PATENT REQUEST : STANDARD PATENT

We, being the person identified below as the Applicant, request the grant of a Standard Patent to the person identified below as the Nominated Person, for an invention described in the accompanying complete specification.

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Invention Title: IMPROVEMENTS IN POTATO HARVESTERS

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ASSOCIATED PROVISIONAL APPLICATION DETAILS
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A crop harvesting machine for root crop vegetables, having diggers (13) at its forward end to harvest root crop from beneath the ground and a conveyor (14) to convey crop to a deviner web (15) having an upper run and a lower run and apertures (19) therethrough to allow crop to gravitate to an extraction system (21) for separating stones and other hard debris from the crop and to convey the crop to a sorting conveyor (23) mounted beneath the upper run of the deviner web (15) and from which sorting conveyor crop gravitates to the top of the lower run of the deviner web (15) for subsequent discharge onto a side conveyor (29) for conveying crop to one side of the machine. Flaps (27) are hinged to the deviner web adjacent the apertures (19) and adapted to hang down from the web to allow crop to pass through the apertures, whilst guideplates (28) are provided below the upper and lower runs of the deviner web above and below the sorting conveyor with which the flaps (27) will engage and swing upwardly to close said apertures.
The following statement is a full description of this invention, including the best method of performing it known to us:
IMPROVEMENTS IN POTATO HARVESTERS

This invention relates to improvements in potato harvesting machines, and more particularly improvements in such machines incorporating what are known as devining webs for separating potato tops and/or weed matter from the crop, although the invention is applicable to the harvesting of any type of root crop vegetable but will be described hereinafter in relation to the particular application in a potato harvesting machine.

When harvesting potatoes it is necessary to separate the potato tops and/or weed matter from the crop, and several ways have been developed to accomplish such separation, that is, use of contra rotating rollers, slopping pintle belts and devining webs, and the present invention relates particularly to separating using devining webs.

A devining web consists of a plurality of longitudinally extending rubber side belts running the way the crop is to flow along the harvesting machine, together with a plurality of cross-members extending laterally of the web and attached to the side belts. The cross-members are spaced apart but parallel to each other at varying pitches, and the spaces between the side belts and the cross-members form apertures through which potatoes delivered to the web fall, whilst the potato tops and weed matter remain on top of the devining web and are carried by the web to the back of the harvester where they fall down onto the ground behind the harvester.

With known devining webs the crop must be removed from underneath the web by changing the direction of crop flow by conveyor means which move the crop sideways of the machine, and this can be the cause of crop damage and reduced flow capacity due to the directional change, whilst it is also difficult to spread the crop evenly over a sideways extending conveyor. In essence the sideways crop conveyance is carried out from underneath the top run of
the devining web and the crop delivered to a sorting station mounted outside the side of the harvester.

It is an object of the present invention to provide a harvesting machine for root crop vegetables, such as potatoes, incorporating a devining web which improves the function of the devining web and overcomes or at least minimises the problems.

In accordance with the invention there is envisaged a crop harvesting machine for root crop vegetables, having means at its forward end to harvest root crop from beneath the ground and convey it to a deviner web having an upper run and a lower run and apertures therethrough to allow crop to gravitate to means for separating stones and other hard debris from the crop and to convey the crop to a sorting conveyor mounted beneath the upper run of the deviner web and from which sorting conveyor crop gravitates to the top of the lower run of the deviner web for subsequent discharge onto a side conveyor for conveying crop to one side of the machine, and wherein means are provided to close the apertures through the deviner web in its upper run above said sorting conveyor. Preferably means are also provided to close the apertures through the deviner web in its lower run beneath said sorting conveyor.

Preferably the means to close the apertures through the deviner web are flaps hinged to the deviner web adjacent the apertures and adapted to hang down from the web to allow crop to pass through the apertures, and means below the upper and lower runs of the deviner web above and below the sorting conveyor with which the flaps will engage and swing upwardly to close said apertures.

Alternatively, the means to close the apertures through the deviner web may be continuous conveyors beneath the upper run and the lower run of the deviner web above and below the sorting conveyor, the upper runs of such continuous conveyors engaging beneath the deviner web to
close the apertures therethrough.

One preferred embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a schematic side elevational view of a potato harvesting machine in accordance with the preferred embodiment of the invention,

Figure 2 is an enlarged side view of part of the length of the deviner web used in the harvesting machine of Figure 1, and

Figure 3 is a plan view of part of the length of the deviner web.

Referring to Figure 1 of the drawings, the harvesting machine has a main frame 10 and a series of sub-frames (not shown) to support the various conveyor belts, a support platform 10a for sorting personnel adjacent a sorting conveyor within the machine, whilst the main frame 10 also supports other equipment for the harvesting machine. The main frame 10 is supported on a pair of wheels 11, and the leading end of the machine has a conventional draw bar assembly 12 for attachment of the machine to a prime mover, such as a tractor, as well as a power take-off facility for providing driving power for the drive rollers for the various conveyor belts and other associated equipment. The earth working and digging assembly at the front of the machine is also conventional, and incorporates coulters (not shown) for penetration and breaking of the ground in front of diggers 13 mounted to pivot relative to the main frame to varying depths of penetration below the ground surface to in effect engage beneath and scoop up potatoes and transfer them to a digger conveyor 14 on the upper run of which the potatoes are conveyed to the deviner web generally indicated as 15. A leading depth control wheel 13a is provided to follow undulations in the terrain and maintain the diggers at a preset depth beneath the ground surface. A spreading
conveyor 16 is mounted above and spaced from the upper run of the digger conveyor to assist in separating and spreading the potatoes on the digger conveyor. Up to this point the front digging and conveying section of the machine is conventional and no detailed description is necessary.

With references to Figures 1, 2 and 3 of the drawings, the deviner web 15 which incorporates the invention the subject of this application, and in this preferred embodiment of the invention, comprises a plurality of side belts 17 extending longitudinally of the web with cross-members 18 extending across the side belts and attached thereto, whereby the side belt 17 and the cross-members 18 define apertures 19 through the web and through which apertures potatoes can fall onto a transfer conveyor 20 for transferring the potatoes to a conventional (star) extraction system generally indicated as 21 which serves to separate stones and other hard debris from the crop before the crop is conveyed by another transfer conveyor 22 to a sorting conveyor 23 above the support platform 10a for the sorting personnel.

The deviner web is trained around a leading idler roller 24, upper and lower transition idler rollers 25, and a rear mounted drive roller 26.

In this preferred embodiment of the invention, flaps 27 capable of pivoting through 180° are hinged to the cross-members 18 adjacent the apertures 19 and over that part of the upper run of the deviner web from the leading idler roller 24 to the front of the sorting conveyor the flaps 27 hang downwardly to leave the apertures 19 open to allow potatoes to gravitate through the apertures and onto the transfer conveyor 20, whilst potato tops and weed matter W too large to pass through the apertures continues to be conveyed by the deviner web to the rear of the machine where they fall to the ground when the upper run of the deviner web becomes a vertically downwardly extending...
run.

In order for the flaps to pivot to positions closing the apertures at crucial parts during the path of the deviner web, such as above and below the sorting conveyor and below the "star" extraction system, a series of guide plates 28 are provided extending beneath the deviner web at those positions, and of a width equivalent to the web. The leading ends of the guide plates are progressively engaged by the flaps causing them to pivot upwardly into a position closing the respective apertures 19. As a result the potato tops and weed matter on the deviner web above the sorting conveyor which may have managed to pass through the apertures at that point is prevented from doing so, whilst potatoes falling from the discharge end of the sorting conveyor are prevented from passing through the apertures until the part of the web on which they lie passes over a sideways extending conveyor 29 where the flaps 27 pass off the guide plate 28 and swing downwardly to allow the potatoes to pass through the apertures 19 and onto the sideways extending conveyor, from which they are elevated by an elevating conveyor (not shown) to be deposited into a truck or trailer mounted bin for transportation to a cleaning and/or packaging facility.

As shown in Figure 3, the leading end of the guide plate 28 beneath the sorting conveyor 23 may be angled so that the flaps 27 across the width of the deviner web will be released to swing downwardly to open the apertures 19 in a timed pattern whereby to spread the crop over the width of the sideways conveyor 29 and thereafter the elevating conveyor.

In another embodiment, and as an alternative to the use of the hinged flaps 27 engaging the guide plates 28 to close the apertures 19 through the deviner web at the required positions along the path of the web, continuous conveyors may be utilised positioned beneath the upper and lower runs of the webs at the required positions equivalent
to the positions of the guide plates 28. The upper runs of those conveyors would be adapted to engage beneath the deviner web and close the apertures 19 at those particular positions.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A crop harvesting machine for root crop vegetables, having means at its forward end to harvest root crop from beneath the ground and convey it to a deviner web having an upper run and a lower run and apertures therethrough to allow crop to gravitate to means for separating stones and other hard debris from the crop and to convey the crop to a sorting conveyor mounted beneath the upper run of the deviner web and from which sorting conveyor crop gravitates to the top of the lower run of the deviner web for subsequent discharge onto a side conveyor for conveying crop to one side of the machine, and wherein means are provided to close the apertures through the deviner web in its upper run above said sorting conveyor.

2. A crop harvesting machine as claimed in claim 1, wherein means are also provided to close the apertures through the deviner web in its lower run beneath said sorting conveyor.

3. A crop harvesting machine as claimed in claim 1, wherein the means to close the apertures through the deviner web are flaps hinged to the deviner web adjacent the apertures and adapted to hang down from the web to allow crop to pass through the apertures, and means below the upper run of the deviner web above the sorting conveyor with which the flaps will engage and swing upwardly to close said apertures.

4. A crop harvesting machine as claimed in claim 1, wherein the means to close the apertures through the deviner web is a continuous conveyor beneath the upper run of the deviner web above the sorting conveyor, the upper run of such continuous conveyor engaging beneath the deviner web to close the apertures therethrough.
5. A crop harvesting machine as claimed in claim 2, wherein the means to close the apertures through the deviner web are flaps hinged to the deviner web adjacent the apertures and adapted to hang down from the web to allow crop to pass through the apertures, and means below the upper and lower runs of the deviner web above and below the sorting conveyor with which the flaps will engage and swing upwardly to close said apertures.

6. A crop harvesting machine as claimed in claim 2, wherein the means to close the apertures through the deviner web are continuous conveyors beneath the upper run and the lower run of the deviner web above and below the sorting conveyor, the upper runs of such continuous conveyors engaging beneath the deviner web to close the apertures therethrough.

7. A crop harvesting machine as claimed in claim 3, wherein the means with which the flaps engage is a guide plate extending along and across beneath the upper run of the deviner web and above said sorting conveyor.

8. A crop harvesting machine as claimed in claim 5, wherein the means with which the flaps engage are guide plate extending along and across beneath the upper and lower runs of the deviner web and above and below said sorting conveyor.

9. A crop harvesting machine substantially as hereinbefore described with reference to the accompanying drawings.
ABSTRACT

A crop harvesting machine for root crop vegetables, having diggers (13) at its forward end to harvest root crop from beneath the ground and a conveyor (14) to convey crop to a deviner web (15) having an upper run and a lower run and apertures (19) therethrough to allow crop to gravitate to an extraction system (21) for separating stones and other hard debris from the crop and to convey the crop to a sorting conveyor (23) mounted beneath the upper run of the deviner web (15) and from which sorting conveyor crop gravitates to the top of the lower run of the deviner web (15) for subsequent discharge onto a side conveyor (29) for conveying crop to one side of the machine. Flaps (27) are hinged to the deviner web adjacent the apertures (19) and adapted to hang down from the web to allow crop to pass through the apertures, whilst guideplates (28) are provided below the upper and lower runs of the deviner web above and below the sorting conveyor with which the flaps (27) will engage and swing upwardly to close said apertures.
TRAP DOOR

Fig. 2.

INSET

Fig. 3

Plan view on Deviner web showing flaps opening progressively.