United States Patent

[11] **3,603,249**

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[54] **FRUIT MARKING MACHINE**
20 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **101/35,** 101/376
[51] **Int. Cl.** **B41f 17/34**
[50] **Field of Search** 101/35, 36–44, 376, 379

[56] **References Cited**

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2,424,006	7/1947	Verrinder	101/40
2,631,535	3/1953	Mumma	101/40 X
2,796,164	6/1957	Hakogi	101/40 X
2,982,203	5/1961	Ahlburg	101/37
3,068,785	12/1962	Ahlburg	101/37
3,094,920	6/1963	Priesmeyer	101/41
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ABSTRACT: A rotary marking device containing a plurality of angularly spaced markers is mounted for rotation above a continuously moving fruit carrying conveyor and is driven so that each marker will be brought into pressure contact with a fruit on the conveyor to imprint an ink mark thereon. Each marker includes a resilient die holder to grip the fruit and a die having a fruit-contacting face with raised indicia thereon, which die is mounted by means of a coil spring to the peripheral face of the die holder. An inking ribbon is rotated adjaCent the marking device for tangential contact with the fruit-contacting faces of the dies to apply ink thereto.

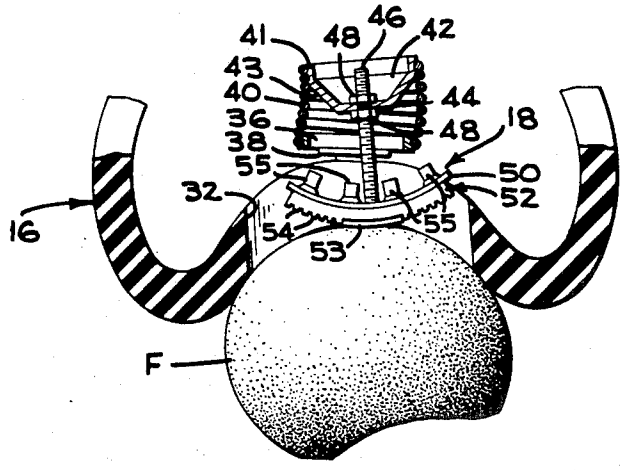

FIG_1

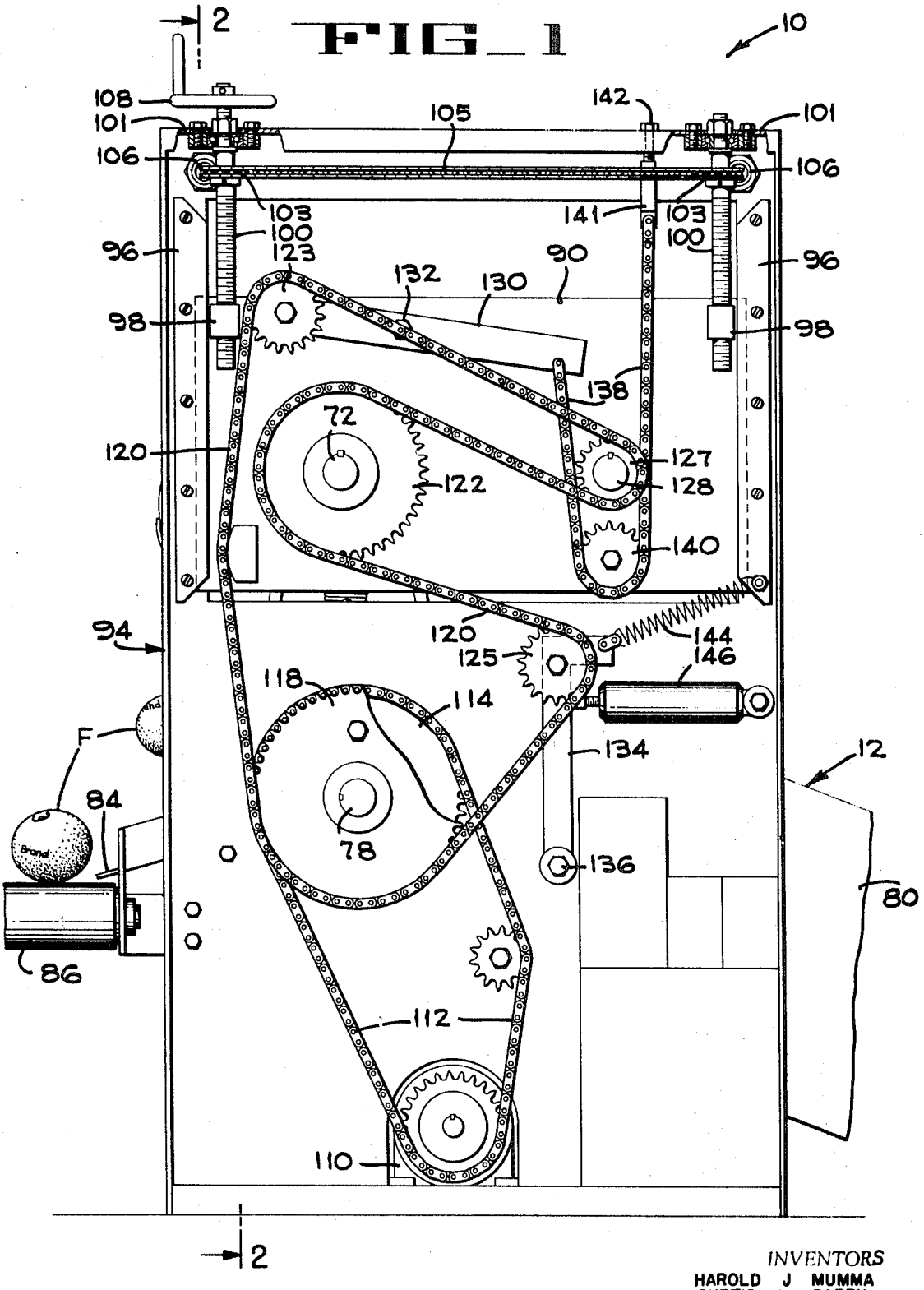

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FIG_2

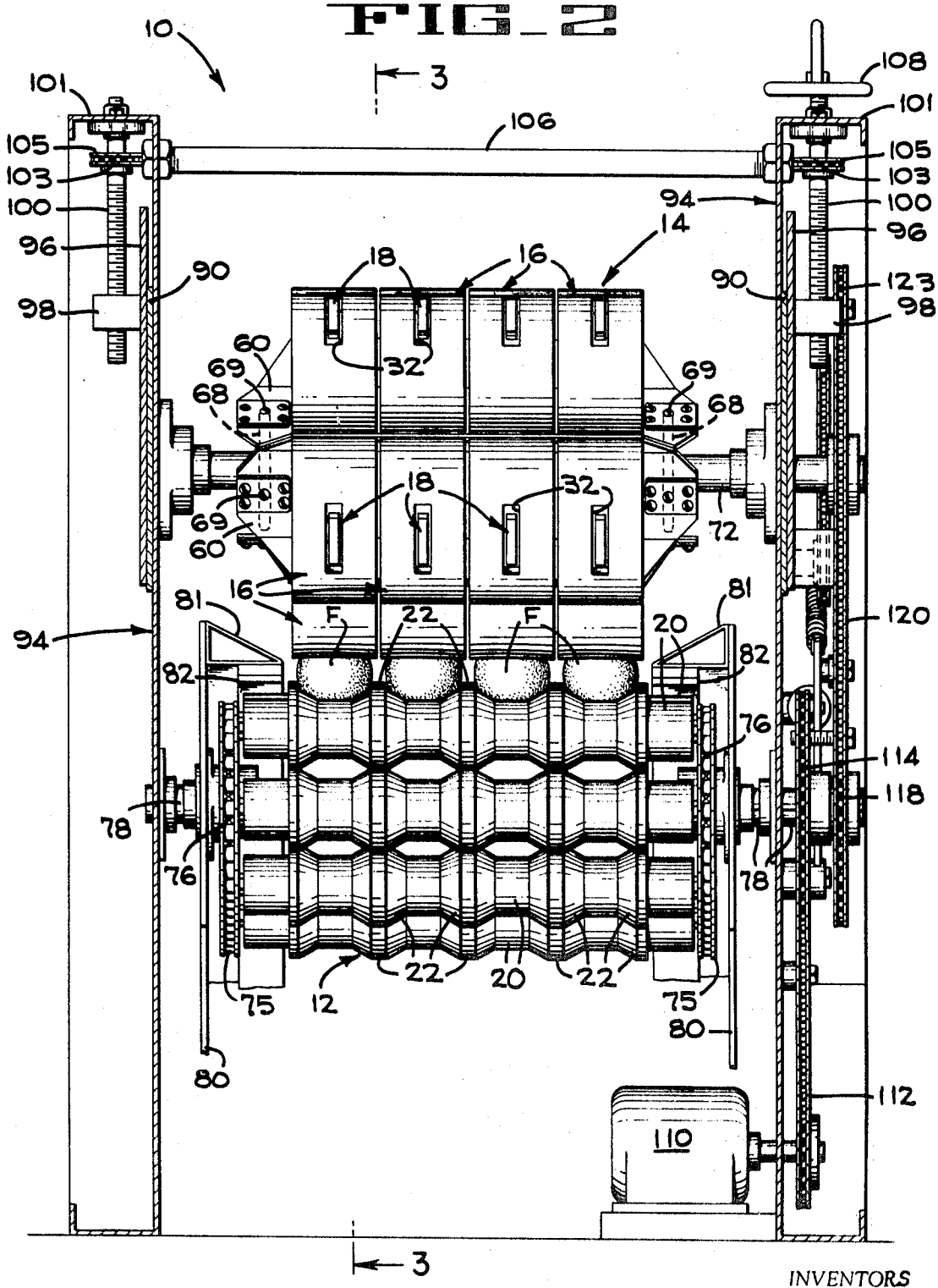

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FIG_3

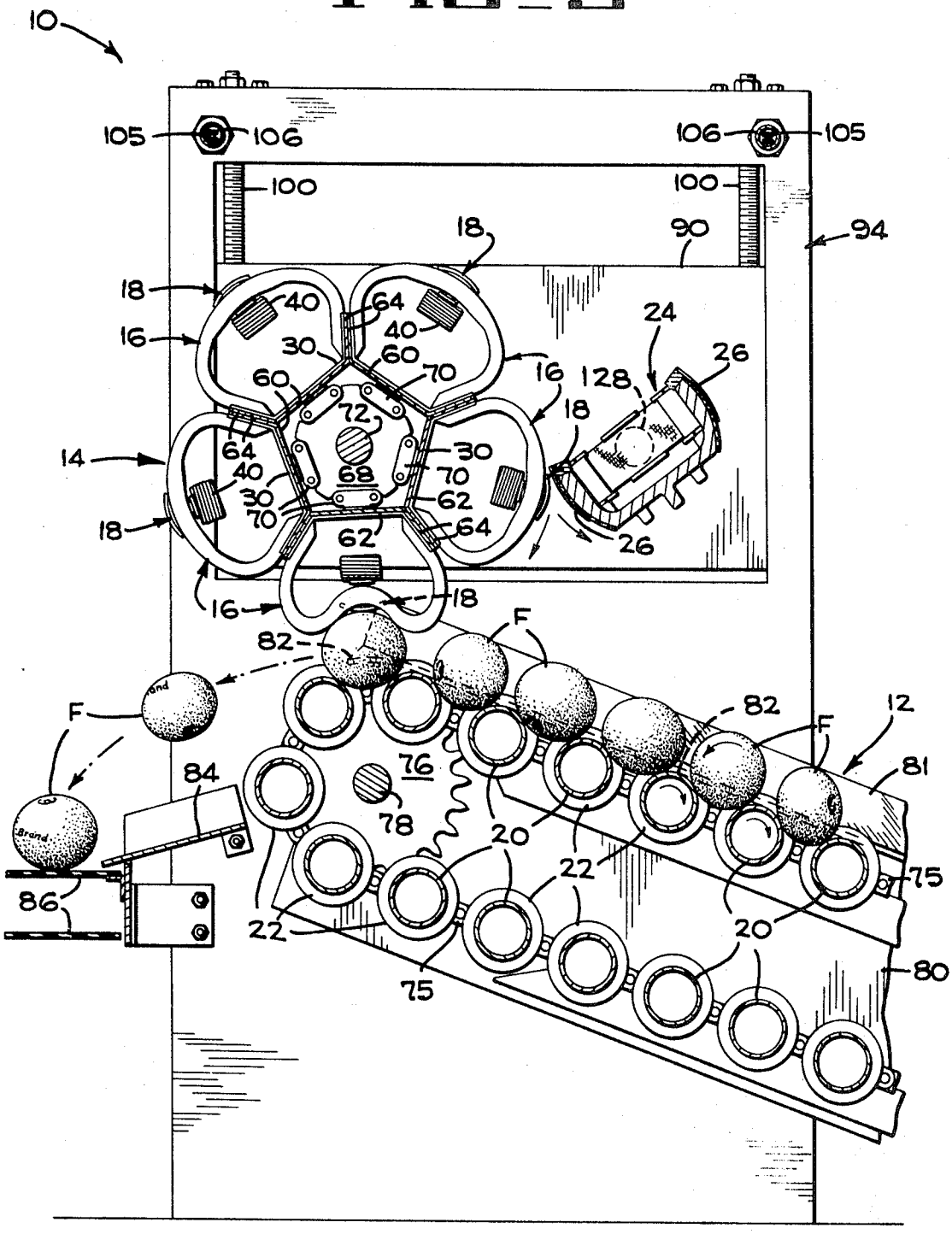

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FIG_4

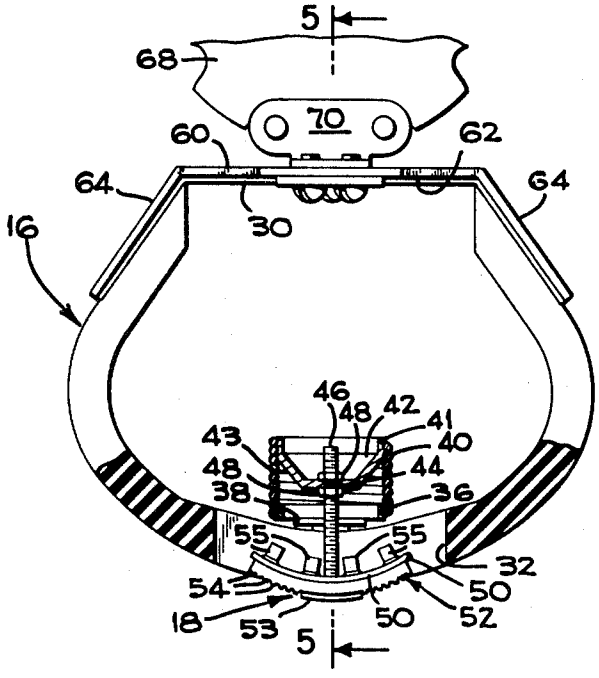
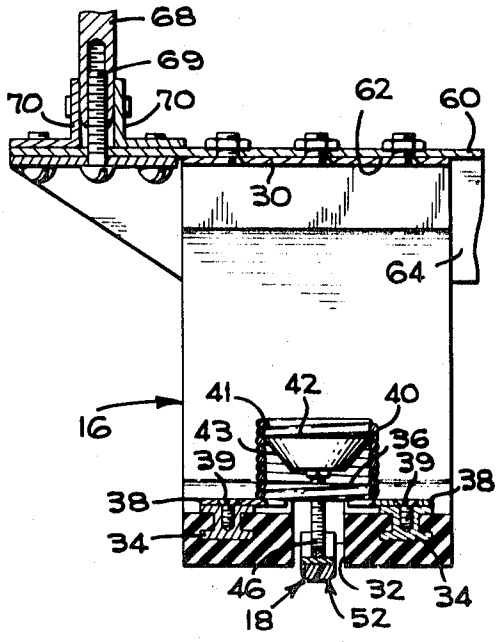


FIG_5



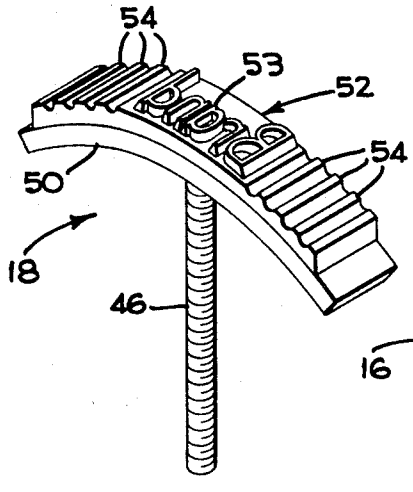
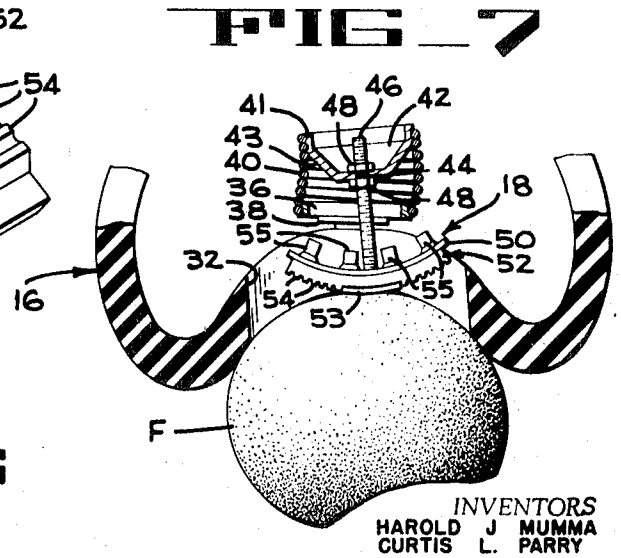


FIG_6

FIG_7



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FRUIT MARKING MACHINE

CROSS-REFERENCE TO RELATED APPLICATION

The present invention concerns a marking structure which is disclosed but not claimed in a U.S. Pat. application of Harold J. Mumma and Curtis L. Parry, Ser. No. 687,870, filed on even date herewith and entitled "Rotary Inking Device." The said application, which is assigned to the assignee of the present invention, is incorporated by reference into the present disclosure for a further and complete description of an inking device which might be sued in cooperation with the marking apparatus 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 printing or marking machines, and ore particularly, it pertains to machines for marking fruit, vegetables, or other nonuniform objects having rounded exterior surfaces.

2. Description of the Prior Art

Machines for printing trademarks or other identifying indicia upon the exterior surfaces of fruit have been utilized for many years by the fresh fruit and vegetable packing industries. A machine which has found wide acceptance in the past is one such as is shown in U.S. Pat. No. 2,830,531 to Tarlton. This type of machine, which is popularly known as the "electric fruit marker," causes the fruit to roll down an inclined ramp and over an electrically heated inking die. A pivotally mounted roller engages the top of the fruit as it passes over the die to control its movement over the die and maintain a predetermined light inking pressure on the die. One important disadvantage of the "electric fruit marker" is the problem of properly heating and maintaining the dies. Furthermore, the structure of the machine is generally complex and cumbersome and its operation is relatively slow and inefficient since it depends upon the free roll of the fruit to the dies for obtaining the transfer of the mark between the die and the fruit skin surface.

A relatively recent modification of the old "electric fruit marker" is shown in U.S. Pat. No. 3,228,325 to Russell. In the machine described in that patent a resilient rotary marking wheel carrying a plurality of spaced dies about its periphery is positioned over a fruit discharge ramp to resiliently grip and apply sufficient marking pressure upon the upper surfaces of the fruit thereon to thus eliminate the need for the heating of the dies. However, the Russell apparatus presents a considerable problem in timing between the rotating marking wheel and the freely rolling fruit. For example, fruit of different shapes will roll at different speeds and differences in the diameters of the fruit will cause different peripheral contact speeds between the face of the die and the surface of the fruit to thereby create a tendency for slipping and skidding to occur with resultant blurring and smearing of the ink marks on the fruit.

Marking machines which eliminate the timing problems involved in attempting to mark freely rolling fruit are disclosed in the U.S. Pat. Nos. to Ahlburg 3,068,785 and Johnson et al. 2,971,459. In the machines disclosed in these patents, the fruit is placed upon a grommeted roller conveyor, and it is marked while it is retained upon the conveyor. A rotary fruit gripping member is mounted above the conveyor at one end thereof to successively engage the spaced fruit on the conveyor with its angularly spaced marking dies. Since the critical timing between the speed of the surface of the fruit and the speed of the face of the marking die in these machines is determined solely by the rotational speeds of the fruit carrying conveyor and the rotary fruit gripping member carrying the dies, it will be apparent that the machines can be properly timed only for fruit of a given diameter during any single operating period. Fruit which is large or smaller than this given diameter will be moved past the die member either at a lesser or greater peripheral speed, respectively, than that of the face of the marking die. Since the die is fixed to the face of the rotary marking device, the tendency for slippage and the resultant blurred marks is pronounced with either the undersized or oversized fruit that are normally present in any commercial run.

Previous attempts to overcome the problem of skidding between the surface of the fruit and the fruit gripping and die carrying member are disclosed in the U.S. Pat. Nos. to Verrinder 2,424,006 and Mumma 2,631,535. The structures described in these patents comprise rotary markers mounted at the end of a spring-loaded pivot arm for pressure engagement with the fruit while it is carried upon a roller conveyor. The dies themselves are mounted at the periphery of the markers for limited movement relative thereto. In the case of the machine disclosed in U.S. Pat. No. 2,424,006, the die is mounted for yieldable radial movement with respect to the rotor but not for tangential or peripheral movement with respect thereto, and therefore the problem of skidding between the surface of the fruit gripping rotor and the skin of the fruit is not solved. In the case of the improved rotor shown in U.S. Pat. No. 2,631,535, tangential movement between die and rotor is permitted to overcome the problems involved in matching the speeds of the die and fruit, but the mounting of the die does not provide a controlled radial pressure upon the surface of the fruit.

A further disadvantage of the latter tow rotary marking devices as well as of the previously discussed prior art marking machines is the absence of significant permissible movement of the marking dies laterally of their direction of movement. This becomes of importance when irregular fruit or fruit having uneven surfaces are processed. If the fruit surface is inclined transversely of the direction of movement of the fruit at the point of contact with the die, the dies of the prior art were distorted under the resultant unevenly distributed stamping pressure and partially blurred or illegible marks were frequently the end result.

SUMMARY OF THE INVENTION

One problem which is encountered by all stamping or marking machines for fruit or other articles which may run in a range of sizes and shapes is the problem of timing the speed of the marking die with the peripheral speed of the fruit at the pint of contact. If the fruit is allowed to roll over the marking die, there are inherent pressure problems connected with the ability of the die to transfer an ink mark onto the fruit. If the fruit is held in pockets or between the rolls of a conveyor, the inherent peripheral speed differential between fruit of a large diameter and fruit of a small diameter produces problems in slippage between the die and the fruit during transfer of the mark. Other problems involved in stamping fruit include the contrasting possibilities of damage to the skin of the fruit if the stamping pressure is too vigorous and the failure to leave a legible mark if the contact between fruit and marking die is not positive enough.

In the present invention, a rotary marking device is provided which includes a plurality of resilient fruit gripping elements angularly spaced about the continuously rotating structure to securely grip the fruit during the marking thereof and maintain it in the proper position, Each of the fruit gripping elements has attached on its outer face a marking die which is spring-mounted to the body of the gripping element for complete flexibility so that it is free to move in any direction with respect to said outer face. With this arrangement, the die can properly mark at any angle of contact if, for example, the fruit has an irregular or inclined surface at the marking position, and the die will remain in contact with the surface of the fruit under a controlled pressure even though slippage may occur between the face of the fruit gripping element and the surface of the fruit.

The present invention has several advantages over the prior art fruit marking machines previously described. Firstly, it permits proper marking of a range of fruit diameters without

requiring any adjustment in the spacing between the marking structure and the conveyor carrying the fruit. This enables the machine of the present invention to handle all of the normally encountered fruit size ranges in any commercial run. The spacing between the marker structure and the fruit carrying conveyor may be adjusted, of course, when the machine is being adapted to handle a different variety of fruit or fruit of an entirely different size range, e.g., the machine may be adjusted to handle at different times citrus fruit ranging from small lemons to large grapefruit. Secondly, the independent spring mounting of the marking die renders the die completely flexible to conform to the peripheral diameter of the fruit and to accommodate its rotational speed to that of the die so as to prevent any slippage therebetween. Consequently, a sharp clean mark will be produced regardless of the diameter of the fruit if it is within the normally encountered range of sizes in any one run. Thirdly, and finally, the independent spring mounting of the die provides a light and controlled pressure of a predetermined amount between the die and the surface of the fruit so that the fruit will be properly marked each time and yet not be subjected to undue pressures which would bruise or cut the skin of the fruit. Again, this predetermined pressure will be approximately the same regardless of the diameter of the particular fruit being marked.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the fruit marking machine of the present invention.

FIG. 2 is a transverse section taken along line 2—2 of FIG. 1.

FIG. 3 is a longitudinal section through the machine of the present invention taken along the line 3—3 of FIG. 2.

FIG. 4 is an enlarged side elevation of one of the fruit gripping members shown in FIG. 2, with portions thereof being broken away for the purpose of illustration.

FIG. 5 is a transverse section taken along the line 5—5 of FIG. 4.

FIG. 6 is an enlarged isometric view of the marking die shown in FIG. 4.

FIG. 7 is a partial side elevation, similar to FIG. 4, but illustrating the fruit gripping member in its compressed position in engagement with the surface of a fruit.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The fruit marking machine **10** of the present invention is depicted in the drawings as it is used to print trademarks or other identifying indicia upon the outer skin surfaces of fruit F, which may be grapefruit as illustrated. It will be apparent from the following description, however, that the scope of the present invention is not limited to the marking of any particular type or variety of fruit since the marking device may be used to mark citrus fruit of all types, such as oranges, lemons and tangerines, as well as such diverse products as apples, avocados, melons, etc., or any other articles which have a rounded exterior surface and which are available for marking in bulk supplies of diverse sizes and/or shapes.

In the marking of fruit with the marking machine of the present invention, a conveyor **12** is provided to carry a plurality of fruit in longitudinally spaced pockets to a position beneath a rotary marking wheel **14** which is generally comprised of a plurality of aligned transverse rows of angularly spaced fruit gripping members **16** each carrying a marking die **18** centrally positioned upon its outer, arcuate periphery. The fruit carrying conveyor is a conventional grommeted roller conveyor and is comprised of a plurality of rotatable rollers **20** between which the fruit are received. At paced positions along the rollers (FIGS. 2) grommets **22** of a rubber or rubberlike material are fixed about the cylindrical roller surface to from enlarged portions thereon and define a series of pockets spaced along the length of each pair of adjacent rollers. As can be seen from FIG. 2, there are four fruit carrying pockets between each pair of rollers to thereby form four lanes of fruit being fed to the marking wheel. It will be apparent that there are four sets of angularly mounted fruit gripping members **16** spaced transversely of the marking wheel with each of the sets of fruit gripping members corresponding to and being vertically aligned with one of the lanes on the fruit carrying conveyor.

The marking dies **18** are provided with type on their outer surface which is supplied with ink, and, as each fruit gripping member is rotated into a position directly above the surface of the conveyor, the die attached to its outer face will be carried into compressive engagement with the uppermost surface of the fruit to transfer an ink mark thereto corresponding to the configuration of said type. As best seen in FIG. 3, an inking member **24** is mounted for rotation adjacent to the marking wheel structure, the inking member being provided with an ink carrying ribbon **26** extending along its opposed arcuate faces for compressive engagement with each of the dies on the marking wheel to transfer ink thereto just prior to their engagement with the fruit on the conveyor.

An important feature of the present invention is the construction and operation of the fruit gripping member **16** and its associated marking die **18** which are shown in detail in FIGS. **4** and **5**. The fruit gripping member comprises a resilient, U-shaped member of rubberlike material which is rigidly attached at its free end portions within the outwardly extending legs of a channel-shaped base member **30**. By way of example, a 40 Durometer (Shore Scale) neoprene may be used for the material of the fruit gripping member. A rectangular slot **32** is cut in the outer face of the fruit gripping member to provide a space for the mounting of the die. Molded within the inner face of the fruit gripping member adjacent to the slot **32** are a pair of fasteners **34** having threaded bores extending therein. A ring-shaped mounting member **36** is attached to the interior surface of the fruit gripping member to straddle that slot (FIG. 5) by means of a pair of rigidly attached, laterally extending flanges **38** which are tightly secured to the fasteners **34** by means of countersunk screws **39**. A coil spring **40** is securely attached at one end to the mounting ring **36** and is attached at its other end to the cylindrical base **41** of a generally conically shaped mounting member **42**, the spring being free for axial extension between the two mounting members. The mounting member **42** includes a tapered portion **43** which projects toward the ring-shaped mounting member **36**. An axially located aperture **44** at the apex of the conical mounting member is provided for reception of a threaded shank **46** of the die member. Lock nuts **48** are rotatably received upon the threaded shank to adjustably fasten the die onto the mounting member **42** and, therefore, resiliently mount the die to the face of the fruit gripping member **16** through the coil spring **40**. The coil spring is relatively weak in comparison with the inherent compressive force in the resiliently compressible fruit gripping member so that the die will be free to move either laterally or longitudinally of the slot **32** if the fruit being stamped should slip or skid upon the surface of the fruit gripping member after initial stamping contact therebetween thus allowing the die to follow the fruit to prevent blurring of the mark. The spring should only create a sufficient force on the die to assure a proper transfer of the mark to the fruit without bruising the fruit or cutting its skin, and this force has been found to be approximately 1 to 2 pounds for stamping citrus fruit such as oranges or grapefruit.

The die **18** (FIG. 6) is seen to comprise an arcuately shaped mounting plate **50** which is carried at the end of the threaded shank **46** and which serves to mount a plastic marker **52** upon its outer surface. The upper surface of the marker includes type **53** formed to indicate the trademark or other identifying indicia to be applied to the fruit and adapted to receive ink from the inking member **24** to transfer it to the surface of the fruit. Also formed upon the surface of the marker at its ends are a plurality of transverse ridges **54** which are intended to prevent slippage between the die and the fruit surface both at the moment of initial contact and when the pressure is re-

lieved and the die is being removed. As best seen in FIG. 4, the marker projects through the slot 32 so that its outermost surface is spaced radially outwardly of the outer surface of the fruit gripping member by a slight distance which has been set at about one-eighth inch to three-sixteenth inch in practice for achieving excellent marking results. The resilient marker 52 is attached to the rigid mounting plate 50 by means of flanged plugs 55 which are integral with marker and which are forced through aligned apertures in the mounting plate 50.

As pointed out previously, each of the fruit gripping members 16 is secured to a U-shaped base member 30. The base members, in turn, are bolted to the flat inner faces 62 of channels 60 which extend across the width of the marking wheel 14 and carry a row of fruit gripping members in end-to-end alignment. Each of the channels includes outwardly extending legs 64 which are placed in engagement with the legs of the channels carrying the adjacent rows of fruit gripping members, as best shown in FIG. 3, so that five equiangularly spaced channels form the structure of the marking wheel. Each end of each channel is secured to a sprocket 68 by means of a bolt 69 FIG. 5 which is threaded radially into the rim of the sprocket and by a pair of angle brackets 70 which are interconnected for reception about one of the teeth of the sprocket adjacent the bolt 69 and are fixed to the inner faces of the channels. The sprockets are keyed to a drive shaft 72 which is arranged to be continuously driven at a predetermined speed during operation of the machine so as to bring each row of fruit gripping members and their associated dies into properly timed engagement with a transverse row of fruit on the conveyor 12.

The fruit carrying conveyor 12 which transports the fruit to the marking wheel 14 is arranged to receive fruit at one end thereof (not shown) and the grommeted rollers which are carried in an upwardly inclined direction are axially rotated to cause the fruit to gravitate into the pockets between the rollers. It will be appreciated that continuous axial rotation of the rollers will also cause continuous rotation of the fruit, and this rotation is such that the peripheral surface of an average sized fruit will be moved at approximately the same linear speed as the speed of the outer peripheral surface of a marking die 18 at the moment of contact with said fruit surface. In order to accomplish this desired rotation of the rollers, each end thereof is freely rotatably carried by an endless conveyor chain 75 (by means of a conventional conveyor chain pin attachment and rotatable bearing at the ends of the rollers, not shown), with each chain being grained about a drive sprocket 76 at its upper end. The drive sprockets are keyed to a drive shaft 78 which is arranged to be continuously driven during the operation of the machine. Flat side frame members 80 are positioned at each side of the conveyor outwardly of the drive sprockets and include at their upper edges a pair of inwardly extending guide ramps 81 (FIG. 2) which support sponge rubber pads 82 from their lowermost surfaces. The pads extend parallel to the upper run of the conveyor and are arranged to be resiliently engaged by the lateral edges of the rollers. It will be apparent that the continuous linear movement of the conveyor chains will cause the rollers to be rotated in a clockwise direction (as viewed in FIG. 3) to, in turn, cause the fruit, which is supported between the rollers in engagement with the grommets 22, to be rotated in a counterclockwise direction as it is passed beneath the marking wheel 14. Conveyor drive shaft 78 is driven so that the linear speed of the conveyor will be approximately half the linear speed of the dies on the marking wheel since the fruit surfaces will be moved at a linear or peripheral speed that is approximately twice that of the conveyor. Consequently, the fruit will be moving at approximately the same peripheral speed as the dies when they are rotated into engagement at the upper end of the conveyor (as shown in FIG. 3). Fruit which is then marked will be propelled off the edge of the conveyor as the rollers pass over the drive sprockets 76 and will gravitate onto a drop board 84 to a take away conveyor 86 extending transversely to the fruit carrying conveyor.

In order to mount the marking wheel 14 for proper engagement with the fruit, the marking wheel drive shaft 72 is rotatably supported at its opposite end portions upon opposed side plates 90 which are slidably carried upon the outer faces of a pair of upright frame members 94 positioned at each side of the marking wheel and conveyor structure. Each frame member carries a pair of vertical brackets 96 which are spaced slightly from the face of the frame member to accommodate the slidable side plate 90. A pair of internally threaded mounting blocks 98 are affixed to the upper corner of each of the side plates and are arranged to receive threaded studs 100 which are rotatably received but prevented from axial movement within outwardly extending top flanges 101 of the frame members, one stud being positioned at each corner of the frame structure. A small sprocket 103 is setscrewed onto each of the studs near its upper end and an endless conveyor chain 105 interconnects each of these sprockets to link each of the four studs for simultaneous rotation, the chain passing through conduit sections 106 to interconnect the two frame members. One of the studs (FIG. 1) is provided with a crank 108 at its upper end so that it can be manually rotated to thereby simultaneously rotate all of the studs in order to raise or lower the side plates and adjust the spacing of the marking wheel with respect to the fruit carrying conveyor.

In order to drive the aforedescribed apparatus a motor 110 is mounted at the base of the machine to drive an endless chain 112 which is trained at its upper end about a sprocket 114 that is keyed to one end of the shaft 78 driving the fruit carrying conveyor 12. Also mounted for rotation with the drive shaft 78 is a sprocket 118 which is bolted to the sprocket 114 and is in driving engagement with an endless drive chain 120 that is trained about a sprocket 122 keyed to the projecting end of the shaft 72 driving the marking wheel. Drive chain 120 is also drivingly engaged with movable idler sprockets 123 and 125 and a sprocket 127 which is keyed to the laterally projecting extension of a drive shaft 128 carrying the inking member 24 and supplying continuous rotary movement thereto. Idler sprocket 123 is rotatably pinned to the end of a pivot lever 130 which is pivotally mounted at its midsection upon a pin 132 projecting from the adjacent, vertically movable side plate 90. Idler sprocket 125 is rotatably pinned upon the upper end of a pivot lever 134 which is rotatably mounted through a pivot shaft 136 at its lower end to the adjacent fixed side frame member 94. The floating idler sprockets 123 and 125 permit proper adjustment of the drive chain when the side plates carrying the marking wheel are adjusted vertically. The pivot lever 130 that supports idler sprocket 123 at one end thereof has a timing chain 138 attached to its opposite free end which chain is trained about an idler sprocket 140 that is rotatably mounted upon the movable side plate. The opposite end of the timing chain is affixed to a connector 141 that is threaded onto the lower end of a bolt 142 loosely anchored in the top flange 101 of the fixed side frame structure It can be seen that vertical adjusting movement of the side plates 90 will cause the lever 130 to pivot but that the timing chain, through its connection with idler sprocket 140, will maintain tension upon the lever regardless of the direction of movement of the side plate; consequently, proper timing can be maintained between the conveyor drive and the drives for the marking wheel and inking member during adjustments in the vertical positioning of the marking wheel. To change the timing between the marking wheel and the conveyor, the bolt 142 is rotated to increase or decrease the effective length of the timing chain and thereby rotate the marking wheel drive sprocket 122 with respect to the conveyor drive sprocket 118. Idler sprocket 125 which is mounted upon the end of pivot lever 134 serves as a takeup member with the lever being connected by a tension spring 144 to the side frame structure to permit the idler sprocket to float and maintain the proper tension throughout the drive chain 120 in any of its adjusted positions. A dashpot 146 is also pivotally connected between lever 134 and the side frame structure to prevent the drive chain from pulling ahead too rapidly when the marking wheel drive shaft

is urged forwardly under the impetus of the fruit being marked.

The inking member **24**, which is carried by the shaft **128**, includes the inking ribbon **26** extending across the oppositely positioned, arcuate faces, as previously pointed out. The inking member is rotated in timed relationship with the marking wheel through the aforedescribed driving system so that each transverse row of dies **18** will be brought into compressive engagement with the inked ribbon to transfer the ink therefrom about a quarter of a revolution before the dies engage the fruit upon the conveyor (FIG. 3). It will also be understood that the inking member is rotated at a speed such that its opposite faces will be placed in engagement with successive rows of dies upon the marking wheel. For further details of the structure and operation of the ribbon-type inking member **24** reference is made to the hereinbefore mentioned copending Pat. application of Mumma and Parry, Ser. No. 687,870. While the described inking member **24** is particularly useful with the marking device of the present invention, other types of ink transferring devices, such as are shown in the aforementioned prior art fruit marking structures for example, may be substituted therefor.

In summarizing the operation of the present marking machine, the aligned rows of dies **18** are seen to be continuously rotated into positions directly above the fruit which is moved by and rotated upon the conveyor **12**. The dies are brought into tangential engagement with the uppermost fruit surfaces to transfer an ink mark from the inked type **53** to the skin of the fruit. The fruit gripping members **16** which surround the dies will engage the face of the fruit and will rotate therewith, the gripping members readily yielding under the force of the fruit. The dies are supported within the fruit gripping members by the coil springs **40** which maintain a predetermined marking pressure upon the die. An important feature of the present invention is the permissible movement of the die relative to the fruit gripping member through shifting of the coil spring. It will be recognized that variations in the outer diameters of the fruit result in movement of their surfaces and movement of the die surfaces at the time of marking at varying peripheral speeds because of the radial shifting of the point of contact from the centers of rotation of drive shafts **78** and **72**, and that variations in speed between fruit and die will cause the fruit to tend to slip relative to the fruit gripping member during engagement. In FIG. 7, the condition is shown wherein the fruit gripping member has skidded slightly forward on the fruit surface after initial contact. Since the force exerted by coil spring **40** that supports the die is relatively weak as compared with the force exerted by the fruit gripping member, the die will follow the movement of the fruit rather than the movement of the gripping member to allow the die to shift rearwardly relative to the gripping member when the gripping member slips forwardly on the fruit, as will be apparent from FIG. 7. The coil spring also permits pivotal movement of the dies transversely of the movement of the fruit on the conveyor, and such permissible pivotal movement is particularly important during the marking of highly irregularly shaped fruit or fruit with surface imperfections which cause a transversely sloping fruit surface to be presented to the die. It should be noted that this pivotal shifting of the die is accomplished in the coil spring alone, and the die will continue to engage the surface of the fruit with a controlled, evenly distributed pressure. As the marking die leaves the face of the fruit, the ridges **54** on the inked marker **52** prevent skidding once the pressure of the fruit gripping member is relieved. The fruit is then discharged over the end of the conveyor, in the manner shown in FIG. 3, to the cross conveyor **86** where it is carried to packing stations or further processing stations.

It will be seen that the apparatus of the present invention provides a device for rapidly and efficiently marking fruit whereby the blurred and illegible marks which have plagued the prior art machines will be virtually eliminated. The marking die is mounted for yieldable movement in a novel manner so that the die will follow the face of the fruit even though slippage occurs between the fruit and the marking wheel structure during the transfer of the mark or even when the marking surface of the fruit is irregular or sloping at an angle to the plane of the fruit carrying conveyor. In practice, it has been found that the presently described marking machine can leave a legible mark even in the indented portion at the stem end of a fruit such as an orange, for example. As a consequence of the described free-floating die mounting, a completely legible mark is achieved and a wide variety of fruit sizes and shapes may be passed through the machine during a single commercial run without any intervening adjustments being required.

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.

I claim:

1. A fruit marking device comprising a resilient fruit gripping member having an outer face, means for rotating said gripping member to bring said face into pressure engagement with a moving fruit surface, a marking die for contact with said fruit surface to transfer an ink mark thereto, and means for yieldably mounting said die upon said gripping member adjacent to but in laterally spaced relationship with said face and so that it is free for limited movement relative to said face in any tangential direction, said mounting means maintaining a force upon said die in a direction normal to the surface of said gripping member and providing a predetermined transfer pressure upon said die during the marking of said fruit surface generally independent of the amount of force created by said pressure engagement of the gripping member with said fruit surface.

2. A fruit marking device according to claim **1** wherein said mounting means comprises a spring secured at one end to said die and at the other end to said fruit gripping member.

3. A fruit marking device according to claim **1** wherein said fruit gripping member comprises a tubular structure of rubberlike material which is adapted to partially collapse when it is in said pressure engagement with the surface of a fruit.

4. A fruit marking device according to claim **3** wherein said outer face of the fruit gripping member has an aperture therein, and wherein said die is mounted so that it extends within said aperture spaced from the sidewalls thereof.

5. A fruit marking device according to claim **4** wherein said die includes a marking head positioned adjacent to said outer face of the fruit gripping member and a supporting shank extending within said fruit gripping member, a coil spring securely attached to the projecting end of said supporting shank and securely attached at its other end to the inner face of said fruit gripping member adjacent said aperture whereby said supporting shank extends axially within said spring.

6. A fruit marking device according to claim **2** wherein said die comprises an arcuately shaped marking head and a supporting shank extending transversely thereto, said shank being supported within said fruit gripping member by said spring so that said marking head is floatingly mounted adjacent to the outer face of said gripping member.

7. A fruit marking device according to claim **6** wherein said die marking head includes at the center of its arcuate outer surface a raised pattern defining the desired indicia to be applied to the fruit surface, and transverse ridges at the ends of said arcuate outer surface of said marking head to prevent the die from slipping upon the fruit surface both during initial contact with the fruit and when the die is removed therefrom.

8. A fruit marking device comprising a marking wheel, a plurality of resilient fruit gripping members angularly spaced about the periphery of said wheel, said gripping members each having an arcuately shaped outer surface, means for continuously rotating said wheel to bring said outer surfaces of the gripping members into pressure engagement with moving fruit surfaces, a plurality of marking dies each being provided with arcuate marking surfaces for contact with said fruit surfaces to transfer ink marks thereto, and means for yieldably mounting

each of said dies to one of said fruit gripping members so that said arcuate surface of the die is positioned adjacent to but laterally spaced from said outer surface of the gripping member so that said surface of the die is free for limited movement relative to the surface of the gripping member in any tangential direction, each of said mounting means maintaining a force upon its associated die in a direction normal to the outer surface of the adjacent gripping member and providing a predetermined transfer pressure upon, the die during the marking of a fruit surface generally independent of the amount of force created by the pressure engagement of the associated fruit gripping member with said fruit surface.

9. A fruit marking device according to claim 8 wherein said fruit gripping members each comprise a tubular structure of rubberlike material which is adapted to partially collapse when it is in said pressure engagement with the surface of a fruit and wherein said outer surface of each fruit gripping member has an aperture therein with said die being mounted within said aperture and spaced from the sidewalls thereof.

10. A fruit marking device according to claim 9 wherein said mounting means comprises a spring and wherein each of said marking dies includes a mounting portion extending radially of said arcuate surface of the die within its associated fruit gripping member, said spring mounting the inner end of said die mounting portion to said gripping member.

11. A fruit marking device according to claim 10 wherein each spring comprises a coil spring surrounding said mounting portion of the marking die and being secured at its outer end to the inner face of the associated fruit gripping member adjacent to said aperture.

12. A fruit marking device according to claim 8 wherein said arcuate outer surface of each die includes at its center portion a raised pattern defining the desired indicia to be applied to the fruit and at its end portion transverse ridges to prevent the die from slipping on the fruit surface both during initial contact with the fruit and when the die is removed therefrom.

13. A fruit marking machine comprising a marking wheel, a plurality of resilient fruit gripping members angularly spaced about the periphery of said wheel, said gripping members each having an arcuately shaped outer surface, conveyor means for carrying a plurality of uniformly spaced fruit beneath said marking wheel, said conveyor means including means for rotating said fruit while they are passed beneath said marking wheel, drive means for continuously rotating said marking wheel in timed relationship with the movement of said conveyor means to bring said surfaces of successive gripping members on said wheel into pressure engagement with successive fruit upon said conveyor means, a plurality of marking dies each being provided with arcuate marking surfaces for rolling contact with the surfaces of said fruit, means for yieldably mounting each of said dies to one of said fruit gripping members so that said arcuate surface of the die is positioned adjacent to but laterally spaced from said outer surface of the gripping member so that said surface of the die is free for limited movement relative to the surface of the gripping member in any tangential direction, each of said mounting means maintaining a force upon its associated die in a direction normal to the outer surface of the adjacent gripping member and providing a predetermined transfer pressure upon the die during the marking of a fruit surface generally independent of the amount of force created by the pressure engagement of the associated fruit gripping member with the fruit surface, and means for applying ink to said surfaces of said dies for transfer to said fruit surfaces.

14. A fruit marking machine according to claim 13 wherein each of said fruit gripping members has an aperture in its said outer surface, said dies being mounted for radial movement within said apertures and in spaced relationship to the sidewalls thereof.

15. A fruit marking machine according to claim 14 wherein said mounting means comprises a spring and wherein each of said marking dies includes a mounting portion extending radially of said arcuate surface of the die within its associated fruit gripping member, each spring mounting the inner end of a die mounting portion to the associated gripping member.

16. A fruit marking machine according to claim 15 wherein each spring comprises a coil spring surrounding said mounting portion of the marking die and being secured at its outermost end to said associated fruit gripping member adjacent to said aperture.

17. A fruit marking machine according to claim 15 wherein said arcuate marking surface of each die includes at its center portion a raised pattern defining the desired indicia to be applied to the fruit and at its end portions transverse ridges to prevent the die from slipping on the fruit surface both during initial contact with the fruit and when the die is removed therefrom.

18. A fruit marking machine according to claim 13, said marking wheel being mounted for adjustable vertical movement with respect to said conveyor means, and means for automatically adjusting said drive means during adjustment of the vertical position of said marking wheel to maintain a proper timing relationship between said marking wheel and said conveyor means.

19. A fruit marking machine according to claim 18 wherein said drive means includes a drive chain and wherein said means for automatically adjusting said drive means includes a pivot lever rotatably supporting said drive chain at one end thereof, a timing chain secured to the other end of said lever, and an idler sprocket mounted for movement with said marking wheel and for driving engagement with said timing chain.

20. A fruit marking machine according to claim 13 wherein said conveyor means comprises a roller conveyor with said fruit being received between the adjacent rollers forming the structure of the conveyor, said rollers being axially rotated to cause rotation of the fruit received therebetween.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,603,249 Dated September 7, 1971

Inventor(s) HAROLD J. MUMMA ET AL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the abstract, line 10, change "adjaCent" to -- adjacent --.
Column 1, line 12, change "sued" to -- used --.
Column 1, line 19, change "ore" to -- more --.
Column 1, line 43, change "3,228,325" to -- 3,228,324 --.
Column 2, line 27, change "tow" to -- two --.
Column 2, line 45, change "pint" to -- point --.
Column 2, line 62, change the comma to a period after "position".
Column 3, line 69, change "paced" to -- spaced --.
Column 3, line 70, change "(Figs. 2)" to -- (Fig. 2) --.
Column 3, line 71, change "from" to -- form --.
Column 4, line 1, insert -- also -- after "will".
Column 5, line 22, change "Fig. 5" to -- (Fig. 5) --.
Column 5, line 47, change "grained" to -- trained --.
Column 6, line 55, insert a period after "structure".
Column 8, line 25, delete "and".

Signed and sealed this 1st day of August 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents