# United States Patent [19]

**Anderson et al.**

[11] **3,731,649**

[45] **May 8, 1973**


[54] **RIBBON-INKING MACHINE**


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[73] Assignee: **Westates Space-era Products Inc.,** El Monte, Calif.



[22] Filed: **June 25, 1971**

[21] Appl. No.: **156,863**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 869,465, Oct. 27, 1969, abandoned.

[52] **U.S. Cl.** .....**118/6,** 118/8, 118/33, 118/60, 118/69, 118/246, 118/259

[51] **Int. Cl.**.....**B05c 1/10**

[58] **Field of Search**.....118/246, 6, 59, 67, 118/60, 69, 33, 8, 259, 244; 226/25; 197/171



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[57] **ABSTRACT**

A ribbon-inking machine is disclosed which includes feed means for holding a ribbon so that it may be unwound from a core member, take-up means for winding a ribbon supplied by said feed means, ironing means for ironing a ribbon passing from the feed means to the take-up means and inking means for supplying ink to a ribbon passing from said feed means prior to such a ribbon being ironed by the ironing means. Preferably the inking and ironing means contact the entire width of the ribbon being processed, also the ironing means used preferably applies heat uniformly to all parts of a ribbon across its width and the inking means used preferably is capable of applying ink to a ribbon in accordance with its ability to take up ink into its internal structure.


**8 Claims, 6 Drawing Figures**

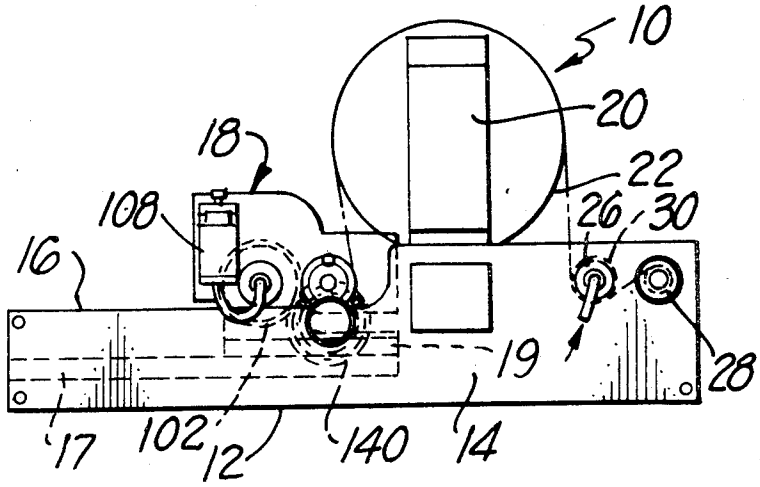


FIG. 2.

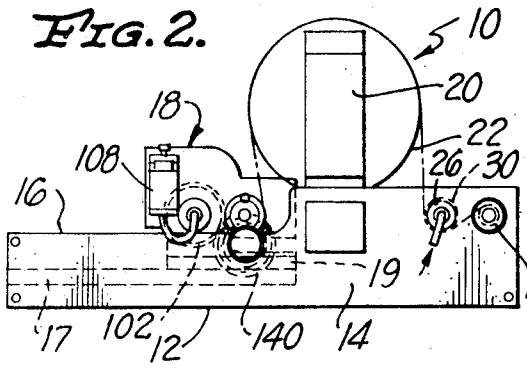



FIG. 1.

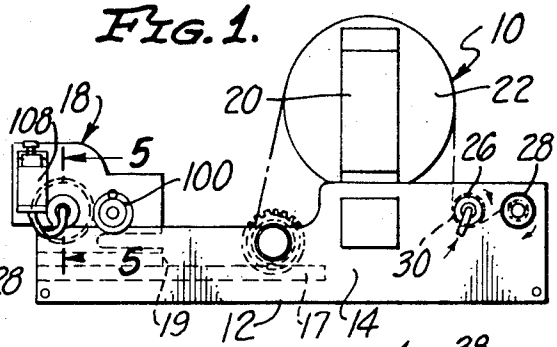



FIG. 3.

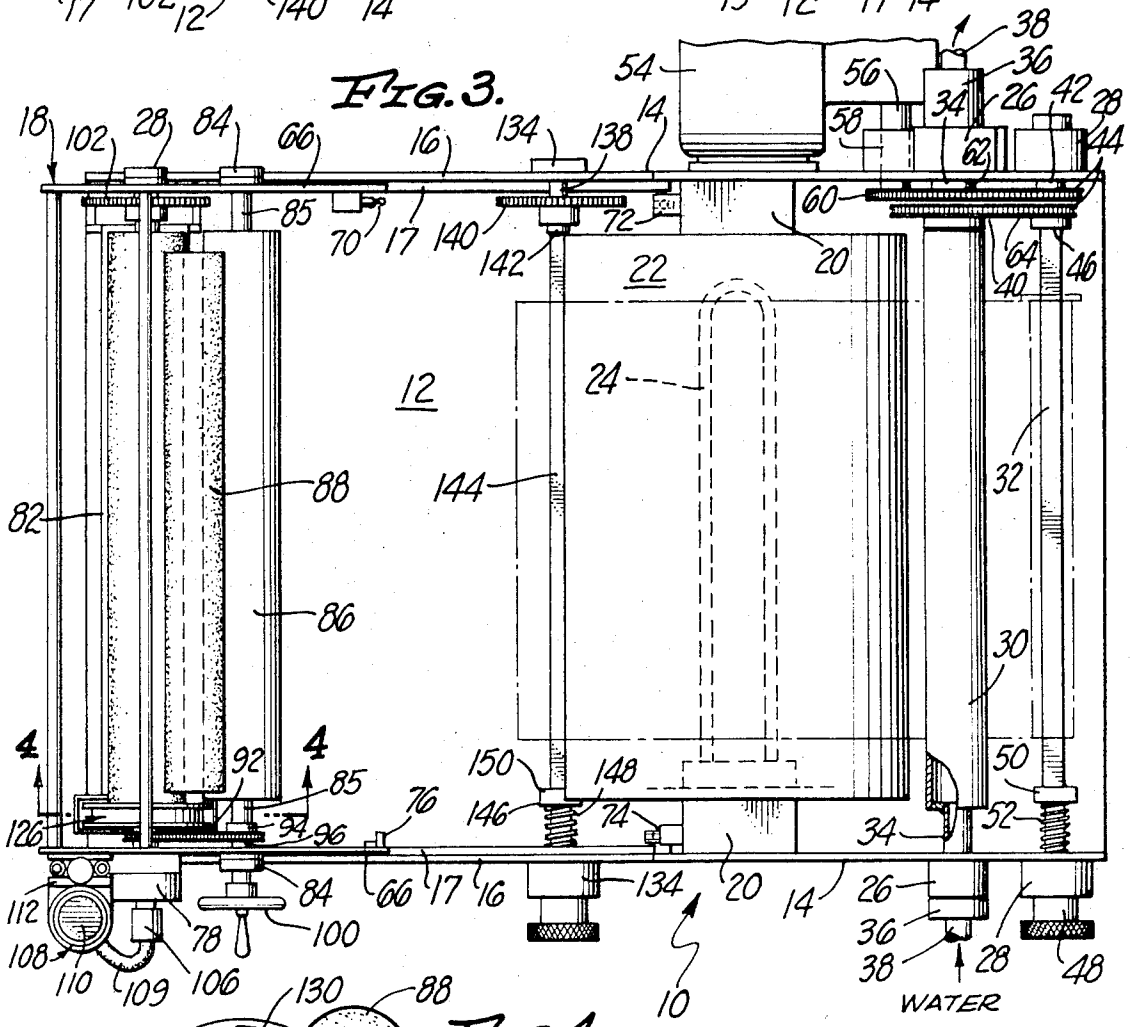
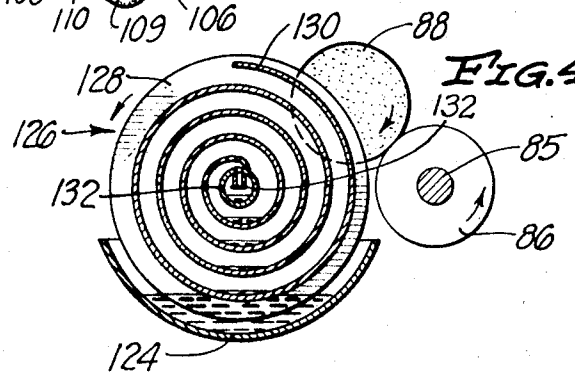



FIG. 4.




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FIG. 5.

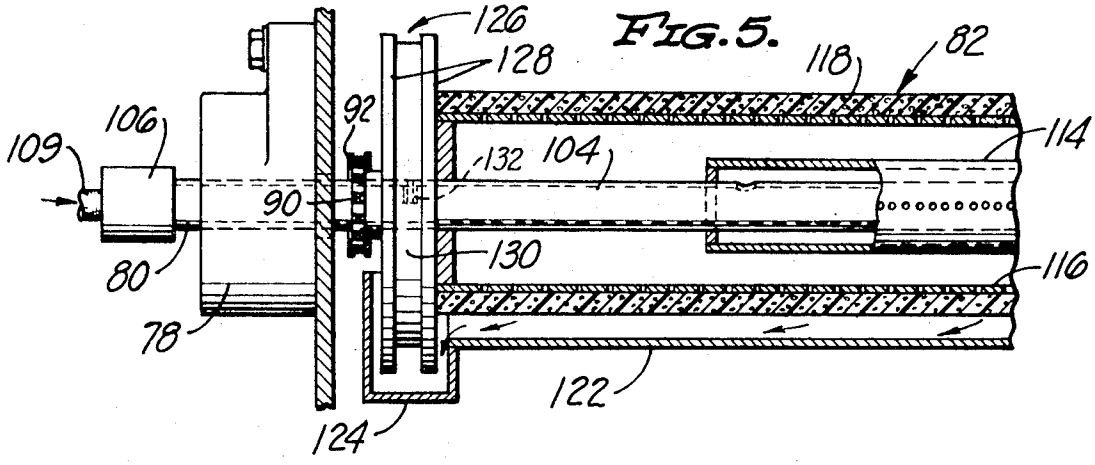
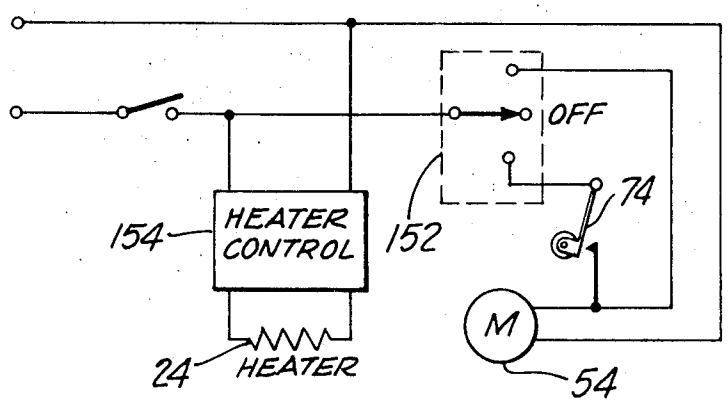



FIG. 6.




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# RIBBON-INKING MACHINE

This application is a continuation-in-part of copending Ser. No. 869,461, filed Oct. 27,1969, now abandoned.

## BACKGROUND OF THE INVENTION

Inked ribbons are commonly utilized in connection with various types of computing, calculating, addressing and related machines in order to print different indicia such as numbers, names and the like. As such ribbons are used, the ink within them becomes exhausted. Because of wear characteristics it is normally preferred that such ribbons be formed of a thermoplastic material such as nylon. As ribbons of such materials are used they tend to stretch in the areas where they are contacted most frequently. Such stretching can lead to the ribbon having an undesired shape or configuration.

As a result of these and related problems it has been conventional to discard ribbons of the type indicated after the ink supply within them has been exhausted. This is considered to be economically undesirable. However, the industry has followed this procedure of replacing used ribbons rather than rejuvinating them because of a lack of a satisfactory procedure for restoring them substantially to their initial condition.

## SUMMARY OF THE INVENTION

From this it will be seen that there is a need for a satisfactory treatment of used inked ribbons so that such ribbons may be reused. An objective of this invention is to supply this need. Still other objectives of this invention are to provide machines for treating used, inked ribbons which are relatively simple to construct, which are easily used, which are effective for their intended purpose and which are capable of giving prolonged reliable performance.

An apparatus of the invention utilizes a base which carries a ribbon feed means for holding a ribbon on a core so that it may be unwound from such a core by a ribbon take-up means for winding the ribbon on another core. In an apparatus of this invention the ribbon traveling between these two means is first contacted by an inking means which applies ink to the ribbon and then by an ironing means which irons the ribbon prior to its being wound on a core by the take-up means. A machine of this invention also preferably includes many other details and features that can be specifically indicated in this brief summary of the principal features of the invention.

## BRIEF DISCRIPTION OF THE DRAWINGS

Further details of the invention as well as the manner in which the objectives of the invention are achieved will be apparent from a careful consideration of the remainder of this specification and of the accompanying drawings in which:

FIG. 1 is a side elevational view of a presently preferred embodiment of a ribbon-inking machine in a position in which this machine may be loaded with a used ribbon upon a core;

FIG. 2 is a side elevational view corresponding to FIG. 1 showing the machine in a running position;

FIG. 3 is an enlarged top plan view of the machine shown in FIG. 1 in the position in which it is shown in FIG. 1;



FIG. 4 is a fragmentary cross-sectional view taken at line 4—4 of FIG. 3 showing a part of the construction of the machine illustrated;

FIG. 5 is a further fragmentary cross-sectional view shown in section showing a part of the construction of the machine illustrated. Those parts of this view shown in section are illustrated as they would appear if a sectional view was taken at line 5—5 of FIG. 1; and

FIG. 6 is a schematic view of the electric circuit used in the machine shown.

It will be realized that the accompanying drawings are only intended to illustrate for explanatory purposes the construction of a presently preferred embodiment or form of a machine of this invention. Other differently appearing and somewhat differently constructed machines serving the same function as the illustrated machine may be easily designed on the basis of the disclosure embodied herein through the use or exercise of routine engineering skill.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing there is shown a ribbon-inking machine **10** of this invention which has a base **12** holding or including two spaced, parallel sides **14**. These sides **14** are formed so as to include parallel edges **16** located in the same plane above the base **12**. These sides **14** carry the pot bottom portions **17** of a conventional movable drawer slide, the inside portions **19** of which are attached to a movable feed carriage **18**.

The sides **14** also include mounting brackets or standards **20** which support a drum **22** having a metal surface. Conventional electric heating elements **24** are held by the standards **20** so as to supply heat to the interior of the drum **22** during its operation so that the drum **22** and the heating elements **24** together act as an ironing means.

In the particular machine **10** illustrated the drum **22** is rigidly mounted on the standards **20** so that it does not rotate during the operation of the machine. However, this drum **22** may be made so as to rotate, although this is not preferred in accordance with the invention. When the drum **22** is rigidly supported as shown it effectively places a "drag" upon a ribbon being treated by friction so as to facilitate obtaining satisfactory results with the machine. Also when the drum **22** is rigidly mounted as shown the expense of a structure rotatably supporting it can be eliminated.

Bearings **26** and **28** are mounted on the sides **14** adjacent to the drum **22** for the purpose of carrying a cooling roller **30** and a take-up bar **32**, respectively, so that the axis of this roller **30** and the bar **32** are parallel to the axis of the drum **22**. The cooling roller **30** is hollow and includes hollow shafts **34** which projects through conventional rotary seals **36** as shown. It will be noted that these shafts **34** are used in connection with the bearing **26** for mounting purposes. These seals **36** carry tubes **38** through which water or other cooling fluid may be circulated during the operation of machine **10**. One of the shafts **34** carries a conventional sprocket **40**.

The take-up bar **32** is capable of fitting within and holding a core or spool for a ribbon so as to cause such a core or spool to rotate. It is directly connected to a bearing **28** by a shaft **42** carrying other sprockets **44**. This shaft **42** includes a nonround socket **46** into which

the bar 32 fits. The other end of this bar 32 is retained by means of a conventional plunger 48 mounted in the other of the bearings 28. This plunger 48 includes a socket end 50 which is adapted to engage and support an end of the bar 32. A conventional coil spring 52 is biased between one of the sides 14 and the end 50 so that the plunger 48 will be operative for its intended purpose. With this construction the bar 32 may be replaced by pulling on the plunger 48.

One of the sides 14 also carries a conventional gear head motor 54 from which there projects a shaft 56. This shaft 56 extends through a bearing 58 mounted on this side 14 and carries another conventional sprocket 60. Roller chains 62 connect the sprocket 60 with one of the sprockets 44; another roll chain 64 connects the other sprocket 44 with the sprocket 40. With this construction when the motor 54 is operating both the take-up bar 32 and the cooling roller 30 is rotated. Both this roller 30 and the bar 32 are rotated in the same direction; however, it will be noted that the sprocket 40 is larger than the sprockets 44. This will serve to rotate the periphery of the roller 30 at a different velocity than the bar 32.

The carriage 18 includes interconnected side plates 66 carrying the drawer slide portions 19 so that this carriage 18 may be moved to the positions as shown in FIGS. 1 and 2 of the drawing. When this carriage is moved to the running position as shown in FIG. 2 a small retaining dog or pin 70 on one of the side plates 66 engages a conventional holding detent 72 so as to lock the carriage 18 in a running position. This detent 72 is mounted upon one of the sides 14. The other of these sides carries a small micro switch 74 which is adapted to be engaged by a projection 76 on the other of the side plates 66 so as to be closed in this running position.

The side plates 66 carry bearings 78 which rotatably support shafts 80 of a composite ink feed roller 82. The construction of this roller 82 will subsequently be described in more detail. The side plates 66 also carry other bearings 84 which rotatably support shafts 85 of a ribbon roller 86. This roller 86 preferably has a metal surface so as to facilitate uniform transfer of ink to a ribbon. The two rollers 82 and 86 are mounted in this manner so that their axes are always parallel to the axes of the cooling roller 30 and the take-up bar 32. The rollers 82 and 86 are further mounted sufficiently close to one another so as to rotatably support between them an ink spreading roller 88. This spreading roller 88 is "free floating" on the two rollers 82 and 86; hence, it will roll during the operation of the machine 10 in a reverse direction to the direction in which the rollers 82 and 86 rotate.

The shaft 80 carries a sprocket 90 which is connected by roller chain 92 to another sprocket 94 mounted upon a short shaft 96. This shaft 96 is carried by a bearing 84 on one of the side plates 66. This shaft 96 carries a small hand wheel 100 which may be utilized to adjust the position of the ink feed roller 88 when a machine is not being used so as to alleviate any loss of ink from this roller. This wheel 100 may also be turned so as to spread out and distribute ink prior to the use of the machine 10. The other of the shafts 80 carries a normally driven spur gear 102.

The shaft 80 which carries the sprocket 90 is hollow and is connected to and forms a part of a hollow perforate tube 104 which extends completely across the interior of the ink feed roller 82. An end of this shaft 80 is secured to a conventional rotary seal 106 similar to the seals 36 previously described so that ink may be conveyed to the interior of the tube 104 from a conventional ink reservoir 108. In the embodiment of the invention shown this reservoir 108 consists of an inverted container such as a jar connected directly to the tube 104 by a tube 109. A mounting bracket 112 upon one of the side plates 66 is used so as to support the container 110.

The roller 82 is constructed so as to utilize a secondary tube 114 which is mounted on and spaced from the tube 104 so as to receive ink from the perforations in the tube 104. This tube 114 is also perforated as shown and is used so as to distribute the ink received by it during the rotation of the entire roller 82 and the tube 104 to the interior of a perforate cylinder 116. This cylinder 116 preferably supports and holds a somewhat resilient microporous cylindrical pad 118 of a known polymer composition. The pad 118 is of the general category used in conventional preinked type stamps which can be used to directly print an image without being separately inked each time used because of an ink storage capacity within such a pad. The particular pad 118 is of such a nature so as to have interconnecting cells so that ink can be transferred through it at what may be regarded as a controlled, metered rate. The pad 118 can be made of any material which will evenly distribute and convey ink in substantially the same manner as the material described.

During the operation of machine 10 ink is conveyed from the reservoir 108 into the tube 104 and into the tube 114 and finally into the interior of the cylinder 116 from the reservoir 108. The ink within the interior of the cylinder 116 will move out through the pad 118 so as to be transferred from it to the ink spreading roller 88. Preferably this roller 88 has a known or conventional surface to which ink will readily adhere. The ink on the roller 88 will be transferred to a significant degree to the ribbon roller 86 from which it will be applied as subsequently described. The method of causing rotation of the ink feed roller 82 and the other rollers 86 and 88 will be more fully apparent from the subsequent discussion.

In any event as the ink is transferred some ink will fall off of the ink feed roller 82. Such ink will be received in a sloping drip pan 122 located under the roller 88 and will flow to a sump 124. With the present invention ink accumulating in the sump 124 will be picked up by a spiral type of pump 126 carried by the tube 104 so as to be conveyed back into the interior of this tube.

This pump 126 includes side walls 128 of a disc-like shape between which there is an enclosed spiral wall 130 leading to a short feed tube 132 extending partially into the interior of the tube 104. This tube 132 is utilized so as to minimize any opportunity for ink draining out of the tube 104 when the machine 10 is at rest. The wheel 100 may be turned so as to position the feed roller 82 so that this tube 132 extends downwardly in such a manner that nothing can drain through it. The tube 132 also serves to prevent ink draining out of the tube 104 as the machine 10 is operated.

The machine also includes adjacent to the drum **22** but on the side of it remote from the cooling roller **30** and the take-up bar **32** adjacent to the carriage **18** aligned bearings **134** which carries a first shaft section **138**. This section **138** carries a drive spur gear **140** which is adapted to mate with the gear **102** when the carriage **18** is moved to a running position. The shaft section **138** also includes a nonround socket **142** which is adapted to receive a bar **144** corresponding to bar **32**. The end of the bar **144** remote from the shaft section **138** fits into a plunger **146** corresponding to the plunger **38** previously described. This plunger **146** is mounted in one of the bearings **134** and is loaded by means of a spring **148** bearing against one of the side plates **66** so that a head **150** of it is secured with respect to the bar **144**.

With this construction when the carriage **18** is in a position as shown in FIG. **1** the bar **144** may be easily removed by pulling on the plunger **146** so that a tube or core or spool containing ribbon to be reinked may be located upon it. Once such a winding of ribbon is located on the bar **144** this bar may be reinserted as shown. The end of such a ribbon may then be passed upwardly around the drum **22** and under the cooling roller **30** where it can be attached to a core, spool or the like located upon the take-up bar **32**. The take-up bar **32** may be removed and replaced in the same manner as the bar **144** so as to locate such a core upon it.

At this point the wheel **100** may be turned so as to uniformly distribute ink. Next, during the use of the device the carriage **18** is moved from the position shown in FIG. **1** of the drawing to a running position as shown in FIG. **2** of the drawing. When it reaches such a running position the pin **70** will be locked by the holding detent **72** so as to secure it in place. Also in this position the ribbon roller **86** will engage the ribbon being inked so as to force this ribbon out of a normal path as indicated in FIG. **1** of the drawing in phantom to a position as indicated in phantom in FIG. **2** of the drawing. The movement of the carriage **18** will also close the microswitch **74** so as to place the machine in condition for operation. Such movement will also cause the gears **140** and **102** to mate.

At this time the machine **10** is ready to operate. To achieve such operation an on-off switch **152** is closed. As shown in FIG. **5** of the drawing this will cause current to flow in parallel to a conventional thermostat **154** connected to the heating elements **24** and to flow to the motor **54**. The operation of this motor will cause rotation of the take-up bar **32**. Such rotation of the take-up bar **32** will cause the ribbon to be wound upon it from the bar **34** from the bar **144**.

As this occurs several things happen. The bar **144** will be caused to rotate. Rotation of the bar **144** will be transmitted through the gear **140** to the gear **102**. This will cause rotation of the ink feed roller **82** so that ink will move outwardly to the surface of the cylindrical pad **118**. From this surface the ink will be transferred to the roller **88** since this roller **88** will operate by frictional contact with the roller **82**.

As this occurs ink will be spread about by the roller **88** and will be transferred to the ribbon roller **86**. This ribbon roller **86** will transfer ink to the ribbon being rejuvinated as it turns. Such ribbon will tend to take up approximately the amount of ink that it needs to replace that which has been used from it. As this occurs, the ribbon roller **86** will turn past the spreading roller **88** where it will pick up such additional ink as it may need and where the ink upon it will be uniformly proportioned. From this it will be apparent that the amount of ink transferred to a ribbon will be dependent upon the nature of the various rollers described. It will also vary with the speed at which a ribbon is moved.

The ribbon traveling past the ribbon roller **86** will move around the drum **22** where it will be heated. The heat within this drum and the contact with the drum will tend to iron out this ribbon. Further it will tend to cause any stretch areas of the ribbon to shrink back into their initial configuration. As the ribbon travels past the drum **22** the ink in it will also be heated. This will reduce the viscosity of normal inks so that such inks will "flow" in order to distribute themselves throughout the ribbon and particularly throughout the pores of interstices of the ribbon. Some ink or ink solvent may also be vaporized by this heat.

A ribbon ironed as described will next move past the cooling roller **30**. There it will be cooled so as to tend to "fix" the structure of the material within the ribbon rendered somewhat flexible by the heating at the drum **22**. This will also make the ink within the ribbon less mobile. The ribbon cooled in this manner will, during the operation of the machine, be taken up and wound upon the take-up bar **32**. With the machine **10** has been operated in this manner and the ribbon is nearly all wound on the take-up bar **32** the tension on the ribbon will increase. This will cause or force to be exerted ribbon roller **86**. As this tension increases the force on the ribbon roller **86** will increase to a point where the carriage **18** will be released by the detent **72**, and will move. As this occurs the microswitch **74** will be released, cutting off power to **54**. This will stop the movement of the ribbon. Then the switch **152** is turned off and the ribbon located on the take-up bar **32** is removed from the machine.

From a careful consideration of the aforegoing it will be realized that any ribbon treated as herein described will be under a considerable amount of tension as it is treated. In this connection the various rollers on the carriage **18** in effect act as a friction brake. A further braking action is achieved by virtue of the previously described rotation of the cooling roller **30**. With the structure shown this cooling roller **30** actually goes against the direction of ribbon travel. This tension is considered quite desirable in stretching a ribbon being inked so as to achieve a smooth appearance.

During the operation of the machine some ink will normally tend to adhere to the drum **22**. This amount of ink is normally adequate to take care of reinking a ribbon adjacent to its lead in end even though such a portion of a ribbon is not contacted by the ribbon roller **86**. If desired, however, the portion of a ribbon adjacent to its leading end may be drawn by hand past the ribbon roller **86** as the ribbon is mounted in the machine **10** so as to apply ink to it.

We claim:

**1**. A ribbon-inking machine which comprises:

a base,

ribbon-feeding means for holding a ribbon so that it can be unwound from a core member, said ribbon-feeding means being located on said base,

ribbon-ironing means for ironing a ribbon passing from a core member held by said ribbon-feeding means by only applying heat to only one surface of said ribbon located on said base,

said ribbon-ironing means comprising a stationary surface and means for heating said surface, said stationary surface being contacted by one side of a ribbon passing from said ribbon-feeding means, only said one surface of such a ribbon being contacted during said ironing,

ribbon-cooling means for cooling a ribbon which has been ironed by said ironing means located on said base, said cooling means having a cooling surface which contacts said ribbon,

ribbon take-up means located on said base for winding up a ribbon which has passed from said ribbon-feed means in contact with said ribbon ironing means and said ribbon cooling means,

ribbon-inking means located on said base for applying ink to the other side of a ribbon passing from said ribbon-feeding means prior to such a ribbon being ironed by said ribbon ironing means,

said ribbon-inking means including a roller contacting a ribbon passing from said ribbon-feeding means to said ribbon-ironing means so as to force such a ribbon out of a direct path from said ribbon-feeding means to said ribbon-ironing means to a path in which such a ribbon is wrapped around said roller,

said ribbon take-up means serving to apply tension to a ribbon being inked so as to rotate said roller of said ribbon-inking means in order to actuate and operate said ribbon-inking means, and being the only source of power for the movement of said ribbon.

2. A ribbon-inking machine as claimed in claim 1 wherein:

said ribbon-cooling means comprises a roller rotatably mounted on said base.

3. A ribbon-inking machine as claimed in claim 2 including:

means for rotating said rotatable roller of said ribbon cooling means so that said rotatable roller rolls in contact with a ribbon being inked in a direction opposite to the direction of travel of such a ribbon.

4. A ribbon-inking machine as claimed in claim 1 including:

means for stopping the operation of ribbon take-up means in response to an increase in the tension of a ribbon being inked, said means for stopping being mounted on said base so as to be affected by an increase in such tension above the tension required to move a ribbon being inked from said ribbon-feeding means to said ribbon take-up means during the normal operation of said machine.

5. A ribbon-inking machine as claimed in claim 1 wherein:

said ribbon-cooling means comprises a roller rotatably mounted on said base, and including

means for rotating said roller of said ribbon cooling means so that said rotatable roller rolls in contact with a ribbon being inked in a direction opposite to the direction of travel of such a ribbon,

means for releasably holding said roller of said ribbon-inking means in contact with a ribbon being inked on said machine,

said means for holding said roller being responsive to an increase in the tension of such a ribbon to move said ribbon-inking means out of an operative inking position, and

means for stopping the operation of said ribbon take-up means upon such an increase in tension.

6. A ribbon-inking machine as claimed in claim 5 including:

a carriage movably mounted on said base so as to be capable of being moved relative to the patch of a ribbon being inked on said machine, and wherein

said roller of said ribbon inking means is mounted on said carriage, and wherein

said means for releasably holding comprise detent means connecting said carriage and said base.

7. A ribbon-inking machine which comprises:

a base,

ribbon-feeding means for holding a ribbon so that it can be unwound from a core member, said ribbon-feeding means being located on said base,

ribbon-ironing means for ironing a ribbon passing from a core member held by said ribbon-feeding means located on said base,

said ribbon-ironing means comprising a stationary surface and means for heating said surface,

ribbon-cooling means for cooling a ribbon which has been ironed by said ironing means located on said base,

ribbon take-up means located on said base for winding up a ribbon which has passed from said ribbon-feed means in contact with said ribbon-ironing means and said ribbon-cooling means,

ribbon-inking means located on said base for applying ink to a ribbon passing from said ribbon-feeding means prior to such a ribbon being ironed by said ribbon-ironing means,

said ribbon-inking means including a roller contacting a ribbon passing from said ribbon-feeding means to said ribbon ironing means so as to force such a ribbon out of a direct path from said ribbon-feeding means to said ribbon ironing means to a path in which such a ribbon is wrapped around said roller,

said ribbon take-up means serving to apply tension to a ribbon being inked so as to rotate said roller of said ribbon-inking means in order to actuate and operate said ribbon-inking means,

means for releasably holding said roller of said ribbon-inking means in contact with a ribbon being inked on said machine,

said means for holding said roller being responsive to an increase in the tension of such a ribbon to move said ribbon-inking means out of an operative inking position, and

means for stopping the operation of said ribbon take-up means upon such an increase in tension.

8. A ribbon-inking machine as claimed in claim 7 including:

a carriage movably mounted on said base so as to be capable of being moved relative to the path of a ribbon being inked on said machine, and wherein

said roller of said ribbon-inking means is mounted on said carriage, and wherein

said means for releasably holding comprise detent means connecting said carriage and said base.

* * * * *