United States Patent

[11] 3,633,506

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[45] Patented **Jan. 11, 1972**

[73] Assignee **FMC Corporation**
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[54] **ROTARY INKING DEVICE FOR FRUIT MARKING MACHINES**
15 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **101/336,** 101/37, 101/40, 197/160
[51] **Int. Cl.** **B41f 1/44**
[50] **Field of Search** ..... 197/151, 160, 161, 162, 163, 164, 165; 101/35, 36, 37, 38, 39, 40, 38 A, 336

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Primary Examiner—Ernest T. Wright, Jr.
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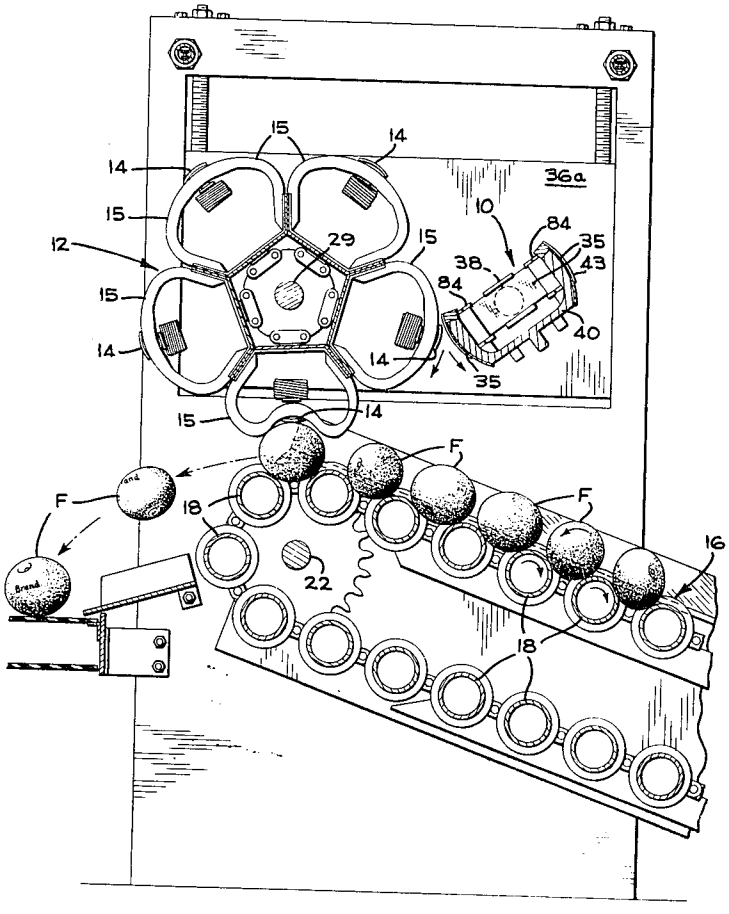
ABSTRACT: An inking device is mounted for continuous rotational movement and for tangential engagement with a plurality of marking dies angularly spaced about a rotatable marking wheel. The inking device includes a pair of spools which carry an inked ribbon that extends therebetween and along the opposite faces of the devices for rolling engagement with the dies. A cam positioned adjacent to the end of the device controls a lever arm which actuates a ratchet fixed to one of the spools to intermittently feed the ribbon. The cam may be shifted so that the lever arm actuates a ratchet on the other spool to reverse the direction of movement of the ribbon.



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SHEET 1 OF 6

FIG_1

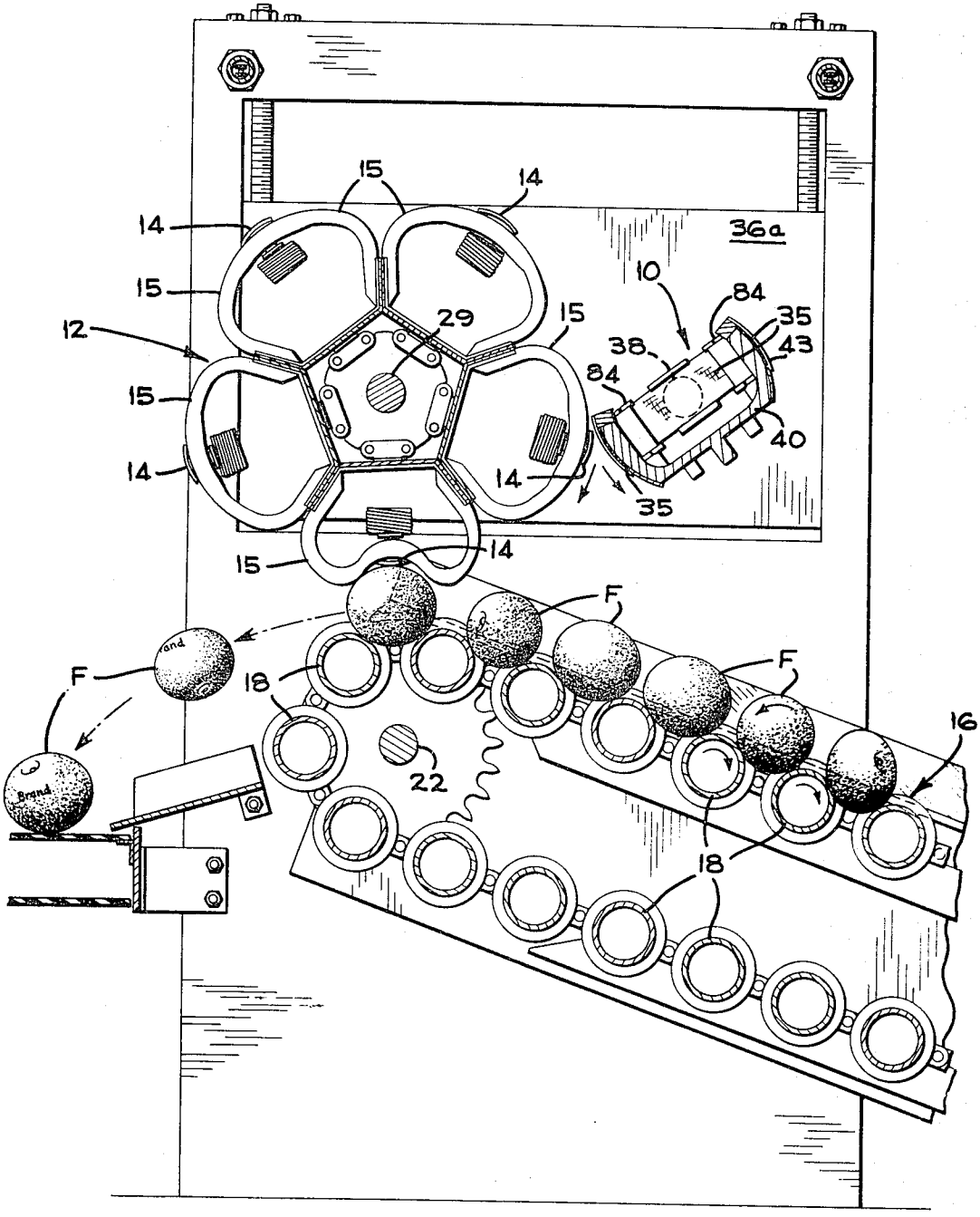

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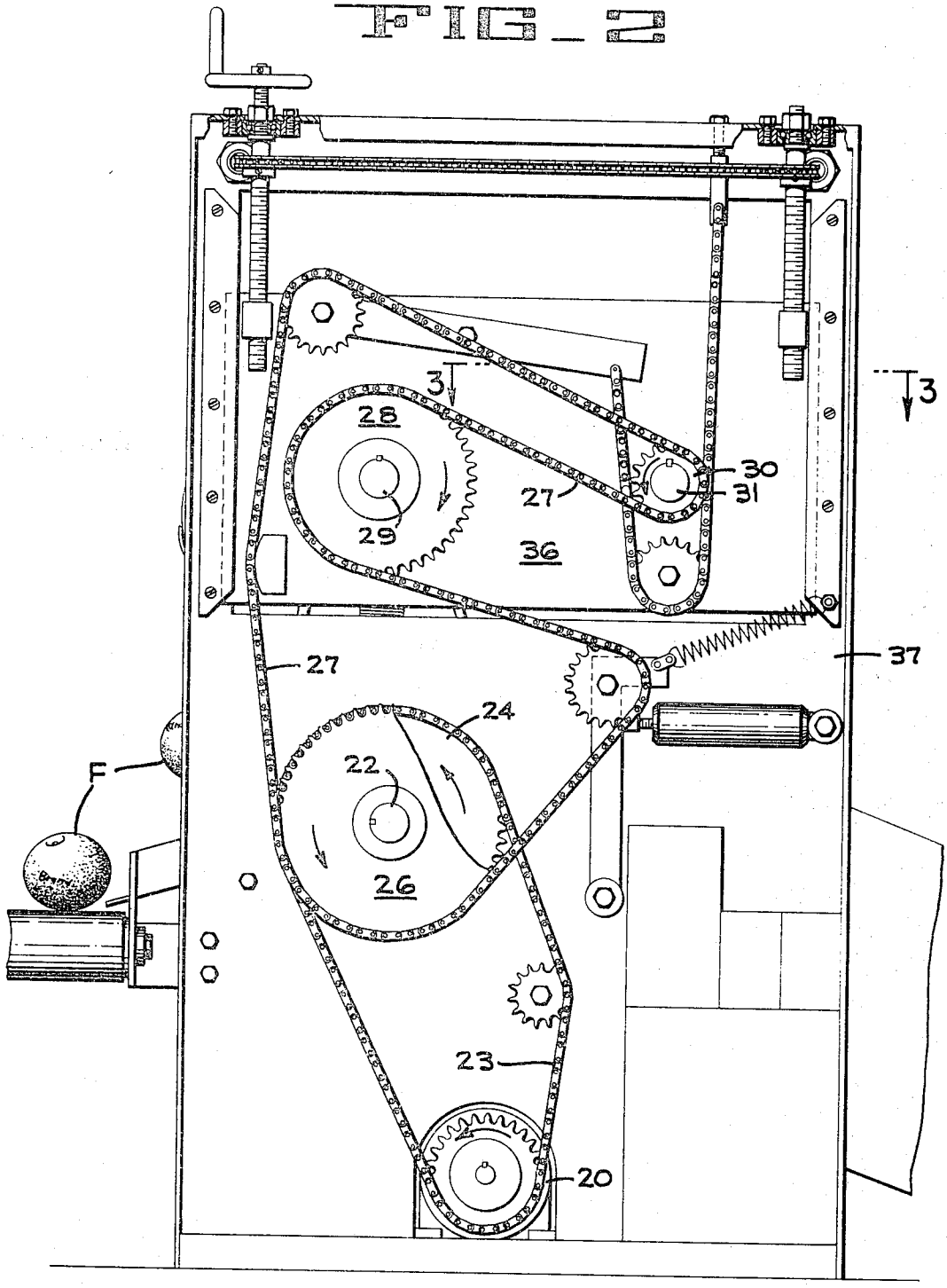
FIG_2



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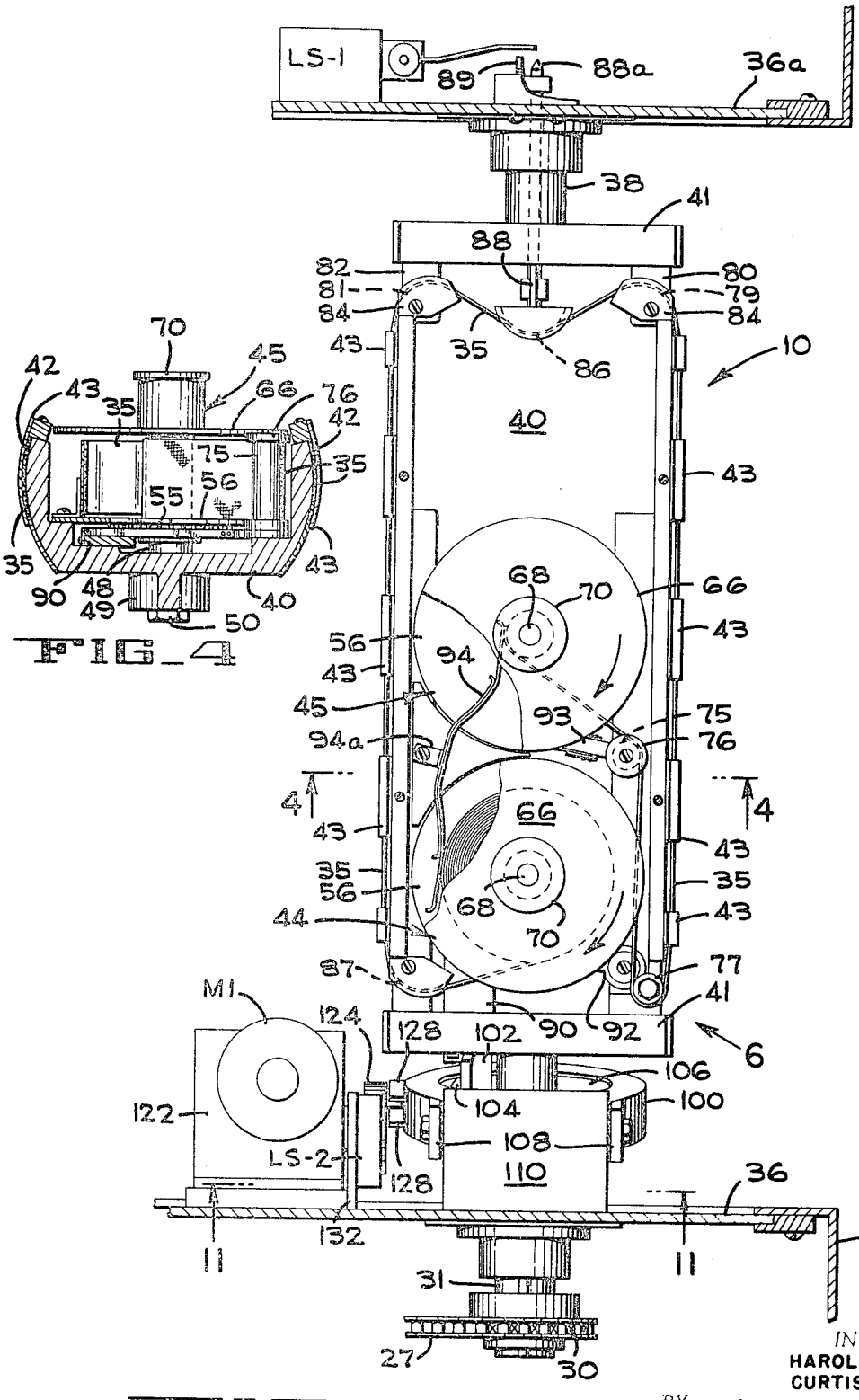

FIG_3

FIG_4

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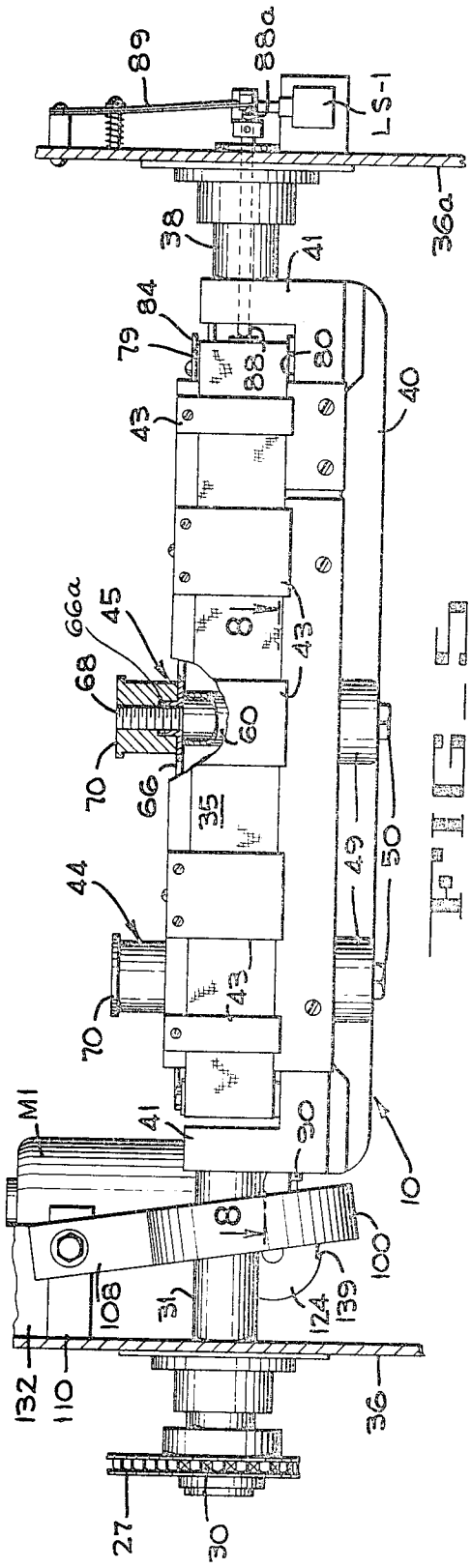

FIG. 5

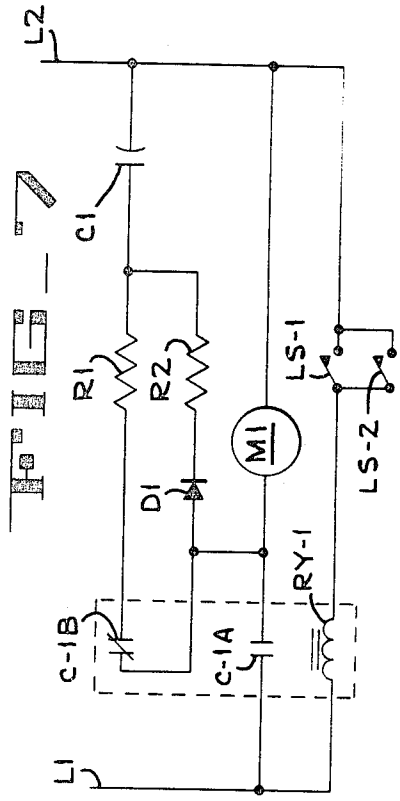

FIG. 7

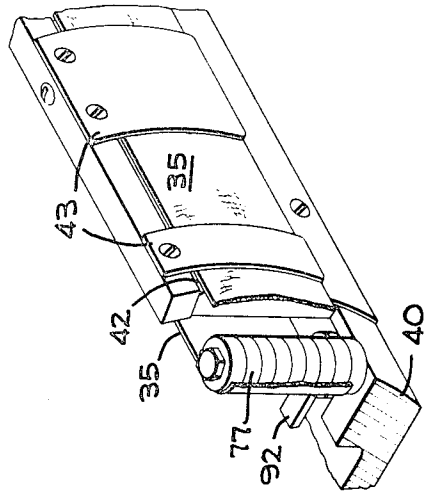

FIG. 6

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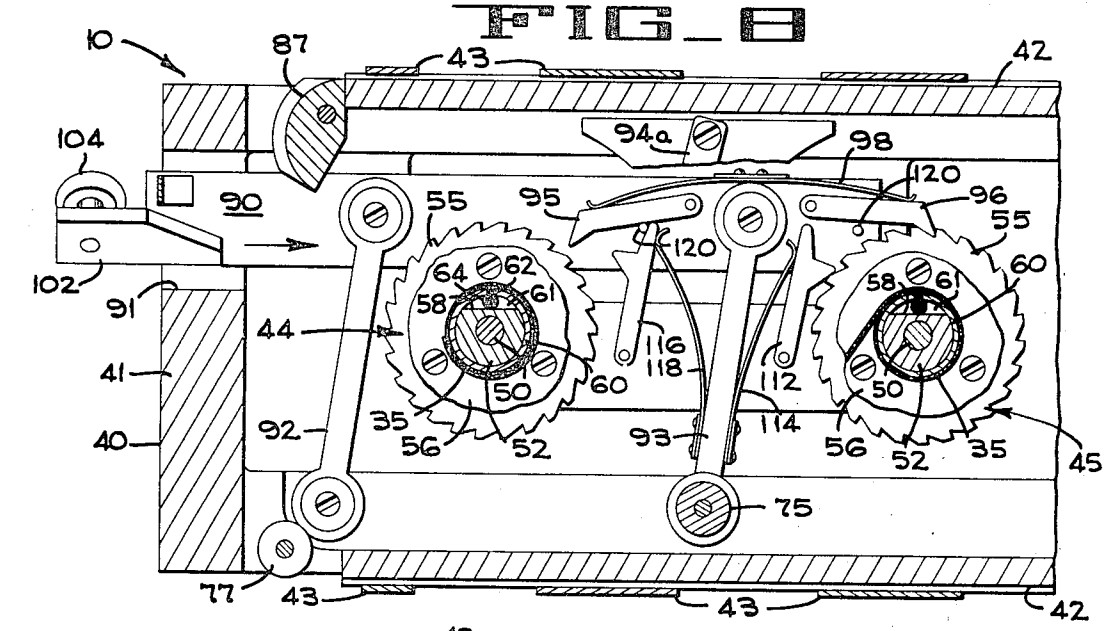
FIG_8



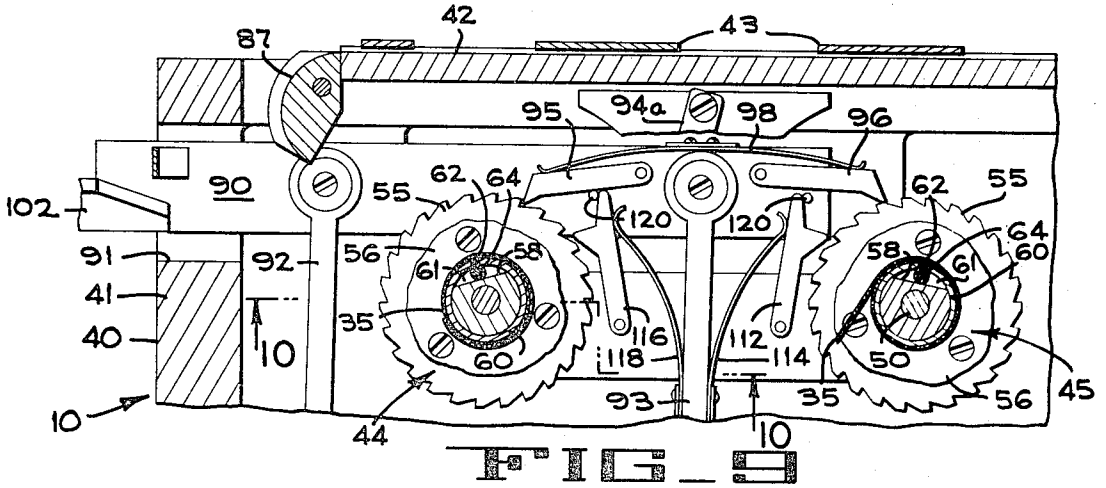


FIG_9

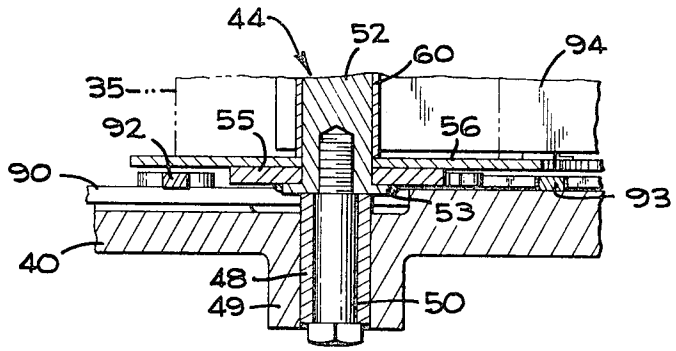


FIG_10

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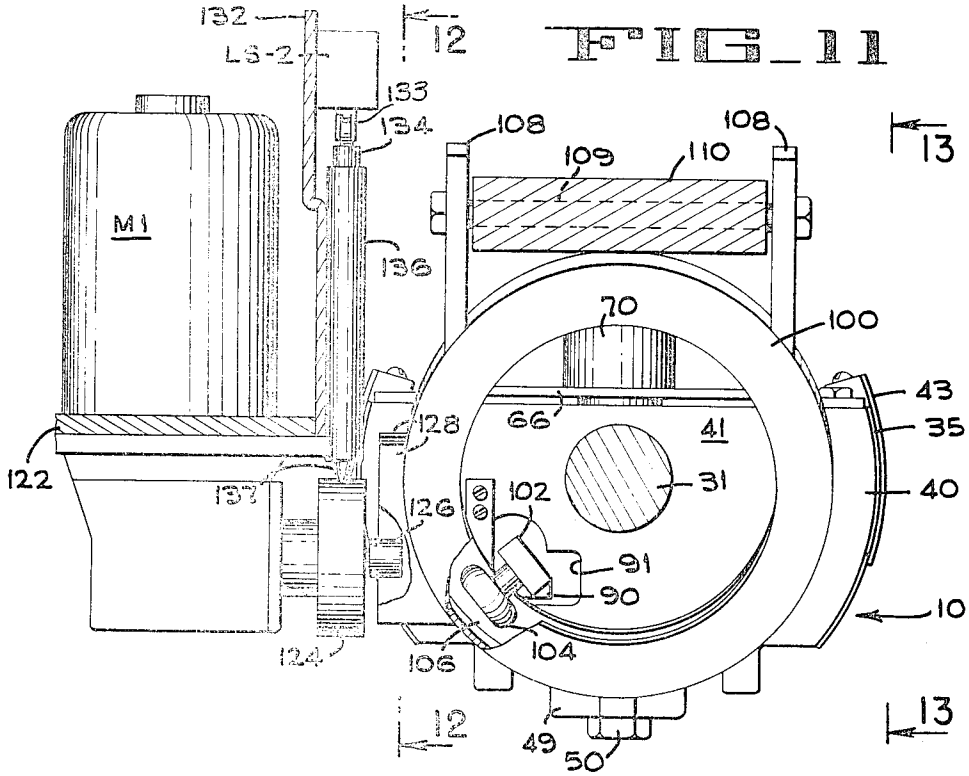

FIG_11

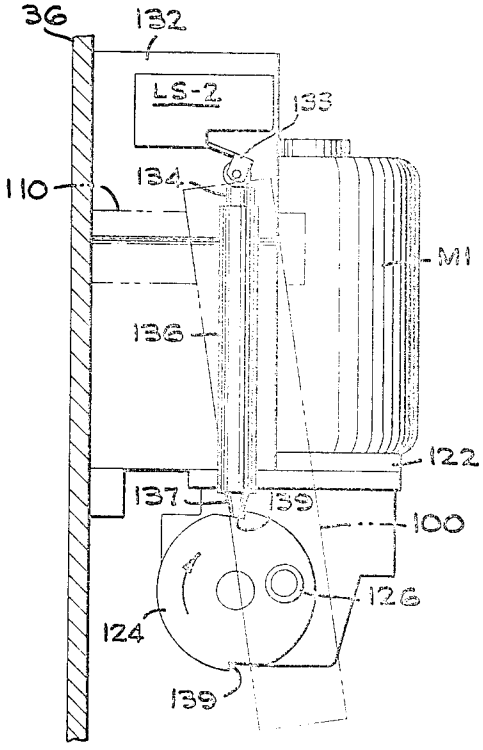

FIG_12

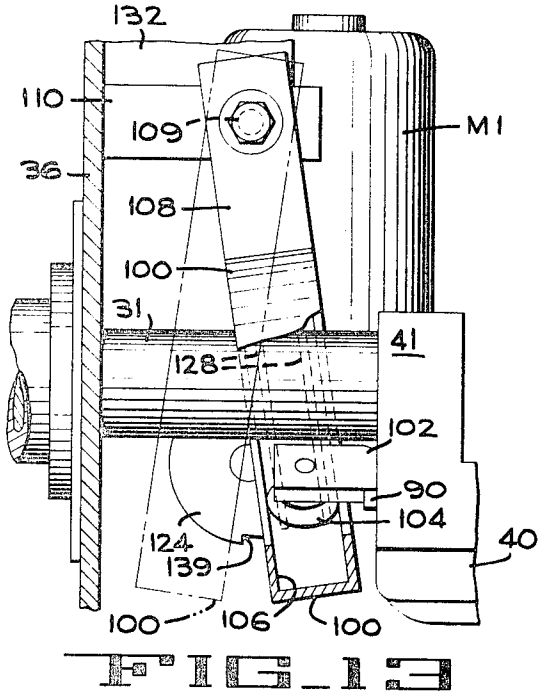

FIG_13

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ROTARY INKING DEVICE FOR FRUIT MARKING MACHINES

CROSS-REFERENCE TO RELATED APPLICATION

The present invention concerns a rotary inking device which is partially disclosed in a United States patent application of Harold J. Mumma and Curtis L. Parry, Ser. No. 687,871, filed on even date herewith and titled "Fruit Marking Machine." The said application, which is assigned to the assignee of the present invention, is incorporated by reference into the present disclosure for further description of the details of an operative environment for the inking device of the present invention.

BACKGROUND OF THE INVENTION

1. Field of the Invention

In general, this invention pertains to that field of art concerned with inking mechanisms for use with printing or marking machines, and more particularly, it pertains to inking mechanisms which utilize a movable inking ribbon.

2. Description of the Prior Art

Rotary inking mechanisms are commonly employed in cooperation with marking head structures which are of a type that are mounted for continuous rotation so that the die or dies which are attached about the outer surface of the head must rollingly engage the outer surface of the inking mechanism for transfer of ink therebetween. One field which has special requirements with regard to rotatable inking mechanisms is the fruit and vegetable handling field where rotatable fruit marking or stamping machines are used with the marking dies being mounted for continuous rotation and being required to adjust for fruit of various shapes and sizes. The marking dies for such stamping machines, which are used to imprint trademarks or other identifying indicia upon fruit surfaces, are generally comprised of a soft plastic or rubber-like material having raised type on the marking surfaces thereof to receive the ink.

One general prior art method of providing ink for the rotating dies of a fruit-marking machine is shown in either of U.S. Pat. Nos. 2,982,203 or 3,068,785 to Ahlburg. In the marking machines shown in these patents, an inking drum is rotatably mounted parallel to and adjacent to a rotatable marking wheel structure, and an ink-impregnated ribbon is placed about the cylindrical outer surface of the drum for tangential rolling engagement with the dies that are spaced about the cylindrical surface of the marking wheel structure. While the drum-type inking mechanisms disclosed in these patents have the advantage of relative simplicity, they also possess some significant disadvantages. Large rolls which have an inked ribbon covering their entire surface area are particularly difficult and messy to handle when they are changed, and they require frequent changing since only the ribbon that is exposed on the surface of the drum can be utilized during any single continuous running of the machine. Of course, changing of a ribbon requires a shutdown of the entire machine, and frequent ribbon changes therefore mean frequent interruptions in processing of the fruit. Another disadvantage of the drum-type linking mechanisms is the large surface area of the ribbon which is continuously exposed to evaporation. Furthermore, if the ribbon is rolled about the transfer surface in a plurality of layers, as is shown in U.S. Pat. No. 3,068,785, difficulties are experienced in controlling the ink flow to the dies so that it will neither be too great nor too little, and this problem is compounded by the variations in ink flow through the ribbon roll as the size of the roll is reduced.

A more sophisticated rotary ribbon-type inking mechanism is shown in U.S. Pat. No. 2,953,987 to Johnson et al. wherein a plurality of ribbons are wound circumferentially about an inking drum with the ribbons being aligned with the fruit-marking dies that extend transversely across the marking wheel and with the linking ribbons each being carried upon spools within the structure of the inking drum. Ratchet means are used to intermittently move the ribbons circumferentially about the face of the drum so that fresh ribbon surface is continuously being exposed to the marking dies. A significant disadvantage of this type of rotary inking device is the fact that it requires the changing of a number of ribbons when the ribbons come to the limit of their travel in one direction. Furthermore, since this condition might occur without warning at any time, a stop for changing of the ribbons might take place in the middle of a run of fruit to the marking machine. A further disadvantage of this plural-ribbon type of inking device is the fact that all of the ribbons do not need to transfer the same amount of ink to the dies since fruit is very seldom fed evenly to each of the sets of marking dies that are spaced transversely across the marking machine, and, even though some of the inking ribbons may be relatively fresh as compared with others, they all must be changed at the same time when the ribbons are fully wound upon the takeup spools, It is also to be noted that the ribbon takeup spools are ratcheted by a fixed angular amount during each rotation of the inking device; therefore, the ribbons will be moved more rapidly when the takeup spools are full than they will when the spools are nearly empty, and the last section of the ribbons will therefore be subjected to less contact with the dies than the initial section of the ribbons.

A rotary ribbon-type inking device which eliminates some of the problems of the aforedescribed inking mechanisms is shown in U.S. Pat. No. 1,755,749 to Sevigne. The inking device which is disclosed in this patent includes a rotary structure having a single ribbon which is arranged to extend longitudinally along the structure so that it can supply ink for all dies that are aligned transversely of the marking machine. A cam-actuated ratchet mechanism intermittently drives the ribbon across the face of the device in increments of varying amounts. A significant disadvantage of this single-ribbon type of inking mechanism is the fact that those marking dies which are nearest to the feed side of the inking ribbon will receive more ink than is necessary while those dies adjacent the takeup side of the ribbon will receive less ink than is required and, consequently, a certain percentage of the fruit will be marked either too heavily or too lightly. Furthermore, as was the case with the prior art device last described, the ribbon will be advanced at different increments depending upon the amount of ribbon on the takeup spool; that is to say, when the spool is almost empty at the start of the ribbon advancing cycle, the ribbon will be advanced by small increments, and when the takeup spool is almost full the ribbon will be advanced by large increments. Since the ribbon cannot be reversed in direction without stopping the machine and rewinding it, it will be recognized that the ribbon will thereby be subjected to inefficient usage.

SUMMARY OF THE INVENTION

The rotary inking device of the present invention utilizes an ink impregnated ribbon as with the aforementioned prior art mechanisms but presents a unique method of feeding and controlling the ribbon so as to achieve the maximum benefit therefrom and prevent as much as possible the frequent shutdowns of the marking structure while the ribbon is changed, reinked, or repositioned.

The inking ribbon of the present invention is mounted for movement between a feed spool and a takeup spool so as to extend across an arcuate, longitudinally extending transfer face of the inking device for rolling contact with each of a series of dies extending transversely across an adjacent marking wheel structure. Means are provided to intermittently feed the ribbon across the transfer face so that a fresh surface of the ribbon will be continuously exposed to the dies. A cam-operated lever accomplishes the feeding of the ribbon, and both the used and unused ends of the ribbon are wound upon the spools within the body of the inking device so as to prevent undue evaporation therefrom.

An important feature of the present invention is the provision for reversing the direction of movement of the ribbon when it has been completely wound upon the takeup spool.

This takes place automatically when the ribbon reaches the end of its travel and the ribbon is allowed to rewind upon what had up to then been the feeding spool. This automatic reversing action can be repeated continuously until the ink impregnated in the ribbon is completely used up, and, therefore, the ribbon may be ratcheted rapidly across the transfer face of the inking mechanism during its use to prevent undue evaporation of the ink therefrom and eliminate the prior art problems in evenly distributing the ink to the dies. Furthermore, differences in the incremental distance of movement of the ribbon because of the varying amount of ribbon on the takeup spool do not present any problems for the device of the present invention since the feeding of the ribbon in the reverse direction will involve ribbon-feeding increments exactly the reverse of those of the forward feed direction, and the ribbon will therefore be used evenly at both of its ends.

Another feature of the present invention is the fact that the inking device has two arcuate transfer faces on opposite sides thereof. Consequently, by providing a rotary marking wheel with an odd number of angularly related dies, each die will be alternately received on the opposite transfer faces of the inking device. Since the ribbon on the transfer face closest to the feeding spool will presumably have more ink than the ribbon on the transfer face closest to the takeup spool, the alternating engagement of the dies upon the opposite faces will balance the amount of ink applied to each individual die.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a section through a fruit-marking machine which includes the rotary inking device of the present invention.

FIG. 2 is a side elevation of the machine shown in FIG. 1 particularly illustrating the drive means therefor.

FIG. 3 is an enlarged section taken along the line 3—3 of FIG. 2 and illustrating, in plan, the rotary inking device of the present invention with portions thereof being broken away for the purpose of illustration.

FIG. 4 is a transverse section generally taken along line 4—4 of FIG. 3.

FIG. 5 is a side elevation of the rotary inking device shown in FIG. 3.

FIG. 6 is a fragmentary perspective taken generally in the direction of arrow 6 of FIG. 3 particularly illustrating a portion of the mounting of the inking ribbon.

FIG. 7 is a schematic of the electrical circuitry that controls the feeding of the inking ribbon.

FIG. 8 is an enlarged section taken along the line 8—8 of FIG. 5 with portions thereof being broken away for the purpose of clarity.

FIG. 9 is a fragmentary section similar to FIG. 8 but illustrating the ratchet actuating mechanism in a position different from that shown in FIG. 8.

FIG. 10 is a section taken along the line 10—10 of FIG. 9 showing the lower portion of one of the ribbon carrying spools with the ribbon roll thereon being shown in phantom lines.

FIG. 11 is an enlarged section taken along the line 11—11 of FIG. 3 particularly illustrating the ribbon driving cam.

FIG. 12 is a section taken along the line 12—12 of FIG. 11 with the position of the cam with respect to its drive motor being shown in phantom lines.

FIG. 13 is an end elevation of the cam shown in FIG. 11 taken generally in the plane of line 13—13 and showing the cam in one of its operating positions with a portion thereof being in section and with the alternate, second operating position of the cam being shown in phantom lines.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The rotary inking device 10 of the present invention is shown in FIG. 1 as it might be used in cooperation with a rotary marking wheel structure 12 in order to provide ink for a series of marking dies 14 angularly spaced about the periphery of the wheel so that the dies can imprint an ink mark upon the surfaces of fruit F which are carried by a conveyor 16 into pressure engagement with the dies. The fruit-carrying conveyor includes a plurality of rotatable rollers 18 which continuously rotate the fruit as they are moved into engagement with the dies so that the surface of each fruit and the surface of its associated die will be travelling at approximately the same speed at the point of engagement to prevent skidding of the die upon the fruit surface and resultant blurring of the mark. The dies, which are provided with raised type on their fruit-engaging surfaces, are carried centrally of and at the outer periphery of resilient fruit-gripping members 15 of generally tubular shape which resiliently engage and control the movement of the fruit at the discharge end of the conveyor while the ink marks are applied. Although FIG. 1 shows only one angularly related set of dies and their associated fruit-gripping members, it will be recognized that a uniformly spaced series of such angularly related dies and gripping members may be mounted upon the marking wheel drive shaft 29 to extend transversely across the machine and that the fruit-carrying conveyor 16 may, in a similar manner, include a series of uniformly spaced fruit extending transversely across the conveyor, as well as longitudinally thereof, in alignment with the transversely spaced sets of dies on the marking wheel.

The drive means for the fruit-marking machinery of FIG. 1 is shown in FIG. 2 and is seen to comprise a motor 20 which powers a drive shaft 22 for the fruit-carrying conveyor 16 by means of an endless chain 23 and a drive sprocket 24 that is keyed to the drive shaft. Also fixed to the conveyor drive shaft is a second sprocket 26 which drivingly engages a main drive chain 27 that is trained about a drive sprocket 28 keyed to the rotary marking wheel drive shaft 29 and a drive sprocket 30 that is keyed to a drive shaft 31 for the rotary inking device 10. It can be seen that the driving force supplied by the motor 20 will provide continuous rotary movement for both the marking wheel and the inking device to rotate these mechanisms, in the direction of the arrows shown in FIG. 1, so that the dies will be moved into tangential pressure contact with an ink-impregnated ribbon 35 extending along the oppositely positioned, arcuate faces of the inking device. Both the marking wheel drive shaft 29 and the inking mechanism drive shaft 31 extend through and are rotatably supported at one end thereof by a side plate 36 which is slidably mounted upon a fixed side frame structure 37 supporting the conveyor drive shaft 22 so that the marking wheel may be vertically adjusted with respect to the conveyor. A second slidably mounted sideplate 36*a* (FIG. 1) rotatably supports the opposite end of the marking wheel drive shaft and also rotatably supports a short stub shaft 38 fixed to the opposite end of the rotary inking mechanism.

For a further and more complete description of the fruit-marking machinery shown in FIGS. 1 and 2, reference is made to the aforementioned copending U.S. patent application of Mumma and Parry, Ser. No. 687,871, filed on even date herewith.

The rotary inking mechanism 10 of the present invention is seen to comprise a generally U-shaped, cast frame structure 40 which is provided with arcuate transfer faces 42 extending longitudinally of the inking device and on opposite sides thereof. Guide plates 43 are mounted over the ribbon at spaced intervals along the transfer faces to maintain the ribbon in engagement with the faces so that proper ink transferring contact with the marking dies 14 of the fruit-marking wheel 12 is provided. End plates 41 are carried at each end of the frame and serve to fixedly mount the inner ends of the drive shaft 31 and the stub shaft 38 so that the frame is positioned for rotation between the side plates 36 and 36*a*. Rotatably mounted within the lower portion of the U-shaped frame structure are a pair of ribbon-supporting spools 44 and 45 which are arranged to alternately feed out and reel in the ink-impregnated ribbon 35.

Each of the spools 44 and 45 is similarly constructed and is rotatably mounted by means of a shoulder bolt 50 which is rotatably received within a bearing sleeve 48 (FIG. 10) pressed into a lower cylindrical extension 49 of the frame structure 40. The shoulder bolt includes a threaded portion at

its upper end which is screwed axially into the lower end of a generally cylindrical center post **52**. The lowermost end of the upright center post is also provided with a laterally extending flange **53** which is tack-welded at its outer edge to the lower face of a ratchet **55**. A flat, circular plate **56** forms the bottom plate of the spool and is securely attached to the upper face of the ratchet. Both the ratchet and the bottom plate are each provided with an aperture so that they can be received and centrally positioned upon the center post. One longitudinally extending edge of the center post (FIGS. **8** or **9**) is provided with a flat face **58**, and a loose sleeve **60** is received about the post so as to provide a small, longitudinally extending space **61** for reception of the end of the inking ribbon **35**. The ribbon is attached to the spool by insertion through a radial slot **62** in the sleeve and is fastened at its end about an upright pin **64** so that rotation of the center post will cause corresponding rotation of the sleeve through the end of the ribbon which is wedged therebetween. The uppermost portion of the spool (FIG. **5**) includes a flat, circular plate **66** similar in size to the bottom plate **56** but having a central hub **66***a* therein that is threaded onto a stud **68** projecting axially upward from the center post. An internally threaded knob **70** is secured to the stud to hold the top plate onto the center post and thus prevent the ribbon from pulling off of the spool during rotation of the inking device. It can be seen that the ribbon may be changed by removing the knob **70**, the top plate **66**, and sleeve **60** from about the center post.

As can be best seen in FIG. **3**, the inking ribbon **35** is secured at one end to the inner spool **45** in the aforedescribed manner and is wound off of the spool about an upright cylindrical guide **75** that is provided with an upper, ribbon-holding flange **76**. The ribbon is then passed to the adjacent end of the inking device where it is trained about a rotatable bearing structure **77** (FIG. **6**). From the bearing structure at one end of the inking device the ribbon is passed along one of the longitudinally extending transfer faces **42** to the other end of the device where it is received around an arcuate guide block **79**. The ribbon is then passed across the frame structure to the opposite transfer face about an arcuate guide block **81** which is similar in construction to the guide block **79**. Guide blocks **79** and **81** are mounted upon flattened portions **80** and **82** of the frame structure, respectively, and include flat plates **84** upon their upper faces to prevent removal of the ribbon during rotation of the frame. Between the guide blocks **79** and **81** the ribbon is passed over a semicylindrical guide spool **86** which is attached to the end of a switch actuator rod **88** for a purpose to be described presently. The actuator rod is slidably mounted within an axial bore in the stub shaft **38** and is urged inwardly of the frame structure of the inking mechanism to maintain tension upon the ribbon by means of a leaf spring **89** (FIG. **5**) which is mounted upon the sideplate **36***a* for engagement with the outwardly extending nose **88***a* of the rod.

From the guide block **81** the ribbon is passed along the adjacent arcuate transfer face **42** of the inking mechanism and around a flanged guide block **87** at the opposite end thereof, which guide block is generally similar in construction to the aforedescribed guide blocks **79** and **81**. The ribbon is wound from the guide block **87** to the outer spool **44** to which it is secured in the same manner as it is to the inner spool **45**. The ribbon is maintained in tight rolls about the sleeves **60** of the spools by a double-ended, upright leaf spring **94** which is pivotally mounted by means of a rotatable bracket **94***a* upon the fixed frame structure of the inking mechanism. It will be apparent that the spring **94** can rotate about the pivotal connection of the supporting bracket **94***a* with the frame as the ribbon is transferred between the spools and that the upwardly projecting lateral ends of the spring will maintain pressure engagement with the ribbon rolls.

Both of the spools are arranged to be driven trough the ratchets **55** attached to their bottom plates although they are not arranged to be driven at the same time; that is to say, when one spool is being ratcheted, the other will be free to turn under the pull of the ribbon, and vice versa. It is an important feature of the present invention that the drive for the spools is provided with means for automatically reversing the direction of feed of the ribbon when one spool has all of the ribbon wound thereon so that operation of the inking device can be continuous and the ribbon will not need to be changed after each passage between the two spools. In order to rotate the spool-driving ratchets a cam lever **90** is provided for reciprocal movement longitudinally of the inking mechanism, which cam lever is best shown in the operational views of FIGS. **8** and **9** where it is seen to extend laterally from the body of the inking mechanism through a slot **91** in one of the end plates **41**. The cam lever is attached to the frame of the inking device by a pair of pivotal crank arms **92** and **93** which are rotatably attached to the cam lever and which are rotatably mounted upon the side of the frame opposite to that along which the cam lever is positioned. The outer crank arm **92** is mounted adjacent to one of the end plates **41** and the inner crank arm **93** is rotatably mounted about the base of the fixed cylindrical guide **75** (FIG. **4**). Pivotally mounted adjacent to the pivotal mounting of the crank arm **93** at the inner end of the cam lever are a pair of drive pawls **95** and **96**. The innermost pawl **96** is adapted for driving engagement with the ratchet that is attached to the inner spool **45**, and the outer pawl **95** is adapted to engage and drive the ratchet attached to the outer spool **44**. The pawls, however, operate independently and only one ratchet will be driven during one operating cycle of the inking mechanism. A double-ended leaf spring **98** is attached to the side of the cam lever to urge both pawls into engagement with their associated ratchets.

The cam lever **90** is arranged to be continuously reciprocated by a circular cam **100** best shown in FIGS. **11**, **12**, and **13**. An angle bracket **102** which is welded to the outwardly projecting end of the cam lever rotatably mounts a cam follower **104**, and the cam follower is arranged for movement within a raceway **106** formed within the circular cam. The cam is mounted about the drive shaft **31** by means of a pair of parallel ears **108** attached to its upper side edge which ears are fixedly secured to the oppositely projecting ends of a pivot pin **109**. The pivot pin is rotatably received within a fixed mounting block **110** that is attached to the sideplate **36**.

As shown in full lines and in phantom lines in FIG. **13**, the cam **100** is arranged to be slightly inclined to the vertical when it is in either of its two operating positions so that the cam follower **104** will follow a circular path inclined to the vertical as the inking mechanism is rotated about the axis of drive shaft **31**. It can be seen that the horizontal shifting of the cam follower will cause the cam lever **90** to reciprocate within the body of the inking mechanism and that this reciprocation will cause the inner pawl **96** to rotate the ratchet of spool **45** when the cam is in the full line position of FIG. **13**. FIG. **8** shows the cam lever being pushed inwardly, in the direction of the arrow, to cause the drive pawl **96** to rotate its associated ratchet. A stop pawl **112** is pivotally mounted to the frame of the inking mechanism adjacent to the spool **45** to catch the ratchet on the outward or return stroke of the cam lever to prevent the ratchet from being rotated back in the reverse direction by the drag of the driving pawl **96**, and a leaf spring **114** fastened onto the crank arm **93** urges stop pawl **112** into engagement with the ratchet.

When the cam is shifted to the phantom line position of FIG. **13** at the time that all of the ribbon is wound upon the spool **45** (by means to be disclosed presently), the cam lever will be pulled in an outward direction through the neutral position shown in FIG. **9** and into a position wherein the outer drive pawl **95** will be in ratcheting engagement with the ratchet on spool **44** to reverse the driving direction of the ribbon and wind it upon spool **44** and off of spool **45**. A stop pawl **116**, similar to stop pawl **112**, is mounted so as to catch the ratchet on spool **44** on the inward strike of the cam lever to prevent the spool from turning clockwise (as viewed in FIGS. **8** and **9**), and a leaf spring **118** is mounted upon the crank arm **93** similarly to the leaf spring **114** to urge the stop pawl into engagement with the ratchet.

In order that the drive pawls **95** and **96** will not be urged into engagement with their respective ratchets by the leaf spring **98** when they are not being utilized to drive their respective ratchets, a pair of pins **120** are attached to the cam lever adjacent to the pawls. When the pawl **96** is driving spool **45** in a clockwise direction, for example, (as shown in FIG. **8**) the pin **120** positioned adjacent to the trailing pawl **95** will prevent this pawl from moving into engagement with the ratchet of spool **44**. It will be appreciated that the pin **120** adjacent to the pawl **96** will provide a similar function when the cam **100** is shifted and pawl **95** is utilized to rotate spool **44** in a counterclockwise direction.

The cam **100** is shifted between its two operating positions (shown in full and in phantom lines in FIG. **13**) by means of a small AC induction motor MI which is mounted upon a bracket **122** carried by the sideplate **36**. This motor, through a suitable reduction gear arrangement, is adapted to drive a notched circular cam plate **124** through 180° increments of rotational movement. A projecting roller **126** is carried upon the face of the cam plate and is received between a pair of parallel plates **128** (FIG. **11**) rigidly attached to the side edge of the cam **100** with the roller being arranged for rolling movement between the plates to pivot the cam about the axis of support pin **109**. When the cam plate **124** is in the position shown in FIG. **12**, the cam **100** will be in the inclined position shown in full in FIG. **13** and the cam lever **90** will be reciprocated as the inking mechanism is rotated to feed ribbon onto the spool **45** and off of spool **44**. When all of the ribbon has been wound off spool **44**, the end of the ribbon will be held on the spool and the rapidly increasing tension on the ribbon will place pressure upon the movable semicylindrical guide spool **86** to force the slidable rod **88** outwardly through the stub shaft **38** against the urging of the leaf spring **89** until the nose **88***a* actuates a limit switch LS–1 positioned on the outer face of the sideplate **36***a*.

As can be seen in the schematic diagram of FIG. **7**, closing of limit switch LS–1 at the end of a ribbon-feeding cycle completes a circuit between AC power lines L1 and L2 and energizes a relay RY–1. Energization of relay RY–1 closes the normally open contact C–1A to provide power for the motor M1 and opens the normally closed contact C–1B. While the motor M1 is being utilized to drive the cam plate **124** (in a clockwise direction as viewed in FIG. **12**) and thereby shift the position of the cam **100**, a circuit is also completed through a diode D1, a current limiting resistor R2, and a capacitor C1 to place a predetermined charge upon the capacitor. As the cam **100** starts to shift, the cam lever **90** will move outwardly of the inking mechanism into a position, such as shown in FIG. **9**, where the stop pawl **112** is freed from the ratchet on spool **45** to thereby release the tension upon the ribbon. This will permit the actuator rod **88** to be pushed inwardly under the urging of the leaf spring **89** to open switch LS–1. However, a second limit switch LS–2 will, by this time, be closed to maintain current to the relay RY–1 and, hence, to the motor M1. Limit switch LS–2 is mounted upon a bracket **132** which at attached to the sidewall **36**. The switch is provided with a downwardly extending actuating arm **133** for engagement by the upper end of a plunger **134** that is slidable and spring urged downwardly within a sleeve **136** also carried by the bracket **132**. The lowermost end **137** of the plunger is tapered and is adapted to ride upon the outer peripheral edge of the cam plate **124** which is provided with a pair of notches **139** spaced 180° apart to receive the nose end of the plunger when the cam **100** is in one of its operating positions. With the cam plate **124** in the position shown in FIG. **12**, energization of the motor M1 through the limit switch LS–1 will cause the cam plate to be rotated in a clockwise direction as shown. When the tapered end **137** of the plunger rises out of the notch on the cam plate the plunger will be cammed upwardly and the switch LS–2 will be closed to maintain the circuit to the motor.

The completed circuit through a closed switch LS–2 will be maintained until the cam plate has rotated 180° and the plunger is permitted to drop into the notch at the other side of the cam plate to open switch LS–2. At this time, cam **100** will be in its alternate operating position shown in phantom lines in FIG. **13**. When switch LS–2 is opened, the relay RY–1 will be deenergized to open contact C–1A and close contact C–1B. The closing of contact C–1B will be seen to provide a circuit for discharge of the charge on the capacitor C1 through the current limiting resistor R1 and the motor M1. This DC transient current is passed through the field of the induction motor M1 and results in rapid braking of the motor rotor due to the creation of opposed magnetic fields whereby the cam plate **124** will be brought to a quick stop to maintain the cam **100** in the proper position. By way of example, when ordinary 115-volt line voltage is provided by power lines L1 and L2, capacitor C1 may be 200 mf., R1 may be 50 ohms, and R2 may be 200 ohms to provide a workable electric braking circuit.

With the cam **100** in the alternate operating position (shown in phantom lines in FIG. **13**) the cam lever **90** will reciprocate so as to cause drive pawl **95** to actuate the ratchet on spool **44** and wind the ribbon thereon and off of spool **45**. This ratcheting action will continue throughout a second ribbon-feeding cycle until the ribbon is completely wound upon the spool **44** at which time the cam **100** and the direction of ribbon feed will again be shifted. This process can be repeated continually until the ink impregnated in the ribbon is completely used up.

To summarize the operation of the device of the present invention, the body of the rotary inking mechanism, which carries the ribbon-supporting spools **44** and **45**, is arranged to be continuously rotated by the drive shaft **31**. The ink-impregnated ribbon **35** is attached at one end of the spool **44** and at the other end to the spool **45**. Between the two spools the ribbon is passed along the arcuate transfer faces **42** of the inking mechanism for contact with a plurality of marking dies **14** rotatably mounted adjacent to the inking mechanism as is shown in FIG. **1**. It is to be noted that there are five dies, i.e., an odd number of dies, angularly spaced about the periphery of the marking wheel **12**, and that, therefore, each die will alternately receive ink from opposite transfer faces of the inking mechanism. This arrangement will assure a more even distribution of ink to each of the dies since the ribbon section which is closest to the feeding spool will presumably have more ink therein than the ribbon section which is closest to the takeup spool. The dies **14** will be continuously rotated into tangential contact with the inking ribbon **35** between the guide plates **43**. As can be seen from the plan view of FIG. **3**, the guide plates are arranged so that a row of four sets of dies spaced along the axis of the marking wheel **12** may engage the face of the ribbon at one time although it will be recognized that a greater number of dies may be inked at one time by merely lengthening the transfer faces **42** of the inking mechanism. During rotation of the inking mechanism, cam lever **90** will be continuously reciprocated by the cam **100** to intermittently ratchet one of the spools **44** or **45** through its associated drive pawl **95** or **96**. In the operational view shown in FIG. **8**, the cam lever **90** is moving inwardly (as indicated by the arrow) and the pawl **96** is ratcheting spool **45** in a clockwise direction while the spool **44** is free to rotate clockwise to intermittently feed increments of ribbon therefrom.

When all of the ribbon has been wound off one spool, the increasing tension in the ribbon causes the slidable rod **88** to actuate limit switch LS–1 and automatically shift the operating position of the cam **100** while the rotary inking mechanism continues to rotate. Shifting of cam **100** will, of course, shift the action of the cam lever from one spool to the other so that the ribbon will feed in the reverse direction. As previously mentioned, this process can be repeated continuously until such time as the ink in the ribbon has been depleted to the point where the dies are not properly or legibly marking the fruit.

Since the inking ribbon 35 is automatically reversed while the inking device continues to rotate and ink the dies 14 of fruit-marking wheel 12, it will be recognized that the ribbon can be driven rapidly across the transfer faces 42 of the inking device to assure transfer of sufficient ink to all of the dies because unused portions of the ribbon during one feeding cycle of the ribbon can be used during the subsequent feeding cycles of the ribbon. Furthermore, even though the ribbon will be incrementally moved by greater distances at the end of a ribbon-feeding cycle than it will at the beginning of a cycle because of the greater diameter of the ribbon roll on the driven takeup spool, the reverse feeding of the ribbon counteracts and thereby eliminates this problem by also feeding the ribbon by greater increments near the end of the cycle where the ribbon had been fed by small increments previously. For example, as the ribbon is wound upon spool 45, as shown in FIG. 3, the feeding increments will be small since only a small ribbon roll is present upon spool 45 and the fixed angular movement of the ratchet 55 will roll only a small linear amount of ribbon upon the spool; however, the ribbon then being rolled upon spool 45 was previously rolled upon the large ribbon roll diameter of spool 44 at large increments of movement, and consequently, all of the sections of the inking ribbon will receive equal contact with the marking dies after one forward and one reverse or two complete feeding cycles of the ribbon.

It will be seen from the foregoing description that the inking mechanism of the present invention is particularly adaptable for use with rotary printing machines such as fruit-marking machines since an ink-impregnated ribbon lying on a hard backup surface is utilized. Thus, the flexible dies of the marking machine may yieldably engage the ribbon to transfer the ink therefrom and there are no problems connected with establishing a predetermined ink flow to the dies as would be the case with a solid inking pad or with a similar ink-feeding system. In the present invention, the inking ribbon is rapidly passed across the marking faces of the inking mechanism to prevent undue evaporation of ink from the ribbon and to distribute ink more evenly to each of the marking dies during a single run of the ribbon. The inking ribbon will automatically reverse itself when it is used up, and the necessity for changing the ribbon will become apparent as the ink marks get lighter upon the stamped fruit.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

Having completed a detailed description of the invention so that those skilled in the art could practice the same, we claim:

1. A rotary inking device comprising a rotatable member having a rigid transfer face at its periphery extending parallel to the rotary axis thereof, a pair of spools mounted for rotation with said member, an ink-impregnated ribbon arranged to be wound at the ends thereof upon said spools with a portion of the ribbon that extends between said spools passing along said transfer face from one end of said rotatable member to the other end thereof in a direction parallel to said rotary axis, means for driving the ribbon to wind it upon one of said spools and off of the other of said spools, means for automatically reversing the drive means when the ribbon has been substantially completely unwound from a spool to initiate the winding of the ribbon upon that spool and the unwinding thereof from the other spool, and means for continuously rotating said member about said rotary axis to bring the ribbon on said transfer face into pressure engagement with a marking die.

2. A rotary inking device according to claim 1 wherein said ribbon-driving means comprises arm means mounted for reciprocating movement, said arm means being selectively operatively engageable with one of said spools for winding the ribbon thereon, and said drive-reversing means including means for shifting the arm means from driving engagement with said one spool to engagement with the other spool when the direction of feed of the ribbon is to be reversed.

3. A rotary inking device according to claim 2 including a ratchet attached to each of said spools, said arm means including pawl means alternatively engageable with one of said ratchets to drive its associated spool.

4. A rotary inking device according to claim 2 including a cam mounted adjacent to said rotatable member, said driving means further including cam follower means on said arm means for engagement with said cam to reciprocate said arm means and rotate one of said spools, and said reversing means including means for shifting said cam from a first operating position to a second operating position to cause the arm means to rotate the other of said spools and thereby reverse the direction of feed of the ribbon.

5. A rotary inking device according to claim 4 wherein said reversing means includes a switch actuatable by the increased tension in the ribbon when the ribbon has been completely unwound from one of said spools, and a motor operatively connected to said cam to shift it between its two operating positions, said motor being energized when said switch is actuated.

6. A rotary inking device according to claim 5 wherein said motor is an induction motor, said reversing means further including a second switch actuatable when said cam reaches an operating position to remove the driving power to said motor, and electrical means for passing a DC current through said motor upon actuation of said second switch for stopping the cam in its operating position.

7. A rotary inking device according to claim 1 wherein said rotatable member includes two longitudinally extending transfer faces positioned on opposite sides thereof with said portion of the ribbon between said spools extending along each face, said faces being curved in the direction of movement thereof.

8. A rotary inking device comprising a frame member, means mounting said frame member for rotation about a longitudinal axis, said frame member having a transfer face at the periphery thereof which extends parallel to said longitudinal axis and along substantially the entire length of said member, said transfer face being curved in the direction of movement thereof, an ink-impregnated ribbon, a first spool mounting one end of said ribbon with the ribbon being rolled thereon, a second spool mounting the other end of said ribbon with the ribbon being rolled thereon, a portion of the ribbon which extends between said first and second spools being passed along the length of said transfer face from one end of the frame member to the other in a direction parallel to said longitudinal axis, each of said first and second spools having a ratchet attached thereto, ratchet actuating means movable during rotation of said frame member and engageable with the ratchet of said first spool for intermittently winding said ribbon off of said second spool and onto said first spool, and means for automatically shifting the operating position of said ratchet-actuating means when the ribbon is substantially completely wound off of said second spool to cause said rachet-actuating means to move into ratcheting engagement with the ratchet attached to said second spool to initiate the winding of the ribbon thereon and off of said first spool.

9. A rotary inking device according to claim 8 wherein said ratchet-actuating means includes first and second drive pawls pivotally mounted thereon, said first drive pawl being positioned to drive the ratchet attached to said first spool when said rachet-actuating means is in a first operating position and said second drive pawl being positioned to drive the ratchet attached to said second spool when said rachet-actuating means is in a second operating position, camming means for continuously reciprocating said rachet-actuating means to rotate one of said ratchets, and said shifting means including means for shifting said camming means to shift said actuating means between its operating positions when the ribbon is completely unwound from one of said spools.

10. A rotary inking device according to claim 9 wherein said camming means comprises a circular cam surrounding said longitudinal axis of the frame member, said ratchet-actuating means extending longitudinally from said frame member and including a cam follower mounted for engagement with said

cam, and means mounting the cam in said first operating position of the rachet-actuating means at an inclined angle to a transverse plane of said frame member so that said ratchet-actuating means is caused to reciprocate within said frame member to intermittently rotate said first spool as the frame member is rotated about its longitudinal axis, said means for shifting the camming means causing said cam to be moved into a position oppositely inclined to said transverse plane of said frame member to bring said rachet-actuating means into its second operating position to intermittently rotate said second spool.

11. A rotary inking device for use with a fruit-marking machine comprising a rotatable marking wheel having a plurality of fruit-marking dies uniformly angularly spaced about its outer periphery, said inking device comprising a rotary member mounted adjacent to and parallel to said marking wheel and having a rigid transfer face at its outer periphery positioned so as to tangentially engage the marking dies on the outer periphery of the marking wheel, a pair of spools mounted for rotation with said rotary member, an ink-impregnated ribbon attached to and wound at each end thereof upon one of said spools with a portion of the ribbon that extends between said spools passing along said transfer face from one end of said rotary member to the other end thereof in a direction parallel to the rotary axis of said rotary member, means for driving a first one of said spools to wind the ribbon thereon and off of the second one of said spools, means for automatically reversing the drive means when the ribbon has been substantially completely unwound from said second spool to initiate winding of the ribbon onto said second spool and off of said first spool, and means for continuously driving said marking wheel and said inking device in a predetermined timed relationship so that said marking dies are brought into pressure engagement with the ribbon on said transfer face to receive ink therefrom.

12. A rotary inking device according to claim **11** wherein said rotary member is provided with a second transfer face at its outer periphery positioned 180° from the first transfer face, said portion of the ribbon that extends between the spools passing along one transfer face in a first direction and along the other transfer face in the opposite direction, and wherein said marking wheel is provided with an odd number of marking dies angularly spaced about its periphery, said marking wheel and inking device drive means causing successive marking dies on said marking wheel to engage the opposite sides of the rotary member whereby each marking die will alternately receive ink from the ribbon on the first and second transfer faces.

13. A rotary inking device according to claim **11** wherein said spool-driving means comprises arm means mounted for reciprocating movement, said arm means being selectively operatively engageable with one of said spools for winding the ribbon thereon, and said reversing means including means for shifting the arm means from driving engagement with said one spool to engagement with the other spool when the direction of feed of the ribbon is to be reversed.

14. A rotary inking device according to claim **13** including a cam mounted about the rotary axis of said rotary member, said spool-driving means including a cam follower carried by a laterally projecting end of said arm means for engagement with said cam to reciprocate said arm means within said rotary member as it is continuously rotated to thereby rotate one of said spools, and said reversing means including means for shifting said cam from a first operating position to a second operating position to cause the arm means to rotate the other of said spools and thereby reverse the direction of feed of the ribbon.

15. A rotary inking device according to claim **14** wherein said reversing means includes a switch actuatable by the increased tension in the ribbon when the ribbon is completely unwound from one of said spools for causing said cam to be shifted between its two operating positions.

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