidly to the base is a clamping plate 18 having a supporting standard 19 which at its upper end carries a shaft 20 to receive a roll of blank ribbon, which is intended to be delivered into the machine to be inked thereon. The preferred construction of the feed roll drum includes a shaft 20 supported on the standard 19 at the feeding end of the machine. A rotatable drum 191 is loosely journaled on this shaft 20 and is of sufficient weight and diameter so that the irregularities of distribution of weight in the roll of blank ribbon will not appreciably affect the center of gravity of the whole. This drum has the collars 192 thereon which are adjustable along the length of the drum so that the ribbon, no matter of what width, may be supported in the machine. The stop collar 193 is employed to prevent longitudinal movement of the feed drum and to restrict it to such a position that it accurately controls the delivery of the ribbon into the machine.

Likewise rigidly mounted on the base 10 is an electric switch E preferably of the tumbler type with the actuating tumbler 21 projecting from the top thereof. This switch is connected by the lead wires 22 with the electric motor switch and the current mains 23, so that this switch controls the supply of current to the motor.

The blank ribbon B as it comes from the reel R is caused to pass above a small freely rotatable guide roller 24 which is journaled by its reduced ends on the side standards 11 and 12 of the machine frame: the ribbon B likewise passes beneath a freely journaled guide roller 25 which has a knurled surface from the portion thereof adjacent which the ribbon passes, and is received at its reduced ends likewise in journal openings on the side standards 11 and 12. The side standards are preferably made with the plates 26 having these journal openings therein and adapted to be rigidly mounted upon the side standards 11 and 12 proper by the connecting bolts 27. A gash 28 in each of these plates 26, between the two journal openings, permits a resilient adjustment of the distance between the openings and hence between the surfaces of the rollers 24 and 25, by the tightening of a binding screw 29 which passes through the upper section of the plate 26 and is threaded into its lower portion. A bell clapper 30 is carried on a resilient arm 31 in operative relation with a gong 32 mounted on one side standard of the frame.

As the blank ribbon roll R comes from the manufacturer, it is found in practice that there are knots in the ribbon caused by unevenness in spinning the yarn from which the ribbon is made: and furthermore in making up large quantities of this ribbon it is customary to join the ends of two ribbons during the factory winding, and such a joint may occur in the middle of a roll. Such knots and joints are unsatisfactory in a high class ribbon; and it is desirable to exclude ribbon lengths containing such knots and joints. With the high speed employed with the present machine, it is not possible to have a visual inspection of the ribbon in its passage through the machine. In order to afford an indication when such a ribbon has been produced, the knot alarm above referred to is employed. The distance between the roller 25 and the lower roller 24 is such that the normal thickness of ribbon will pass freely therethrough without causing a rotation of the upper roller 25: but when an increased thickness occasioned by a knot or joint occurs, a slight jamming occurs between the rollers, so that the upper roller is set into rotation and its clapper 30 is brought against the bell 32, thus giving an alarm to the operator that an imperfect ribbon is now being prepared. Usually the gong will sound several times. When the ribbon then being prepared is cut off, it is stored separately and may be sold as a second grade ribbon.

The ribbon blank in its passage under the transverse bolt 33 is guided by the adjustable sleeves 33*a* which may be clamped at any desired positions along the length of the bolt. The inward ends of these sleeves 33*a* are made conical, and are normally separated a distance equivalent to the width of the ribbon blank B, and thus constitute an alining guide for guiding a ribbon blank B into the machine at a proper and predetermined position with respect to the side standards 11, 12.

The blank ribbon now passes beneath the micrometer adjustment shaft 34 and between the top or pressure roll 35 and the inking roll 36, and is inked therebetween and finally passes as inked ribbon B* to be taken up on the spool 37.

In order to maintain an even tension upon the ribbon during its passage through the machine, irrespective of the relative diameter of the supply roll R, a brake shaft 38 is mounted upon the base plate or on the standard 19, and has journaled thereon a sleeve having a radially projecting finger 39 which carries secured thereto a curved brake plate 40 which is pressed against the surface of the roll R by means of the coil spring 41 which is connected at one end to a screw 42 on the base 10, and at its other end to an eye 43 carried on an arm which is located on the shaft 38 and is adjustable in its angular relation to the finger 39, so that by a change of this relation, the relative tension of the coil

spring 41 may be varied, and thereby its braking effect produced at the end of the plate 40.

The take-up system comprises the spool 37 which is preferably the spool to be later employed in packaging and marketing the ribbon. A driven take-up shaft 44 is journaled in bearing 45 at the end of the arm 14 of the side standard 12 and its offset bracing lug 14a. It is preferred to provide a housing 46 at the end of the bracing lug 14a to receive the end of the shaft 44, and the end of a take-up driving shaft 47 which is journaled at one end of and within the housing 17 and at its other end in a suitable bearing 48 in the housing 46.

Gears 49 and 50 are mounted respectively on each of the shafts 47 and 44, to constitute a meshed driving relation between these two shafts.

At the other end of the shaft 44 is a flat friction disk 51 which is supported in the working condition against the side of the spool 37 and drives the same by its frictional engagement therewith. In the outer end of the arm 13 of the standard 11 is located a sleeve 52 which has a spindle 53 mounted for free sliding movement therein. The spindle 53 has an enlarged head 54 to prevent its passage out of the sleeve 52 and to serve as a handle. A conical head 55 is carried in extension of the spindle 53 by a suitable joint 56. A compression spring 57 is coiled about the spindle 53 and the shank of the conical head 55, and tends to force the conical head 55 away from the adjacent end face of the bushing 52. The bushing 52 is held in its adjusted position in the arm 13 by a set screw 58. This driving plate 51 and the spring actuated cooperating spindle head 55 automatically center the spool, and it is found in practice that ribbons of any width up to say two inches may be wound in this device without any alteration of the parts: and that by a very simple change of parts, ribbons up to the full width of the inking roll may be prepared.

The operation of removing one spool 37 when filled and replacing it by an empty spool is as follows: The enlarged head 54 is seized by the fingers and retracted against the compression of the spring 57 whereby the conical head 55 is withdrawn from the central hole in the just filled spool 37, and the latter may be moved either upwardly or downwardly across the face of the friction disk 51. The inked ribbon B* is then cut at a proper point, and the filled spool 37 removed from the machine. The free end of the cut ribbon B* is then fastened to the hollow central shaft of a new spool 37 in the usual manner, and the spool is placed flat against the friction disk 51, and the spindle 53 is allowed to return until the conical head 55 is received within the hole at the opposite face of the new spool 37. During the rotation of the shaft 44 which is coaxial with the spindle 53, it will be noted that the spool tends to aline itself concentrically with these shafts.

The ink fountain 60 has an ink feeding roll 61 journaled therein as will be described hereinafter, which is positively rotated during the operation of the mechanism. An inking roll 36 is journaled in the frame for rotation in a clockwise direction as shown by the arrow in Fig. 2. An ink cut-off roll 62 is likewise adjustably journaled in the frame in the manner to be described hereinafter, and serves to reduce and regulate the thickness of the film of ink retained upon the periphery of the inking roll 36 at the point at which the latter encounters the ribbon blank B to be inked.

In order to press the ribbon blank into firm contact with the inking roll so that it will absorb the ink thereon, there is employed the top or pressure roller 35 which is freely rotatable about a shaft 63x which is journaled in the bearing blocks 64 shown in dotted lines in Fig. 2. These bearing blocks are held fixedly in a predetermined position by the backing plates 65 and the adjusting screw 66 at the end of each of two arms 67, which latter are connected rigidly together by a stirrup 68 and thereby held for rocking movement about a shaft 69. An outstanding arm 70 is secured to the stirrup 68 by the screw 71: and in turn carries the weight 72 which may be adjusted and secured in any desired position along this arm 70, for the regulation of the effective pressure of the roller 35, by means of a set screw 73.

The position of the top or pressure roller 35 may be accurately adjusted with respect to the inking roll 36. The shaft 69 may be accurately adjusted at either side independently, so that the axis of the roll 63x may be set accurately in parallelism to the axis of the inking roll 36, whereby a uniform pressure is delivered along the full width of the machine. By a simultaneous adjustment of the two ends of the shaft 69, the axis of the roll 35 may be adjusted with respect to its distance from the rocking axis of the arms upon the frame. The lower the axis of the shaft 63x with respect to the frame, the further to the left this axis will be presented with respect to a vertical plane passing through the plane of the axis of the inking roll 36, and the less will be the pressure exerted upon the ribbon. Further, the top roll 35 may be maintained at a predetermined point by the adjusting screw 77. This regulation has been found possible in this machine, and permits the pressing of the ribbon blank against the inking roll 36 to a carefully regulated extent calculated upon the thickness and quality of the ribbon blank and of the ink to be applied. The pressure is never sufficient to crush the fibres of the ribbon, and hence a uniform inking of the ribbon at the periphery of the roller 36 is assured.

In order to adjust the exact position of the axis of the shaft 63x with respect to the axis of the roll 36, the shaft 69 for the upper roll rocker is journaled in the eccentric bushings 74 which are tightly received in the upper portions of the side standards 11, 12 of the machine, and which by their relative rotation will change the exact position of the roll 35 with respect to the roll 36. In order to hold these eccentric bushings 34 in their allotted positions, the set screws 75 are located in the side standards 11, 12. In order to adjust the exact position of the upper roll 35 in its working condition, the stirrup member 68 has the downwardly depending webs 76 to receive the adjusting screws 77 which are threaded therein and may be held in adjusted position by the lock nuts 78. When the roll 35 is in its working position, as shown in Figs. 1 and 2, the free end of the adjustable screw 77 is received against a vertical upstanding portion 79 of the respective side standards 11, 12 and the roll is thereby prevented from rocking any further in a counterclockwise direction toward the right in Figs. 1 and 2: in this way if the axis of the roll 35 is slightly to the left of a vertical plane through the axis of the roll 36, the pull of the ribbon can not cause the roll 35 to move to the right and thereby exert a greater pressure upon the ribbon during its passage through the machine.

As shown in Fig. 7, the ink cut-off roll 62 has the reduced shoulders 80 at its ends, terminating in the still further reduced journal spindles 81. This ink cut-off roll is preferably of the same length as the inking roll, so that a smooth, substantially uniform film of ink is maintained on the latter. A bearing bushing 82 is journaled in the wall of each standard 11, 12: the bearing bushings 82 each have a conical central cavity, and are preferably made of iron. Mounted within this conical cavity is a split conical journal bushing 83, preferably of brass, and having the threads 84 at its small end. The clamping nut 85 is disposed in meshing engagement with the threads at the end of each of the journal bushings 83, and by rotation of this nut, it is possible to draw the conical journal bushing into the respective outer bushing 82, thereby wedging it together and into a tight but journaled bearing upon the respective reduced stub shaft 81. This construction is adapted to assure an invariable location for the axis of the shaft 81 under the conditions of working.

The bearing bushings 82 are supported against accidental removal from the side standards 11 and 12 by the peripheral grooves 82*a* formed therein, which engage with plates 82*b* which in turn are forced into these grooves by the locking screws 82*c* which are threaded into the respective side standards 11 and 12.

In order to be able to adjust the exact position of the ink cut-off roll 62 within the standard, the outer bushings 82 are formed with the axes of their conical cavities in eccentric relation to their outer peripheries, so that by a relative rotation of the bushings 82 within the respective standards 11, 12, it is possible to vary the exact position of the axis of the ink cut-off roll 62 with respect to the inking roll 36.

In order to obtain a very minute but accurate adjustment of the relative rocking movement of the outer bushing 82, an eccentric strap 86 is located about the outer end of each of them, which is split and held in clamping relation upon the end of the respective bushing 82 by a clamping screw 87. The outer end of the eccentric strap 86 is formed with a cut-out section 88, as shown in Fig 9, to receive the respective ends 89 of the spindle 34 which extends across between the side standards 11, 12 of the machine and has its central concentric portion journaled therein. The end spindles 89 are slightly offset or eccentric with regard to the central portion 34 of the spindle. A precision plate 90 is located within the cut away section 88, and is pressed tightly against the side of the respective end 89 of the spindle but not tight enough to clamp it against rotation, by means of the precision adjusting screw 91, which is threaded in one section of the bifurcated end of the eccentric strap 86.

On the outer end of the shaft 89 which projects through the side standard 11 is fixedly secured a dial disk 92 by means of a collar 93. This dial disk 92 has scale divisions at its edge which are presented in indicating relation with the finger 94 fastened to the side standard 11, to indicate the exact prevailing angular position of the spindle 34 and its ends 89. It will be understood that by a rotation of the spindles 34, 89 and their indicating dial 92, the spindle 34 turns about its own axis, and the ends 89 of this spindle are caused to move with their axes eccentric with respect to the axis of the main body of the spindle, thus pushing in one direction or the other against the strap 86 or the precision plate 90 which is held in a fixed relation with regard to the strap 86, thus causing a rotation of the outer bushing 82 within the respective side standard 11 or 12, and thus producing a graduated but minute movement of the axis of the ink cut-off roll 62, with regard to the axis of the inking roll 36, and thus regulating the free space between their peripheries, and controlling the thickness of the ink layer thereon.

During the preliminary setting up of the machine at the factory, the bushings 82 are rotated within the side standards 11 and 12 of the frame by the insertion of spanner wrenches into the sockets 82*s* in these bushings, until the axis of the stub shafts 81 and roll 62 is exactly parallel to the axis of the inking roll 36, and at a proper distance therefrom so that the micrometer adjustment will regulate closely and to a proper thickness the layer of ink on the surface of the inking roll 36. During this the nuts 85 have been employed to draw the sleeves 83 into the bushings 82; while the eccentric straps 86 are loose upon bushings 82. After this preliminary adjustment has been accomplished, the straps 86 are locked upon the bushing, and thereafter are employed to rotate the same within the side standards 11 and 12.

It may be indicated that a difference in the separations of the peripheral faces of these two rollers of the order of two ten-thousandths of an inch will determine the difference between a properly and an improperly inked ribbon.

The eccentric throw or actual eccentricity of the sleeve 83 with respect to the bushing 82, in an actually constructed machine, was one-thirty-second of an inch: and the eccentricity of the stub shaft 87 with respect to the central portion 34 of the transverse and adjusting shaft was three-sixteenths of an inch. With the usual working limit of one ten-thousandth of an inch in grinding the ink cut-off roll 62, and the inking roll 36, it was found that a uniformly inked ribbon was produced, and that an extreme accuracy of the adjustment was afforded.

In order to obtain an exactly uniform coating of ink over the entire surface of the inking roll 36, the two rolls 36, 62 are of the same length and fibre plates 120 are provided to fit flat against the end surfaces of these two rolls. The compression springs 121 are guided at one end in a cavity 122 in the respective side standard and at the other end are received against the respective fibre plate 120, and have their axes substantially in the line of approximate tangency of the respective rolls 36, and 62, as is more clearly set forth in Fig. 8*a*.

A counter and throw-out mechanism is provided for the purpose of measuring the length of the ribbon inked in the machine and wound upon the take-up device, and for the purpose of stopping the machine after a ribbon of predetermined length has been inked and wound up. For this purpose there is located on the end of the inking roller spindle 36*a*, which projects through side standard 11, a multilated gear 100 having a single tooth. Loosely journaled about the axis of the stud shaft 36*a* is a gear plate 101 which has journaled therein an idler gear 101*a* in meshing relation with the mutilated gear 100. An arresting pawl 102 is likewise pivoted upon the gear plate 101 and is constantly pressed in the direction of the gear 101 by the spring 103 which is supported at its other end against a lock 104 on the gear plate 101. A counting gear 105 is journaled on a suitable shaft 106 on the side frame 11. An actuator finger 107 is secured to the side of the count-

ing gear 105 by a pin 108 so that it revolves positively therewith. The counting gear 105 is in mesh with the idler gear 101. The throw-out finger 109 is pivoted by a pin 110 upon the side standard 11, and has an upper nose 111 projecting into cooperative relation with the actuating finger 107. A cavity 112 at the bottom of the throw-out member 109 fits closely about the tumbler lever 21 of the electric switch E.

The method of operation of this counting and throw out mechanism is as follows: At each revolution of the stub shaft 36a of the ink supplying roll 36, which corresponds to a delivery of a length of ribbon equivalent to the periphery of the roll, the mutilated gear 100 revolves once and moves the idler gear 101 by a predetermined amount, which in turn is communicated to the counting gear 105 as a partial rotation of the latter. By a mathematically selected relation between the periphery of the roller 36 and the number of teeth on the counting gear 105, the counting gear will be caused to make one complete revolution for the delivery of a fixed length of ribbon onto the take-up spool 37. During this revolution, the counting gear 105 will pass from the position shown in Fig. 1 back into the same position. The device in Fig. 1 is shown in the "off" position, in which the electric motor is disconnected. In other words, a fresh spool has just been inserted in the machine. If now the throw-off lever 109 be rocked in a clockwise direction about its pivot pin 110, the tumbler lever 21 will be thrown into its left hand position, and the switch will admit current to the electric motor M which will then begin to drive the mechanism and cause the feeding of the blank ribbon into and through the same, and the inking of the same and the take-up of the inked ribbon. This progresses for a sufficient length of time for the mutilated gear 100 to cause the counting gear 105 to return in its revolution to a position in which the actuating finger 107 strikes against the nose 111 of the actuating lever 109 and rocks this lever in a counterclockwise direction about its pivot pin 110, and finally causes the actuation of the tumbler lever 21 by its proper spring and the opening of the circuit to the motor at the electric switch E, whereupon the motor comes to a standstill. The inertia of the electric motor and associated parts will carry the finger 107 into the position shown, so that the switch may be closed again manually. The filled spool 37 may now be removed and a fresh one inserted in the manner indicated, and the motor again started by manual actuation of the tumbler lever 21 as before indicated.

The method of driving the rolls in proper timed relation is shown in Figs. 3 and 5. The motor M drives its shaft S and by means of a universal joint 16 actuates the driving shaft 130, which extends into the gear casing 17, and is packed, to prevent the leakage of oil from this casing, by any suitable means including the packing clamp bushing 131. The shaft 130 is journaled within the wall of the gear casing 17, and carries the worm 132 in meshing relation with the worm wheel 133 on a transverse shaft 124, which is journaled at one end in the casing 17, and at the other end in the face plate 135 of this casing. This face plate is securely bolted to the casing and forms an oil tight joint therewith. The shaft 134 extends through the face plate 135 and at its outboard end carries the universal joint 136 which couples it in driving relation to the spindle 36a of the inking roll 36. The shaft 130 likewise carries a small gear 137 in meshing relation with a gear 138 carried on the end of the shaft 47. This shaft 49 projects through the wall of the gear casing 17 and extends along the machine and serves to drive the take-up shaft 44, in the manner hereinbefore described.

The shaft 130 likewise has a ball thrust bearing 139 to take up the strain of the worm and worm gear thrust upon the shaft. A preferred form of assembly for the shaft is to have the portion 130 thereof formed with a journal section 140 which fits snugly for rotation within the wall of the gear casing 17, and which is continued by a reduced portion 141 which is received within the worm wheel 132 and the gear wheel 137, which latter are formed as sleeves therearound and are keyed thereto. The extreme end of the reduced portion 141 extends into the stud 142 and is guided thereby: this stud 142 likewise supports one portion of the race for the thrust bearing. By this assemblage, it is possible to place the worm 132 and the gear 139 within the casing 17, and then to insert the shaft 130 into its proper relation with these parts. The stud 142 is then adjusted within the casing 17.

The shaft 134 likewise carries a small gear 143 in meshing relation with a larger gear 144 which is carried on a second transverse shaft 145, likewise journaled within the casing 17, and projecting through the face plate 135 thereof and carrying a universal joint 146 so that it is in driving relation with the reduced spindle 81 at the adjacent end of the ink cut-off roll 62. A further gear 147 is secured on the end of the transverse shaft 134. The face plate 135 is hollowed out to provide for this gear, and this hollow extends downwardly to receive a further gear 148, which is shown in dotted lines in Fig. 5, and passes through a packing system represented at 149 and is in driving relation with the ink feeding roll 61, in the manner to be described hereinafter.

It will thus been that a simple and compact gear transmission is provided for delivering movement from the motor M to the various operative portions of the machine, so that these always operate in proper relation to each other. The casing 17, its face plate 135 and cover 17a contain the gears and a supply of lubricant therefor to assure protection from dirt and to prevent injury to the operator.

This method of transmission by means of universal joints permits the driving of the respective rollers in the adjusting positions, and prevents any vibrations or warping of the rolls from their predetermined and adjusted positions.

It may particularly be pointed out that in a constructed machine the inking roll 36 is about two and three fourths inches in diameter and makes seventy revolutions per minute; and the cut-off roll 62 is about one and three-fourths inches in diameter and makes forty revolutions per minute. The inking roll 36 moves and drives the ribbon, and the top roll 35 is of the same diameter and moves at the same peripheral speed therewith. The cut-off roll is positively driven at a peripheral speed which is less than that of the inking roll in the ratio of about 4 to 11. The ink feeding roll 61 is likewise positively driven and delivers a regular quantity of ink to the surface of the inking roll.

The ink fountain 60 has a blind bearing 160 formed on the inside of the face at the side opposite the gear casing 17, to receive the stub shaft 161 of the ink feeding roll 61. The shaft 162 at the opposite end of the roll passes through a

packed bearing 165 formed in the side wall of the ink fountain 60 adjacent to the gear casing 17, and carries a transverse pin 166 at its end outside of the fountain. It will be noted that the shaft 162 does not project beyond the outside face of the fountain. The shaft 149 is driven from the motor M through the transmission described above and has at its end a pin 167 which is received in the bayonet slot 164 of a sliding sleeve 163. A spring 168 is located between the end of this shaft 149 and the bottom of the recess in the sleeve 163, and tends constantly to force the sleeve toward the shaft 162. The sleeve 163 at its end adjacent the ink fountain 60 has a recess which may fit over and receive the end of the shaft 162, and has grooves therein to receive the ends of the pin 166 to form a driving relation with the shaft 162.

When the parts are in the position shown in Fig. 6, the shaft 149 is driven from the motor M and transmits its movement by the pin 167 to the sleeve 163 and the latter in turn by the pins 166 to the shaft 162 so that the ink feeding roll 161 is driven positively and at a regulated rate of speed. If it be desired to remove the ink fountain from the machine, the operator seizes the sleeve 163 and draws it toward the left in Fig. 6, thus compressing spring 168, and withdrawing the end of the sleeve from about the shaft 162 and the pins 166. A transverse extension 169 of the bayonet slot 164 permits the sleeve 163 to be rotated slightly while the shaft 149 remains stationary, so that the pin 167 will now hold the sleeve 163 against return. In this position, the end of the sleeve has been withdrawn within the wall of the side standard 11, and the ink fountain may be easily removed from between the standards by an endwise movement.

The ink fountain 60 is supported upon the bed plate 10 of the machine; at the take-up end of the machine, it has an extending lug 170 which receives loosely in an aperture thereof the clamping bolt 171 which is threaded into the base 10. An elevating bolt 172 is threaded into the lug 170 and rests against the upper surface of the base 10, and has a locking nut 173. If it be desired to raise the general ink level in the machine, the clamping bolt 171 is unscrewed a proper distance, and the elevating screw 172 is actuated after releasing its lock nut 173. When the desired ink level has been attained, the lock nut 173 is turned back to maintain this level and the clamping screw 171 is drawn tight to prevent any movement of the ink fountain within the body of the machine. In this way, a very accurate adjustment of the ink level may be obtained. It may be pointed out, however, that the volume of ink contained within the fountain 60 is usually so great that the ink feeding roll 61 will deliver a sufficient quantity to the inking rolls 36 without adjustment for a long period of time, and that owing to the employment of the micrometrically adjustable ink cut-off roll 62, this regulation of the ink fountain is not critical.

In the modified form of Figs. 10, 11 and 12, the lower ink feeding roll 161 is also employed as a stripper roll, being for this purpose provided with the extending stub shafts 161a which are received in the eccentric bushing 182 which is guided in a bracket 183. There are two journals 182, one at each end of the roller, and each is provided with a bracket: these brackets being connected together by a bridge member 180. The eccentric journals 182 have extending arms 186 for the adjustment of their annular position; these arms at the upper end being provided with the transverse shaft 134 corresponding to shaft 34 in the first form of execution, and likewise being provided at its ends with rotating means whereby to adjust the annular position of the extending levers 186.

The respective brackets 183 are provided with lateral extensions 187 received behind the guides 188 of the frame: and limited in their downward movement by the stops 189 (Fig. 12). It will be seen that by forming these guides 188 and the stops 189 in a predetermined position on the machine, it is possible to construct a series of brackets 183 which will present their rollers in proper respective positions.

The ink fountain 160 is provided with notches extending downward from its top to receive the extended ends 161a of the stub shafts. The upper or ink applying roll 136b is likewise provided with the stub shafts 136a which are journaled in the brackets 183. Each of these rollers is provided with a gear respectively 190 and 191, one stub shaft 136a being provided with a separable extension 192 by which the system may be driven from the power motor, such as M in Fig. 3. It will be understood that the shafts 136a and 192 may be separated by an endwise movement of the latter, and thereafter the bracket system with the rollers journaled therein may be lifted out of the fountain.

An upper or pressure roller 135a is employed as before with stub shafts journaled in the downwardly extending arms 168 which are journaled similarly to the arm 68 in the first notch: so that the position and distance of the roller 135a may be easily adjusted with respect to the inking roll 136b and the roll 135a is maintained in position by the weighted arm 170.

In a constructive form, the lower roller 161 was 2¾ inches in diameter, and its gear was provided with sixty teeth: the inking roll 136 was 2¾ inches in diameter, and its gear 191 had fifty teeth: while the upper roll 135 was 2¾ inches in diameter and was provided with a driving gear 200 meshing with a gear 201 on the shaft 192: each of these gears 200 and 201 having forty-four teeth.

The edge plates 202 are provided for limiting the ink at the ends of the rolls, similarly to the plates at 20 on Fig. 8.

The operation of this device is substantially the same as before.

In the form shown in Fig. 13, the brackets 183 are provided as before and the arms 186 regulate the stripping operation for the ink. In this form of the invention the ink fountain 160 is divided by a vertical partition 160x extending upward above the level of ink in the tank. A central fibre plate 210 has a bifurcated lower end 211 fitting over the wall 160x. The ink feed rolls 161x are mounted one on each side of the central partition 160x: and similarly the ink supply rolls 136x are mounted on opposite sides of the fibre plate 210.

As shown in Fig. 14, one roll 136x is fastened to the shaft 136y, and is provided on the face adjacent the plate 210 with an annular groove to receive a packing 215: while the other roll 136x has a similar annular groove for a packing 216 which is forced against the plate 210 by a metal ring 217 which is adjustable by cap screws 218. This second roll 136x has a key mounting 219 on the shaft 136y.

In this form of the device, the partition or intermediate stripping plate 210 is made very

thin, and the ink which is picked up by the respective rolls 136x is placed upon the ribbon B at opposite sides of the ribbon, but with only a small distance left between the two layers of ink, so that the slight diffusion or spreading of the ink will not cause any substantial overlapping of the inking applications. It will be noted that by this means a well regulated and uniform inking is applied to the two color ribbon.

In the forms of execution shown in Figs. 10 to 13, it will be noted that the brackets 183 and all appurtenant parts may be easily and quickly removed from the machine and replaced by new parts, and by a removal of the ink fountain 160 and the substitution of another fountain having a different color of ink with the replacement of the new bracket 183, and a mere wiping of the upper or pressure roll 135, the machine is immediately ready for the inking of ribbon in another color.

In these latter modifications the roll 161 takes up ink from the ink fountain, but by the movement of the feeding rolls 136x, the quantity of ink transferred to the rolls 136x is carefully regulated and may be determined very accurately by the rotation of the shaft 134 and its displacement in its eccentric bearings. The pressure to be applied by the roll 135 is carefully adjusted and being merely sufficient to hold the ribbon B against the inking roll 136 without crushing the fibre: this is again possible since the function of this roll is not to force off the surface ink, but merely to determine a full application and absorption of ink from the roll 136 and 136x.

It is apparent that the invention is not limited solely to the forms illustrated, but that it may be modified in many ways within the scope of the appended claims.

What is claimed as new is:

1. In a machine for inking typewriter ribbons, an ink applying roll, an upper roll to guide the ribbon to said ink applying roll, means for supporting said rolls whereby to prevent crushing of the ribbon, and means for supplying and regulating the quantity of ink carried by said applying roll, said latter means including a roller journaled in an eccentric bearing, an arm, and an eccentric bushing engaging the end of said arm and rotatable through a predetermined angle so that the position of said latter roller may be regulated positively within a limit of less than two ten-thousandths of an inch.

2. In a machine for inking typewriter ribbons, a ribbon guiding roll, an ink applying roll adjacent thereto, an ink feeding roll, an ink film regulating roll, means to pass a ribbon between the applying roll and the guiding roll, means to maintain the guiding roll at a predetermined distance from said applying roll to prevent crushing of the ribbon, and means to maintain said regulating roll at a predetermined distance from said applying roll whereby a film of ink is prepared on said feeding roll and thereby delivered to said applying roll and brought to uniform thickness and thence transferred to the ribbon.

3. In a machine for inking ribbons as in claim 2, means for adjusting said regulating roll by increments of less than two ten-thousandths of an inch whereby to determine the thickness of the ink film on said applying roll.

4. A machine as set forth in claim 2, including means for regulating the vertical and angular positions of the axis of said guiding roll with respect to the axis of said applying roll.

5. In a machine for inking typewriter ribbons, an ink applying roll, an upper roll to guide the ribbon to said ink applying roll, means for supporting said rolls whereby to prevent crushing of the ribbon, and means for supplying and regulating the quantity of ink carried by said applying roll, said latter means including a roller journalled at its ends in eccentric bearings, arms connected to said bearings, and common means for rocking said arms for adjusting said bearings simultaneously.

6. In a machine for inking typewriter ribbons, a ribbon guiding roll, an ink applying roll adjacent thereto, means to pass a ribbon between the applying roll and the guiding roll, means to maintain the guiding roll at a predetermined distance from said applying roll to prevent crushing of the ribbon, and means for delivering a film of ink of predetermined thickness onto said applying roll, said delivering means including a roll, bearings for said latter roll including eccentric members each having an extending arm, and means for simultaneously rocking said arms.

7. A machine as in claim 6, in which said rocking means includes a device operative to move the same and said eccentric members for shifting said latter roll in the delivering means toward and from said applying roll by increments of less than two ten-thousandths of an inch.

8. A machine as in claim 6, in which said rocking means includes a shaft, two eccentrics on the shaft each engaged with a corresponding arm, and a device for rocking said shaft.

9. In a machine for inking typewriter ribbons, a ribbon guiding roll, revoluble ink applying roll means adjacent thereto, means to pass a ribbon between the applying means and the guiding roll, means to maintain the guiding roll at a predetermined distance from said applying means to prevent crushing of the ribbon, a plurality of independent ink fountains, and means for delivering films of ink of predetermined thickness from each fountain to said applying means, said delivering means including an individual roll for each said fountain, bearings for said individual rolls including eccentric members, and devices for rocking said eccentric members whereby to vary the thicknesses of the ink films by increments of less than two ten-thousandths of an inch.

10. In a machine for inking typewriter ribbons, a frame, a ribbon guiding roll, an ink applying roll adjacent thereto, means to pass a ribbon between the applying roll and the guiding roll, means to maintain the guiding roll at a predetermined distance from said applying roll to prevent crushing of the ribbon, a regulating roll cooperative with said applying roll, bearings for said regulating roll including adjustment members, said frame having guides therein, and brackets mounted on said guides and supporting said applying roll and said bearings.

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