United States Patent

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[73] Assignee **FMC Corporation**
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[54] **NEEDLE CLEANING BRUSH**
5 Claims, 4 Drawing Figs.

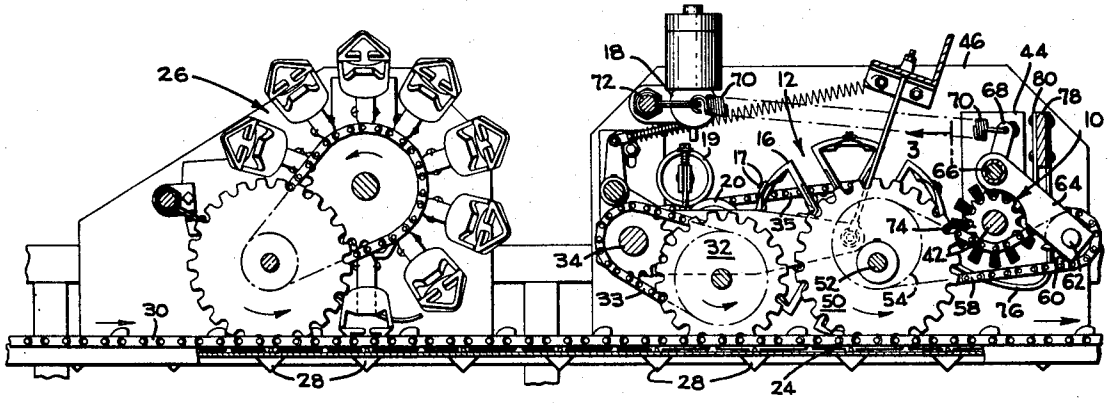
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[51] **Int. Cl.** **B44b 5/00**
[50] **Field of Search** 101/4–7, 19, 22–24, 26, 28–30, 32, 35, 37, 43, 44; 15/21

[56] **References Cited**
UNITED STATES PATENTS

1,965,276	7/1934	Barghausen	101/24
3,068,785	12/1962	Ahlburg	101/37
3,447,659	6/1969	Mumma	101/35

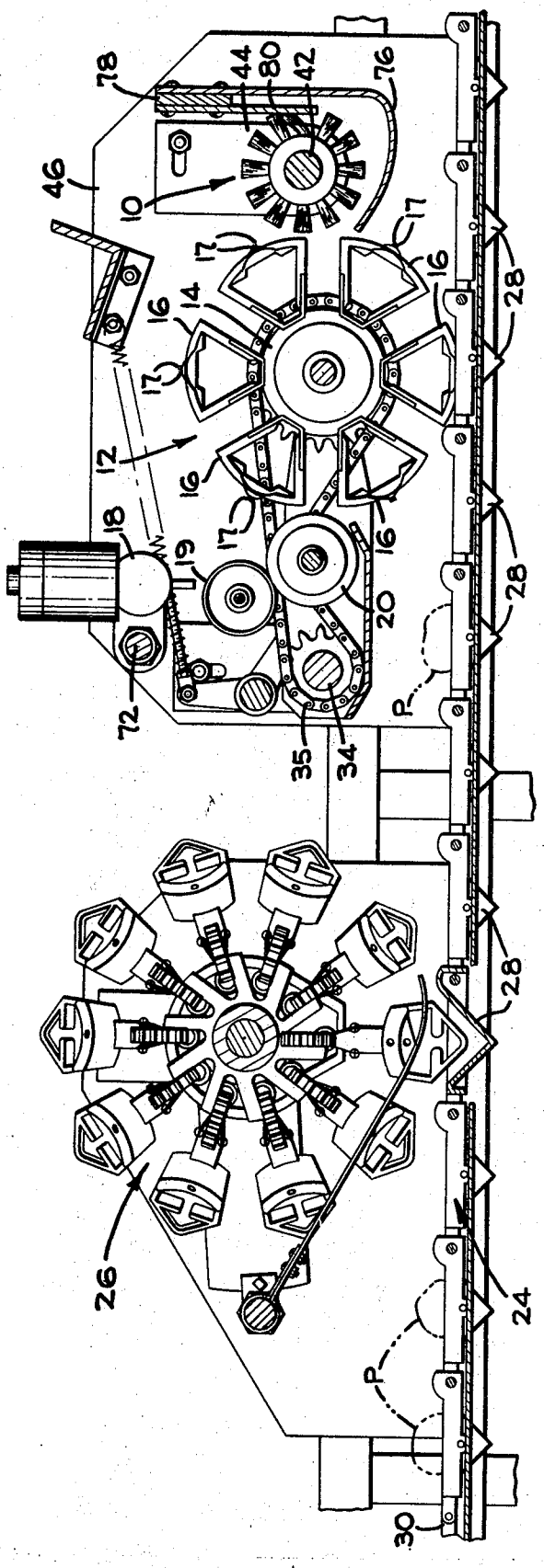
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ABSTRACT: A rotary brush is used to clean a rotary fruit marking wheel which has a plurality of marking needles projecting radially from the periphery thereof with the brush being mounted for tangential engagement with the wheel. The brush is driven by a conveyor chain which, in turn, is driven by an eccentrically mounted sprocket so that the brush will be moved at tangential speeds sometimes slower and sometimes faster than the constant tangential speed of the wheel whereby the needles will be alternately brushed in both directions for a thorough cleaning.



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FIG — 1



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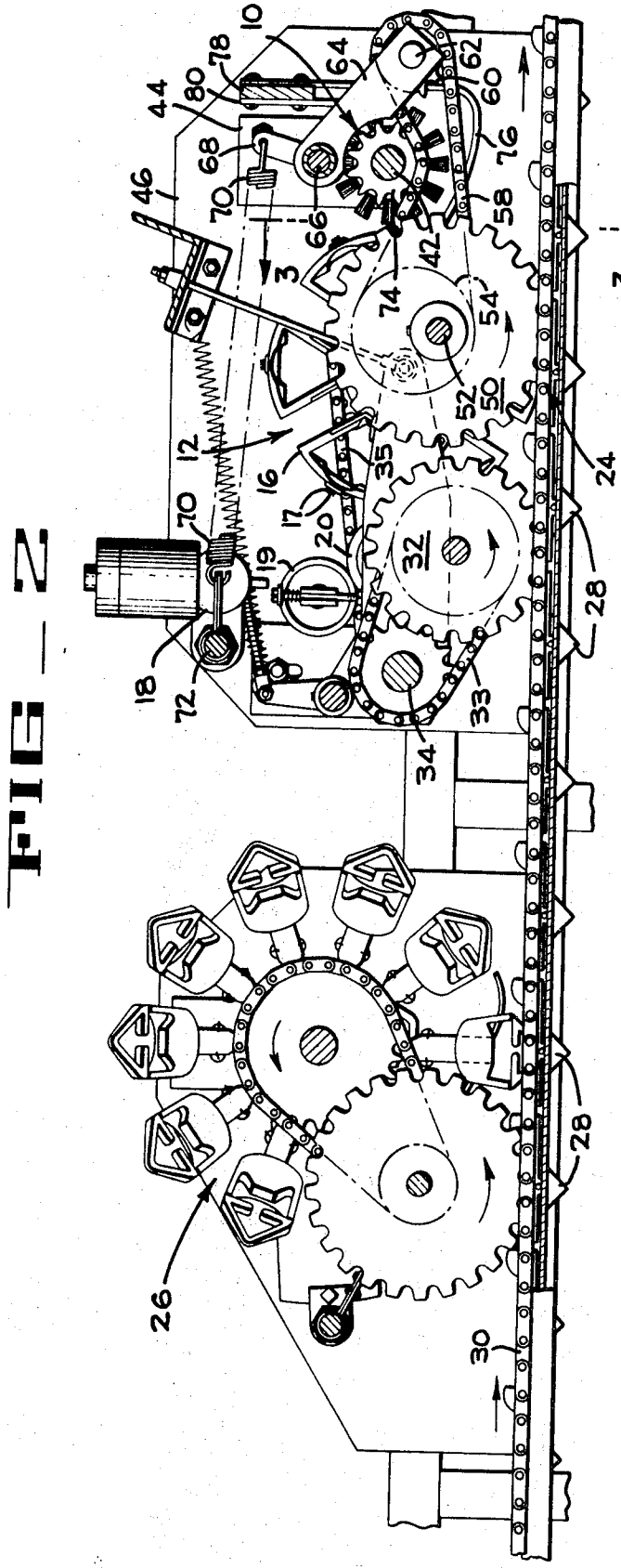


FIG. 2

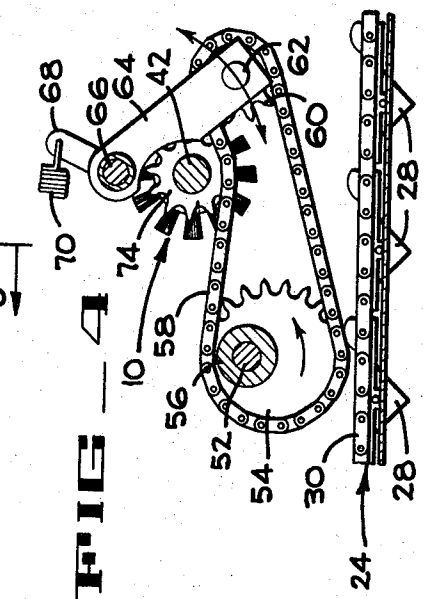


FIG. 4

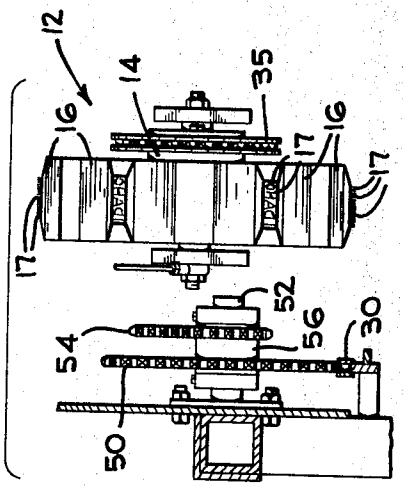


FIG. 3

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NEEDLE CLEANING BRUSH

CROSS-REFERENCE TO RELATED APPLICATION

The present application is a division of the pending U.S. Pat. application of Kalmar and Mumma, Ser. No. 645,799, filed June 13, 1967, which application is assigned to the assignee of the present application. The present invention is disclosed but not claimed in said earlier application which is incorporated by reference into the present disclosure for a description of the details of an operative environment for the present invention.

BACKGROUND OF THE INVENTION

1. Field of the Invention

In general, the present invention pertains to that field of art concerned with brushes used for cleaning, and more particularly, it pertains to rotary brushes used to clean moving needles in a marking machine.

2. Description of the Prior Art

A rotary marking device for fresh fruit or vegetables has recently been introduced to the packing industry which device essentially comprises a rotatable wheel structure having spaced groups of marking needles extending radially from the periphery thereof. Brushes have been used with prior art marking wheel structures of a broadly similar type to apply ink to such marking needles. These brushes were commonly stationarily mounted so as to be contacted by the rotating needles, as shown, for example, in the prior patents of Deutsch 1,919,688 or McKee et al. 1,807,631.

SUMMARY OF THE INVENTION

The aforementioned marking wheel structure, which is cleaned by the rotary brush of the present invention, generally comprises a wheel having a plurality of marking dies mounted about the periphery thereof with each of the marking dies resiliently maintaining a group of closely spaced needles that are used to imprint a mark upon a fruit or vegetable passed beneath the marking wheel structure. Since fresh fruit and vegetables are to be marked by this wheel, bits of skin, dirt or other debris are quite easily picked up by the thin, closely-spaced needles. For example, in the marking of potatoes, tiny bits of the corky outer skin of the potatoes will become wedged into the spaces between the needles to eventually destroy their effectiveness for leaving a legible mark. Consequently, it has been found to be necessary to provide a brush, of the standard bristle variety, to brush through the marking needles while they are moving to subject them to a thorough cleaning action.

The present invention proposes a unique method of brushing the needles whereby each group of needles will be alternately brushed in opposite directions to effect a better cleaning action. This is done by driving the brush at a varying speed such that the relative speed between the brushes and the needles at their point of contact will be continuously reversed in direction. The driving means whereby this result is accomplished comprises an important part of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal section through a potato marking apparatus which includes the needle cleaning brush of the present invention.

FIG. 2 is a side elevation of the potato marking apparatus shown in FIG. 1, with a portion thereof being shown in section.

FIG. 3 is a partial section taken along the line 3—3 of FIG. 2.

FIG. 4 is a side elevation of the needle cleaning brush shown in FIG. 1, particularly illustrating the drive means therefor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the rotary cleaning brush 10 of the present invention is arranged to be used in conjunction with a potato marking device 12. The potato marking device generally comprises a marking wheel 14 which includes a plurality of marking dies 16 spaced about the periphery thereof with each die carrying a plurality of needles 17 arranged in the pattern of the desired indicia to be applied to the potatoes P. Ink is supplied to the needles by means of an ink pump 18 and transfer rollers 19 and 20. The marking wheel is continuously driven so that each marking die 16 will be caused to engage and mark a potato carried by a continuously driven conveyor 24 passing beneath the wheel. An aligner 26 is positioned adjacent to and on the upstream side of the potato marking device 12 to center the potatoes within V-shaped troughs 28 of the conveyor. The troughs are mounted between and are carried by conveyor chains 30 which extend the length of the apparatus. The conveyor chains are also used to rotate the marking wheel 14 through a sprocket member 32 (FIG. 2), drive chain 33, shaft 34, and drive chain 35 (FIG. 1), the drive chains each being drivingly engaged with the shaft. It will be appreciated that the relative movement of the conveyor 24 and marking wheel 14 is timed so that successive marking dies 16 on the wheel will be received over successive troughs 28 of the conveyor to cause each potato which is passed beneath the wheel to be marked. For further details of the potato marking apparatus, reference is made to the aforementioned copending patent application of Kalmar and Mumma, Ser. No. 645,799.

Since the needles 17 that are mounted at the periphery of the marking wheel 14 will quickly become clogged with tiny bits of potato skin, dirt or other debris from the surfaces of the potatoes which are marked, it is imperative that the needles be continuously cleaned during operation of the marking apparatus. In order to accomplish this, a rotary cleaning brush 10 is mounted on the upstream side of the marking wheel in a position such that the outermost edges of the bristles that make up the brush will be received between the adjacent needles on the marking dies when the wheel is rotated. The cylindrical brush structure is keyed to a drive shaft 42 which is rotatably mounted within bearing blocks 44 that are adjustably secured to fixed side frame members 46 (one side only being shown in FIGS. 1 and 3).

The brush 10 is provided with a special drive whereby the peripheral or linear speed of the bristles will continuously and uniformly vary throughout the operating cycle of the device, with the bristles sometimes moving faster than the needles 17 on the marking wheel and sometimes slower. This reversible linear speed differential between the brush and the needles will cause the bristles to brush through each set of needles in different directions at different times so that a thorough cleaning action is provided. In order to provide the required variable speed drive, a large sprocket 50 (FIG. 2) is mounted upon a fixed stub shaft 52 that is attached to one of the side frame members 46 of the apparatus (FIG. 3), the sprocket being arranged to be driven by means of its driving engagement with one of the continuously moving conveyor chains 30. A smaller sprocket 54 is rigidly attached to the sprocket 50 by means of a collar 56 and is also rotatably mounted upon the stub shaft 52. As clearly shown in FIG. 4, the smaller sprocket 54 is eccentrically mounted on the stub shaft 52. This eccentric sprocket drives one end of an endless chain 58, the other end of which is trained about a small sprocket 60 rotatably received upon a shaft 62 that is fixed to a pivotally mounted arm 64. Arm 64 is fixed to a pivot shaft 66 that is mounted for pivotable movement in the bearing blocks 44 which support the brush. Shaft 66 also rigidly mounts a lever arm 68 which carries a tension spring 70 that is fixed at its other end to a shaft 72 extending between the side frame members 46. The tension spring, through the lever arms 68 and 64, yieldably supports the shaft 62 so that the brush drive chain 58 will be free to shift longitudinally (in the direction of the arrows shown in FIG. 4) under the urging of the eccentric driving sprocket 54. The upper run of the brush drive chain is received upon the teeth of a sprocket 74 that is fixed to the brush drive shaft 42.

With the driving arrangement described, it will be appreciated that the brush **10** will be driven at a varying angular speed dependent upon the position of the eccentrically mounted sprocket **54** with respect to the drive chain **58**. When the eccentric sprocket is in the position shown in FIG. **2**, the brush will have just passed its point of maximum speed which will occur when the largest diameter of the eccentric sprocket is at the tangent point of the drive chain **58** linking the chain with the brush drive sprocket **74**. When the eccentric sprocket has rotated to the position shown in FIG. **4**, the brush will have just passed through its point of minimum speed where the smallest diameter of the eccentric sprocket is tangent to that portion of the drive chain **58** connecting the eccentric sprocket to the brush drive sprocket **74**.

The relative timing of the drive means for the marking wheel **14** and the drive means for the brush **10** is such that the moments of maximum and minimum brush speeds will occur at different angular positions of the marking wheel during each rotation of the wheel. Thus, the needles of each marking die will be periodically subjected to brushing in both directions to effect a thorough cleaning thereof. In the described embodiment of the invention, the eccentric sprocket **54** driving the brush is caused to rotate six revolutions for every five revolutions of the marking wheel. With this arrangement, each revolution of the sprocket **54** will cause the moment of maximum brush speed with respect to the wheel to change through an angular distance of 60°. That is to say, if a given die is numbered "one" and the other dies are consecutively numbered "two" through "six" about the periphery of the wheel, and if the moment of maximum brush speed occurs when die one is passing through the bristles, the next moment of maximum brush speed will occur when die six is being brushed, the next moment of maximum brush speed when die five is being brushed, and so forth. The moment of minimum brush speed will occur after the marking wheel has rotated 150° from its position at the moment of maximum brush speed.

The potato skins and other debris which are removed from the needles by the bristles of the brush **10** are caught by a collecting trough **76** which is positioned beneath the brush and is supported by a bracket **78** carried between the side frame members **46**. The front edge of this bracket carries a scraper bar **80**, the lower edge of which is positioned to deflect the bristles and cause any extraneous matter thereon to be snapped off and into the collecting trough (FIG. **1**).

From the foregoing description it can be seen that the

present invention provides a cleaning brush which is driven in a manner to cause the marking needles to be subjected to a complete brushing action that will most effectively prevent potato skins or other debris from accumulating about the needles. The brush is also subjected to a continuous cleaning action by the scraper bar to prevent transfer of the debris back to the needles.

We claim:

1. A cleaning brush structure in combination with a rotary marking structure that is comprised of a wheel having a plurality of marking dies uniformly angularly spaced about the periphery thereof, each of said marking dies having a plurality of needles mounted to extend radially therefrom and being arranged in a pattern defining an indicia to be applied to a fruit or vegetable by penetrating engagement therewith, and means for driving said wheel at a uniform speed, said cleaning brush structure comprising a rotary brush mounted for rotation so that the bristles will pass between said needles on the periphery of said rotary marking structure, and means for driving said brush at varying speeds between a maximum wherein the tangential speed at the outer periphery of the brush is faster than the tangential speed of the needles and a minimum wherein the tangential speed at the outer periphery of the brush is slower than said tangential speed of the needles, said varying speed of said brush causing the needles of each marking die to be brushed alternately in opposite directions during operation of the brush and marking wheel apparatus.

2. A cleaning brush structure in combination with a rotary marking structure as set forth in claim **1**, said drive means for the rotary brush including a drive chain mounted for driving engagement with said rotary brush, and an eccentrically driven rotor mounted for driving said drive chain.

3. A cleaning brush structure in combination with a rotary marking structure as set forth in claim **2**, said drive chain comprising an endless chain trained about said eccentrically driven rotor at one end thereof, and a rotatable member for rotatably supporting the other end of said chain, said rotatable member being mounted for translational movement.

4. A cleaning brush structure in combination with a rotary marking structure as set forth in claim **3** including spring means connected to said rotatable member for yieldably biasing said drive chain toward said other end thereof.

5. A cleaning brush structure in combination with a rotary marking structure as set forth in claim **1** including a scraper bar mounted for engagement with the bristles of said rotary brush.