

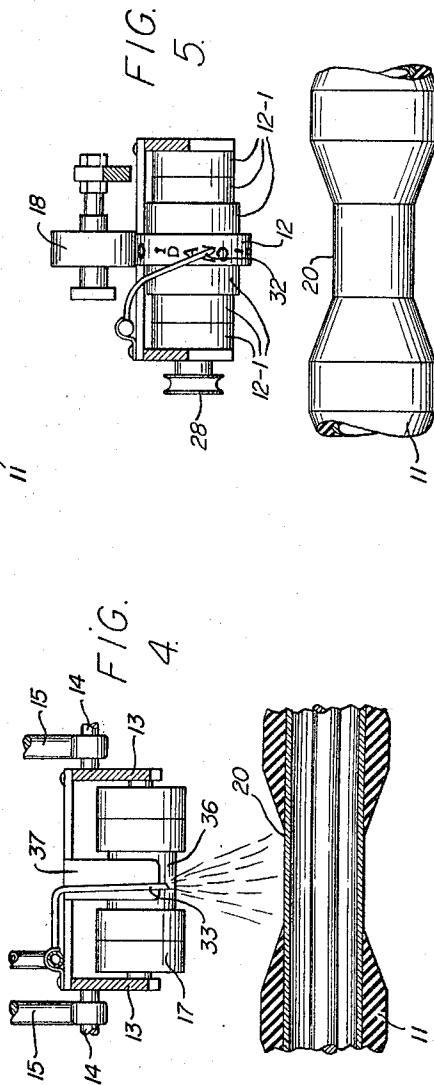
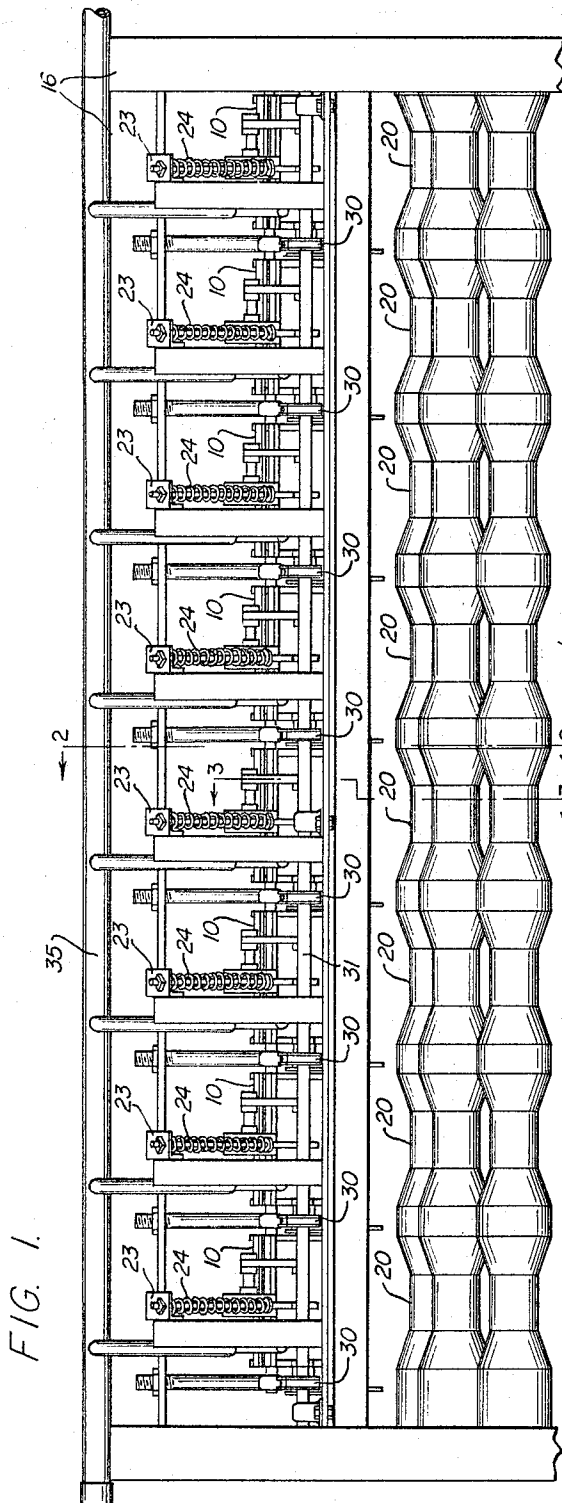
May 7, 1968

D. E. EVERINGHAM
MACHINE AND METHOD FOR MARKING FRUITS AND VEGETABLES AND THE
LIKE, PARTICULARLY POTATOES

3,381,610

Filed Sept. 13, 1966

3 Sheets-Sheet 1



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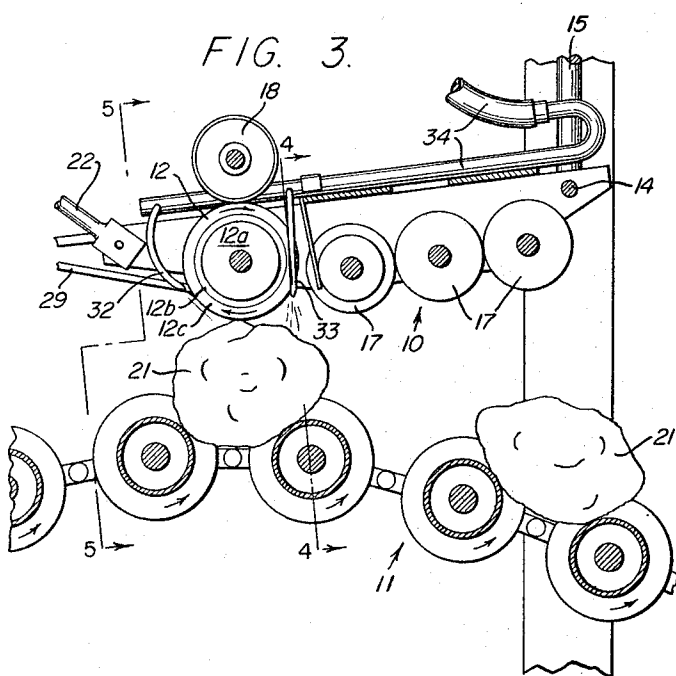
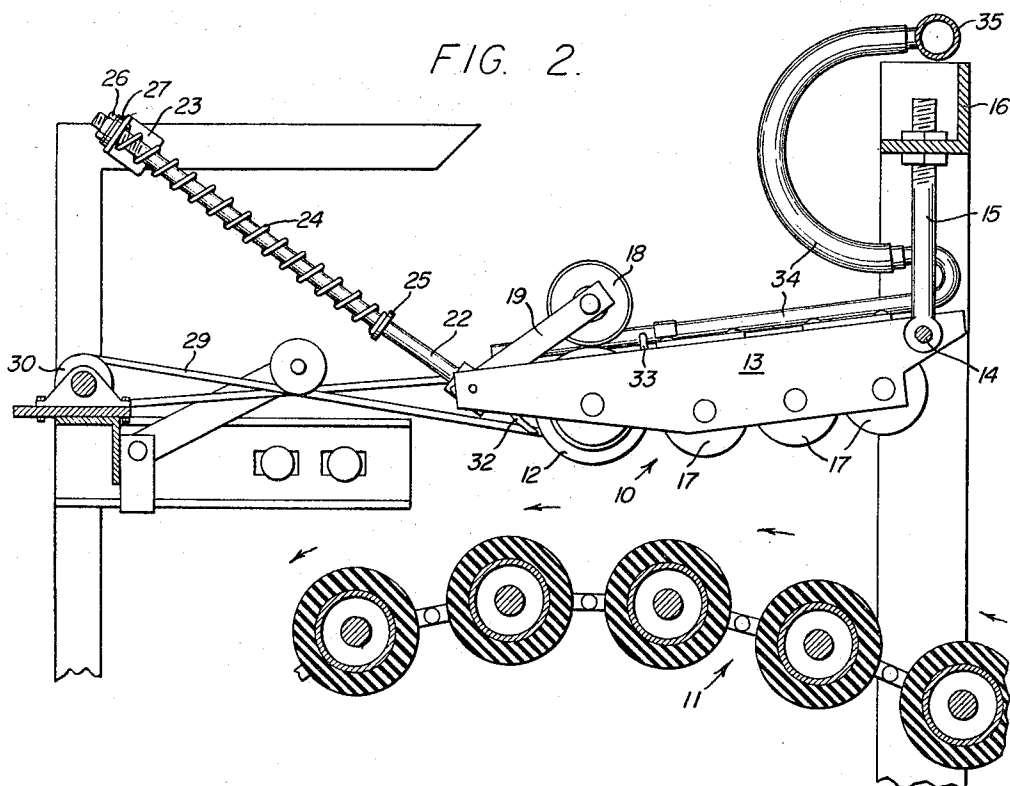
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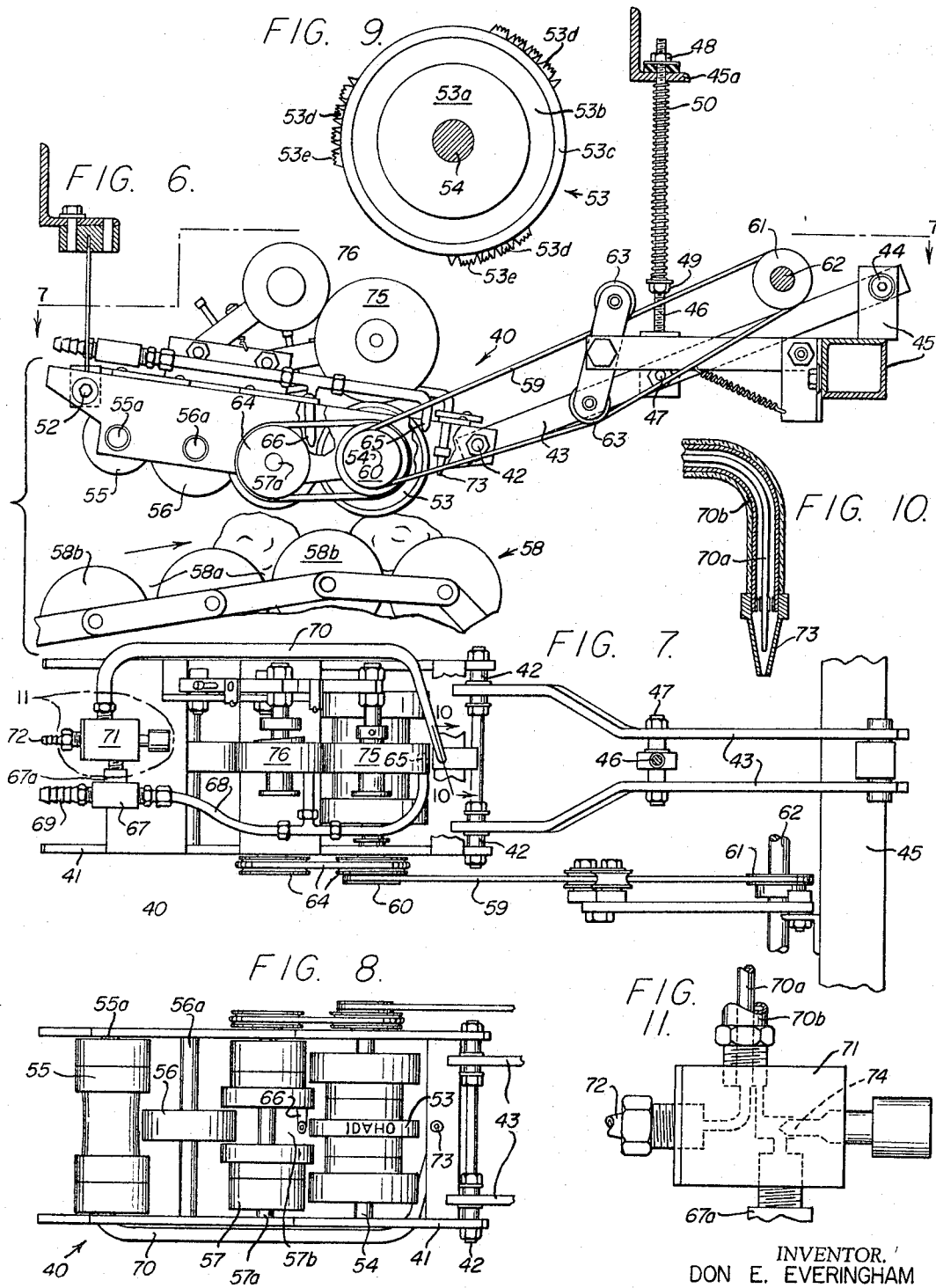
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3 Sheets-Sheet 3



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MACHINE AND METHOD FOR MARKING FRUITS AND VEGETABLES AND THE LIKE, PARTICULARLY POTATOES

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Continuation-in-part of application Ser. No. 461,380, June 4, 1965. This application Sept. 13, 1966, Ser. No. 589,152

19 Claims. (Cl. 101—35)

ABSTRACT OF THE DISCLOSURE

A method and machine for marking potatoes and other generally similar items wherein individual items to be marked are conveyed sequentially under a printing die. The die is mounted at one end of an elongate marking head that is yieldably and resiliently mounted to move upwardly and downwardly in accordance with various sizes of the respective items to be marked. A series of pilot rollers, formed for cushioned gripping action on the items passing thereunder, are mounted on the marking head in advance of the printing die so as to firmly hold the individual items as they are advanced toward and under the die. The items to be printed are usually washed prior to the printing operation and are wet or moist when passed to the printing die. At the feed side of the printing die, a blast of air is directed against the localized portion to be printed of the item, for drying such area and holding surrounding moisture back as the item is fed under the printing die. The marking ink is normally of a type that coagulates at a temperature below a predetermined minimum. In order to prevent ink deterioration upon application to the item, the blast of air and the printing die are heated to a temperature that will maintain the ink above the specified minimum temperature. The printing die is advantageously heated by means of a jet of heated air directed against the printing die.

This invention relates to marking machines and methods and is concerned with providing a new and improved machine and method for marking fruits and vegetables, particularly potatoes, and for various other items having generally similar characteristics. The present application is a continuation-in-part of my copending application Ser. No. 41,380, filed June 4, 1965, entitled, "Marking Machine for Fruits and Vegetables, Particularly Potatoes" and now abandoned.

Various constructions for machines of this type are known. However, there has not heretofore been available a machine of reasonable cost that will satisfactorily mark potatoes on a mass production basis. There is great need for such a machine, especially in the State of Idaho which is desirous of having potatoes grown there and shipped elsewhere marked with the designation "Idaho."

A feature of the invention is the preparation of a localized area on each potato for marking, e.g. by the cleaning, drying of superficial moisture from, and by the heating of such a localized area by means of preliminary washing and the directing of a blast of air on potatoes as they travel single-file toward a marking device, which may be an inked printing wheel, hot brand, etc. It is also advantageous to direct a blast of air on the printing wheel following each printing operation to clean it of any adherent material.

Another feature is the mounting of the marking device at the downwardly urged but upwardly yieldable end of an elongate marking head, under which the potatoes are carried by suitable conveyor means, such as a roller con-

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veyor of conventional type, and the provision of a series of cushioned pilot rollers on such head in advance of the marking device, so as to pre-place such marking device at a level suitable for each potato as it travels thereunder, regardless of variations in size of the potatoes, and so as to firmly direct and hold the potatoes for marking. It is preferred that the marking head be articulatively and resiliently mounted at both ends, so the marking device rises substantially vertically as the items to be marked pass under the pilot rollers toward and under the marking device.

An optional feature, depending upon the type of marking, is a provision for applying (preferably by spraying) a protective coating material over the freshly applied mark.

Although it is normally more economical to use an inked printing roller as the marking device, rather than an electrically heated hot brand roller which must be maintained at high temperature in order to instantaneously burn a clear-cut and legible mark in each potato as it passes, either of these types of marking devices is preferred. In either instance, the blast of air previously mentioned serves an additional purpose. In the case of an inked printing wheel, it tends to accelerate drying of the ink and, if heated to a proper temperature, depending upon the type of ink utilized, prevents the normally cold and damp potato from having a destructive effect on the wet ink immediately following its application to the potato. In the case of a hot brand, the relatively cool air protects the pilot rollers from excessive heat so they can be made of or covered with a rubber-like cushioning material, as has been found functionally advantageous.

A further optional feature of the invention is the making of the type or marking portions of the printing wheel with spines or fingers of a stiff but yieldable material, such as a nylon or polyethylene plastic, projecting from the raised, type surfaces thereof so as to grip by slightly indenting the surface of the potato during the marking operation and thereby prevent any smearing that might otherwise occur due to slippage between the raised, type surfaces and the surface of the item being marked.

It has also been found advantageous to arrange the pilot rollers and printing wheel in a particular way and to arrange the drive so the potatoes will be held tightly and be properly placed during the respective marking operations.

There are shown in the accompanying drawings specific embodiments of potato marking machines of the invention, representing what are presently regarded as the best mode of carrying out the invention in practice. From the detailed description of these, other more specific objects and features of the invention will become apparent.

In the drawings:

FIG. 1 represents a fragmentary elevation of one embodiment of the invention, looking into the discharge end of the machine;

FIG. 2, a fragmentary vertical section taken on the line 2—2 of FIG. 1 and drawn to a larger scale;

FIG. 3, a similar view taken on the line 3—3 of FIG. 1;

FIG. 4, a fragmentary vertical section taken on the line 4—4 of FIG. 3;

FIG. 5, a similar view taken on the line 5—5 of FIG. 3;

FIG. 6, a view corresponding to that of FIG. 2, but showing a different embodiment of the invention and the opposite side of the machine;

FIG. 7, a top plan view of the portion of the machine shown in FIG. 6, as taken on the line 7—7 of FIG. 6;

FIG. 8, a fragmentary bottom plan view as reflected from a mirror plane;

FIG. 9, a fragmentary vertical section taken in FIG. 7 so as to show the printing wheel per se in side elevation, the view being drawn to a scale larger than that of FIG. 7;

FIG. 10, a fragmentary vertical section taken on the line 10—10 of FIG. 7 to show, in longitudinal axial section, the nozzle for applying a protective coating to the applied marking on a potato, this view also being drawn to a scale larger than that of FIG. 7; and

FIG. 11, an enlargement of the portion of FIG. 7 encircled by the broken line 11 of FIG. 7, with internal passages indicated by dotted lines.

Referring to the drawings:

In the particular form illustrated, the machine of the invention comprises a series of printing heads 10, FIG. 1, suspended above a roller conveyor 11 of conventional type (slope somewhat exaggerated in FIGS. 2 and 3), which serves to receive potatoes and feed them under and carry them away from such printing heads 10 in the direction of the arrows in FIG. 2.

As illustrated, the printing heads 10 each comprise a printing wheel 12, FIGS. 2, 3, and 5, rotatably mounted with spacer roller sections 12-1, FIG. 5, in one end of an elongate frame 13 that is pivoted at its opposite end, by means of stub shafts 14, FIGS. 2 and 4, in eyebolts 15 depending rigidly but height adjustably from a structural supporting frame 16. Between such printing wheel 12 and the pivoted end of the printing head are rotatably mounted a number of pilot rollers 17, there being three of these in the present instance. An ink-absorbent, inking roller 18, rotatably mounted in pivoted arm 19, rides freely on printing wheel 12.

The printing heads 10 are so arranged side-by-side across the width of the conveyor 11, see FIG. 1, as to coincide with the individual conveyor paths 20 thereof, respectively, and so the potatoes, small ones being shown at 21, FIG. 3, are fed under the pivoted end thereof and are discharged under the printing wheel 12. Although the exaggerated slope of conveyor 11 indicates that only excessively large potatoes would contact the pilot rollers 17 in advancing of printing roller 12, it should be realized that, as actually constructed, see FIG. 6, potatoes of normally large size would contact such rollers.

As so provided and arranged, the printing wheel ends of the printing heads 10 are urged downwardly by gravity so the printing wheels 12 ride freely and heavily on the successive potatoes of the respective rows of potatoes in conveyor paths 20, meanwhile being continuously supplied with ink from the respective inking rollers 18, which are themselves supplied with ink in any suitable manner, as, for example, automatically by any one of a number of conventional devices well known in the art or manually by an eye dropper or the like.

To augment the force of gravity, stabilize the printing heads, and insure rapid return thereof to predetermined level following the printing operations on the individual potatoes, the printing wheel end of each printing head has pivoted thereto a rod 22, FIG. 2, which extends through a bracket 23 and carries a coil spring 24 between a rigidly fastened collar 25 and the underside of the bracket. A nut 26 on the protruding end of the rod 22 provides for adjusting both the tension of spring 24 and the normal height of printing wheel 12 above conveyor 11 for different potato grade sizes. A rubber washer 27 cushions the resiliently actuated return of the printing head to normal level following each printing operation.

Printing wheel 12 is preferably positively driven at the same speed as conveyor 11 by means of a pulley 28, FIG. 5, connected by a belt 29, FIGS. 2 and 3, to one of the pulleys 30, FIG. 1, of a line shaft 31, which, in turn, is driven by suitable drive connection, e.g., belt and pulleys or sprocket chain and wheels, with conventional power means (not shown) for driving the conveyor.

Air blasts fore and aft of each printing wheel are provided for by jet nozzles 32 and 33, respectively, FIGS. 2-5, leading from an air supply line 34 supplied with compressed air from any suitable source (not shown) by way of a header 35, FIG. 1. Forwardly disposed nozzle 32 at the discharge side of the printing wheel 12 is directed

preferably tangentially toward the marking rim or face of such printing wheel 12 to project a blast of air downwardly across its face against its direction of rotation and thence onto the top of the potato being stamped as it passes thereunder. Rearwardly disposed nozzle 33 at the feed side of the printing wheel is directed downwardly toward the top of the potato being fed to the printing wheel. In this way, the printing wheel is cleaned, the portion of each potato to be stamped is cleaned and dried before printing, and the freshly printed matter is at least partially dried during operation of the machine.

It should be realized that the potatoes are ordinarily washed prior to being marked and often carry a heavy film of water with them as they travel on roller conveyor 11, and normally, at the very least, are moist as they approach the printing heads 10. The blasts of air from nozzles 33 not only blow the areas to be marked on the respective potatoes free of adherent water but tend to dry such areas to the extent that no "running" of ink is experienced. The function of the blasts of air from nozzles 32 is primarily to clean the printing wheel of any adherent foreign matter, but the air also exerts a beneficial drying effect on the applied ink. Both nozzles are highly advantageous, even though the marking device is a hot brand rather than a printer.

For steady and guiding the potatoes on conveyor 11 as they approach printing wheel 12, the pilot roller 17 located proximate such printing wheel is preferably formed with a central section 36, FIG. 4, of less diameter than the remainder of the roller to provide an annular depression enabling the roller to, in effect, grip a potato as it passes thereunder. Each of these pilot rollers 17 is preferably made up of individual roller sections, as shown, which are at least faced with and preferably made entirely of a soft rubber-like material, for example, sponge rubber, for both cushioning and gripping purposes. A finger 37 is preferably provided to ride in the depression 36 to keep it free of foreign matter. Roller sections 12-1, FIG. 5, laterally adjoining printing wheel 12, are preferably of the same material as the individual sections of the pilot rollers, those on the inside next to the printing wheel being in this instance of larger diameter than the others. Printing wheel 12 has a rigid core portion 12a, FIG. 3, an annular portion 12b of preferably sponge rubber, and a rim portion 12c made as a rubber stamp with the desired type face for printed material to be applied to the potatoes.

The pilot rollers 17, it should be noted, act to engage larger-sized potatoes and to lift the entire printing head to proper level before such potatoes pass under and are contacted by the printing wheel, this engagement providing cushioned gripping action that tends to hold such potatoes (not shown) in marking position as they advance on the upward slope of the conveyor 11 toward and into the marking zone.

When marking is by branding, the printing wheel 12 need only be replaced by an electrically heated branding wheel. Under such circumstances, the air blast from nozzle 33 serves to cool and protect the rearwardly disposed pilot rollers.

In the embodiment of FIGS. 6-11, each printing head 40 is pivotally, but yieldably and resiliently, supported at its end opposite the pilot rollers, that is to say at the marking end, by pivotal connection of its frame 41, as at 42, with the free end of a mounting lever 43, whose opposite end is fulcrumed by pivotal connection, as at 44, with structural supporting frame 45 of the machine. Intermediate the length of lever 43, a rod 46 has one end pivotally connected, as at 47, with the lever, and its opposite end slidably extended through a member 45a of the structural supporting frame. Opposite ends of the rod 46 are threaded to receive adjustment nuts 48 and 49, respectively, and a coil spring 50 resiliently resists upward movement of such rod and of lever 43.

The other end of each printing head 40 is articulatively

and resiliently suspended from a member 45b of the frame 45 by means of a leaf spring 51 pivoted at 52, so the printing wheel 53 can rise substantially vertically during the marking operations. This insures against any smearing of the ink during application thereof to the potatoes and is also applicable to other marking techniques that may be employed, such as hot branding.

The printing wheel, see FIG. 9, has a rigid core 53a fixed on a shaft 54 and is encircled by an annulus 53b of resilient cushioning material, such as a sponge rubber, and by an outer annulus 53c, which provides the marking rim of the printing wheel and has on its outer circumference a circumferential series of marking areas 53d, each comprising raised printing type or dies supplying the letters or other symbols to be applied to the potatoes. To grip the potatoes by slight surface indentation, the superficial surfaces of such raised printing type are formed by stiff but yieldable fingers or spines 53e. It is advantageous that the entire outer annulus 53c be molded or otherwise formed of stiff but yieldable material, such as a polyethylene or nylon plastic.

In the present instance, the pilot rollers and the rollers laterally adjoining the printing wheel are somewhat differently arranged, although they could be as shown for the first embodiment. Thus, there is a first pilot roller 55, FIG. 8, made up of a transverse series of circular sponge rubber sections on a shaft 55a, as are the rollers 17 of the embodiment of FIGS. 1-5; a second pilot roller 56, made up of a single sponge rubber section centrally located on a shaft 56a; and a third pilot roller 57, made up of two transverse series of sponge rubber sections mutually spaced at opposite end portions of a shaft 57a to leave space 57b centrally thereof for accommodating outer portions of both the second pilot roller 56 and the printing wheel 53. On the shaft 54, laterally adjoining the printing wheel, the sections next to the printing wheel are advantageously of smaller diameter than are the outer sections. This overall arrangement is advantageous, both for the greater area it provides for application of the cleaning and drying air blast to the potatoes before the respective marking operations and for its effectiveness in tightly holding potatoes of all sizes on the roller conveyor 58 during such marking operations.

The roller conveyor is conventional, as indicated in connection with the first embodiment, but its convergent feeding relationship with the printing head 40 here is not exaggerated, as in FIGS. 2 and 3.

Drive of the printing wheel 53 is carefully synchronized with drive of the roller conveyor 58 to place the valleys 58a that occur between successive rollers 58b, directly under the respective marking areas 53d during operation of the machine. This further insures against any smearing of the ink during the printing operations. To this end, a belt drive 59 for each printing head 40 connects a pulley 60 on printing wheel shaft 54 to pulley 61 on powered line shaft 62. Respective, pivoted, dual, belt-tensioning idlers 63 maintain proper belt tension of the drives for the several heads during up and down movement of such heads about line shaft 62 as a center. A belt and pulley drive, generally designated 64, drives pilot roller shaft 57a in synchronism with the printing wheel. Of course, chains and sprockets can be utilized if desired for the several drives in place of belts and pulleys.

As in the first embodiment, a jet nozzle 65 (corresponding to the jet nozzle 32) is directed to discharge a blast of air against the up-travelling face of the printing wheel, for cleaning it following the printing operations, while a jet nozzle 66 (corresponding to the jet nozzle 33) extends downwardly into space 57b and is directed to discharge a blast of air into the top of each potato as it moves into position to be marked, thereby displacing from the area to be marked any water coating the potato as a film and tending to dry such area. It is preferred that the air, supplied to the jet nozzles through distributor head 67, FIG. 7, and piping 68 from any suitable source

by means of a flexible hose (not shown) attached to nipple 69, be heated sufficiently (e.g. about 200° F.) to in turn heat the respective marking areas of the normally cold potatoes and to also heat the printing type or dies 53d. This overcomes a problem of ink coagulation previously encountered with a proprietary marking ink obtained from Sunkist Growers, Inc., Ontario, Calif. under the designation "stamping ink" as approved by the Food and Drug Administration of the U.S. Government. Since this ink coagulates at about 60° F. I have found that heating the air to 200° F. keeps the printing type or dies 53d at about 80° F. and satisfactorily conditions the areas to be marked on the potatoes.

It is also advantageous to protectively coat the applied markings with a water repellant material, such as a food grade glyceryl monostearate glaze made, for example, by dissolving granules of the proprietary product Atmul 124, produced by Sunkist Growers, Inc. in a vegetable oil such as Wesson cooking oil on the basis of one part by weight to nine, respectively, so as to prevent any possibility of moisture causing smearing of the applied ink upon discharge of the potatoes from the conveyor. The mixture of Atmul and oil solidifies at 90° F. We have found that, even with the heating previously described, the temperature of the printed areas of the potatoes is lower than that and the resulting glazing effectively prevents smearing of the applied ink.

For this purpose, an insulated dual pipeline 70, comprising inner and outer concentric tubes 70a and 70b, respectively, see FIG. 10, receives air in its outer tube 70b by connection, through a second distributor head 71, see particularly FIG. 11, with branch 67a of distributor head 67, and also receives liquid coating material in its inner tube 70a from any suitable source through a flexible hose (not shown) connected to nipple 72. A jet nozzle 73 is positioned just beyond jet nozzle 65, downstream of the travel of potatoes on conveyor 58, so as to direct a blast of atomized coating material onto the marked areas of the potatoes.

The supply of air to outer tube 70b and, thus, of coating material through inner tube 70a is controlled by a needle valve 74.

The conditioning of items to be marked by means of air blasts and the protective coating of marked areas constitute method aspects of the present invention as claimed hereinafter.

In the applying of ink to the marking rim of the printing wheel of each printing head 40, it has been found advantageous to utilize a transfer roller 75 of dense though soft rubber or the like as an intermediary between such marking rim and an absorbent inking roller 76 of porous material, which is periodically supplied with a charge of ink from an eye-dropper or other dispenser, as in the case of inking rollers 18 of the first embodiment.

Whereas there are here illustrated and specifically described certain preferred constructions of apparatus which are presently regarded as the best mode of carrying out the invention, it should be understood that various changes may be made and other constructions adopted without departing from the inventive subject particularly pointed out and claimed herebelow.

I claim:

1. A marking machine for fruits and vegetables, particularly potatoes, comprising
 - a. an elongate marking head containing a marking device at one end and a series of pilot rollers between it and the opposite end, said pilot rollers comprising soft and yieldable resilient material for cushioned gripping action on items to be marked that pass thereunder, and being successively spaced different distances from the conveyor in the path of its movement so as to individually contact differently sized articles moved toward said marking device;
 - b. supporting structure for the marking head;
 - c. yieldable means articulatively and resiliently suspending

said marking head in the supporting structure at a predetermined level for resisted upward movement and forced downward movement; and

a conveyor mounted below the marking head in spaced relationship therewith for carrying items thereto and therefrom in single file thereunder, passing from said opposite end to said one end thereof in contacting relationship with the marking device.

2. A marking machine according to claim 1, wherein the suspending means for the marking head is height adjustable with respect to the conveyor.

3. A marking machine according to claim 1, wherein the means yieldably suspending the said one end of the marking head comprises a rod extending from and having one end pivoted to the said one end of the marking head; a bracket secured to the supporting structure and having the opposite end of the rod projecting freely therethrough, said opposite end of the rod being threaded as a bolt; a coil spring encircling the rod and extending between the bracket and an anchorage on the rod adjacent to the pivoted end of the rod; and a nut on the threaded projecting end of the rod.

4. A marking machine according to claim 1, wherein the suspending means for the marking head comprises a lever having one of its ends pivoted to the one end of the marking head and its other end pivoted to the supporting structure; resilient means positioned intermediate the length of said lever to resist upward movement thereof; and resilient suspension means yieldably suspending the opposite end of the marking head from the supporting structure.

5. A marking machine according to claim 4, wherein the resilient suspension means at the opposite end of the marking head is a leaf spring.

6. A marking machine according to claim 1, wherein the marking device is a wheel; and means are provided for rotating said wheel in the direction of conveyor movement at substantially the same speed as the conveyor.

7. A marking machine according to claim 6, wherein the rim of the marking wheel is provided with printing type from whose printing faces extend numerous flexible gripping fingers.

8. A marking machine according to claim 6, wherein the marking wheel comprises a marking rim, and soft and yieldable material circumferentially backing said rim.

9. A marking machine according to claim 8, wherein the marking rim is of rubber stamp character.

10. A marking machine according to claim 9, wherein the stamp portions of the rim have numerous flexible gripping fingers extending therefrom.

11. A marking machine according to claim 1, wherein the pilot roller proximate the marking device has an annular depressed portion centrally of its length.

12. A marking machine according to claim 11, wherein the marking means is a wheel; and wherein means are provided for driving the specified pilot roller and the marking wheel substantially in synchronism.

13. A marking machine according to claim 1, wherein there are additionally provided means for projecting a jet of air at the feed side of the marking device against at least that portion of each item's surface that is to be marked, so as to substantially dry that portion prior to marking when the item is wet or damp.

14. A marking machine according to claim 13, wherein there are additionally provided means for projecting a jet of heated air at the discharge side of the marking device against the said marking rim thereof.

15. A marking machine according to claim 14, wherein the marking device is a wheel having a marking rim, and the additional air jet is directed downwardly against the marking rim of the wheel.

16. A marking machine according to claim 1, wherein the marking device is an inked stamp; and there are provided means for applying a moisture-resistant glaze over the applied marks.

17. A marking machine according to claim 1, wherein the marking device is a printing wheel having a marking rim; means are provided for inking said wheel; means are provided for projecting a jet of air at the feed side of the wheel against at least that portion of each item's surface that is to be marked; means are provided at the discharge side of the wheel for projecting a jet of air downwardly against the said rim of the wheel; and means are provided for applying a moisture-resistant glaze over the applied marks.

18. A marking machine according to claim 17, wherein the glaze-applying means and both air jet means comprise respective jet nozzles and a piping system in common mounted on the marking head for supplying air under pressure to said jet nozzles.

19. A marking machine according to claim 1, wherein the pilot roller proximate the printing wheel has a space centrally thereof into which the printing wheel protrudes, and wherein the next pilot roller also protrudes into said space.

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