



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

What is veg. & fruits harvesting?

Removing the crop from plants

Time range is very narrow

A process of value addition because fruits and vegetable sold fresh get a good price.

If not sold, then must be maintained fresh



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Problems of mechanical harvesting?

Products are highly variable

Agronomic, physiological & structural characteristics

Size and shape

Detachment method

Harvesting machine are very specialized

Low annual use

Machine displaces labour and not available for post production activities

Other factors like

Varieties, planting system

Scheduling of crop cultivation



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Root crop harvester

Engaging the above-ground portion of the crop prior to actually digging

The plants (P) with above-ground portions (F) and root portions (RC) are engaged before the soil lifter (1) uproots the crop.

The concept is to gain control of the root crop by the tops and transfer that control to the elevator means (2) prior to actual digging.

In this machine the next function is to separate the unwanted tops from the desired root portion by a pair of counter rotating cylinders (4)

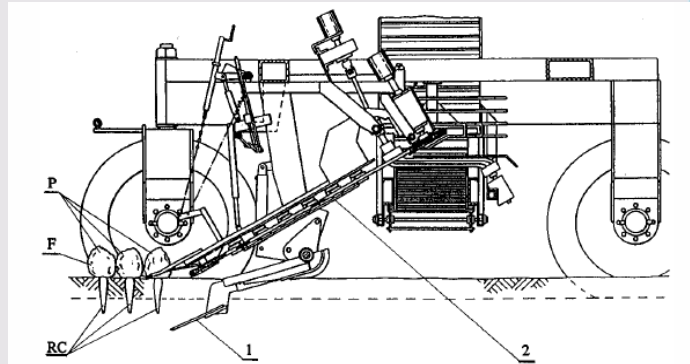


Figure 13.3 – Row crop harvester, side view (U.S. Patent #4,416,334).

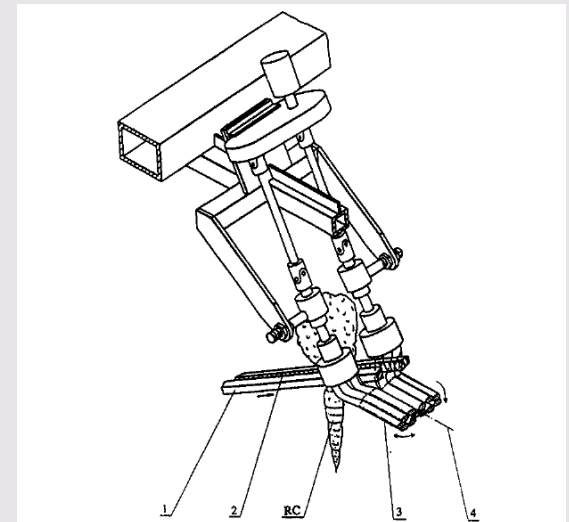


Figure 13.4 – Row crop harvester, side view (U.S. Patent #4,185,696).



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Pulling method

Aerial parts engaged by a pair of grasping elevating belts

Due to combination action of advancing speed and inclination, an upward pulling force is exerted

At upper end a pair of counter rotating bars or discs mounted to remove the top of the plants

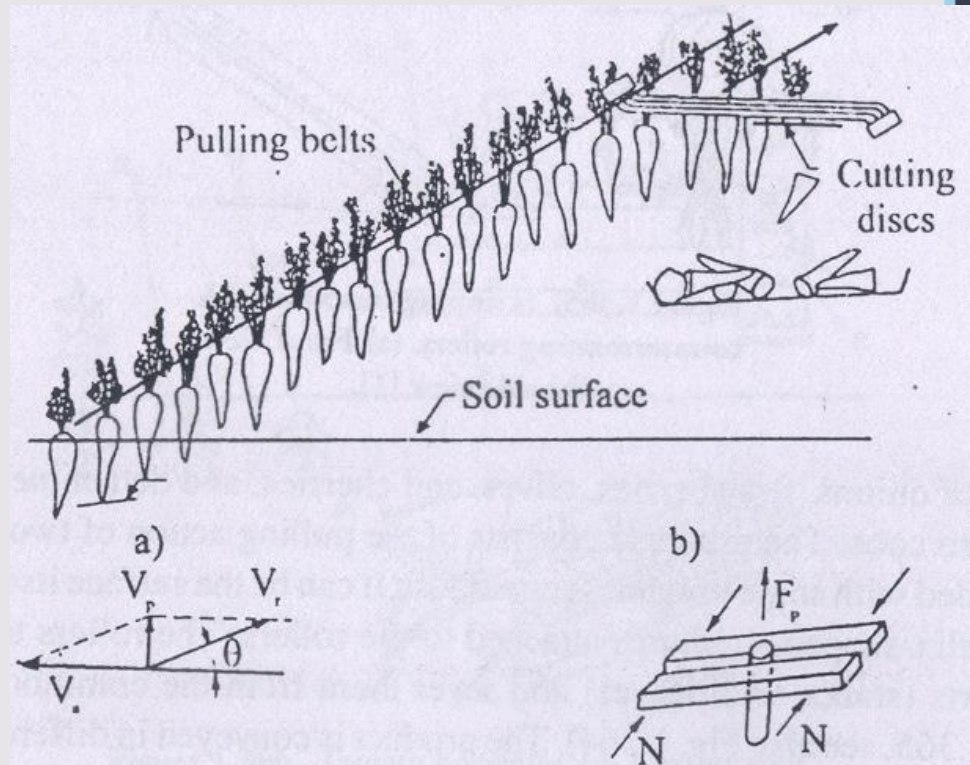


Figure 1.361. Pulling principle and units. Velocities (a) and forces (b) in the pulling belts [1].



Cabbage harvester



5



- Harvest different sizes of cabbages without damage
- One row, with 3-point attachment
- Equipped with soft rubber-covered conveyor belt
- Picker equipped with side-shift for better row alignment
- Adjustable cutting height
- Straight and precise cutting
- Harvest up to 200-250 tons per day



Cabbage harvester

Two elevated feed rollers with helical spiral elements

Rotate opposite direction

Control horizontal motion with respect to direction of travel

Roots oppose the lifting of plants

Cabbage head seats over the roller firmly until the seating force is sufficiently high than root resistance

Cabbage is pulled up

Cabbage roots are cut by the rotating discs

Conveyed upward

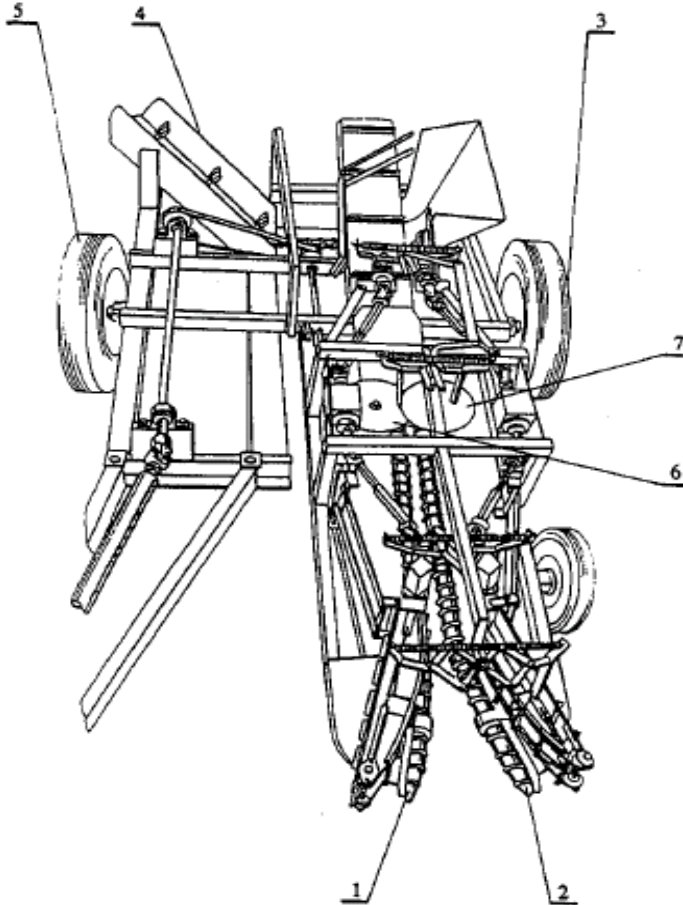


Figure 13.7 – Cabbage harvester (U.S. Patent #3,858,660).



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Snap bean harvester

Lifter point guide the plants to each stripping unit

The reel bends the plants and holds the plants over the metal concave plate

The fingers strip the beans and move them towards the conveying platform

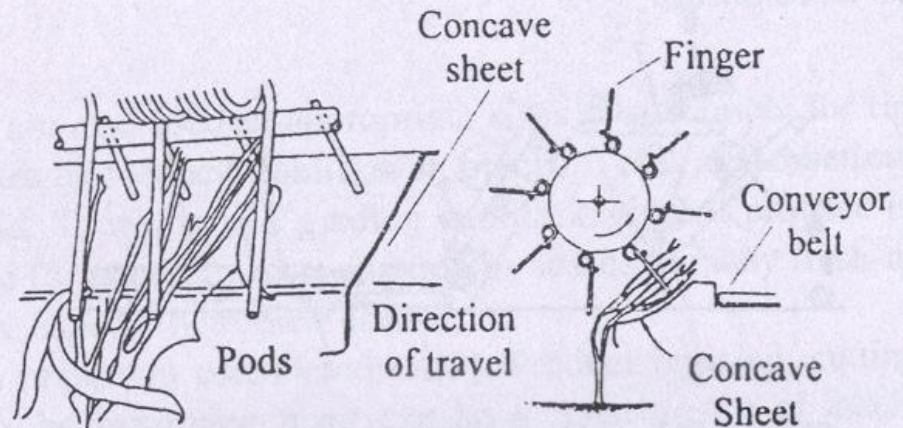


Figure 1.363. Cylindrical reel-type snap-bean harvester:
(a) Pods are removed by contact of fingers with the pedicle
(b) Detachment originated by the cylindrical reel and the concave sheet in the plant [1].



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Strawberry harvesting

Plants are moved over the finger conveyer

Stripping is done by slow moving combing fingers on the conveyer

Blower aspirate the plants materials

Strawberry falls down and guided out by a discharge valve

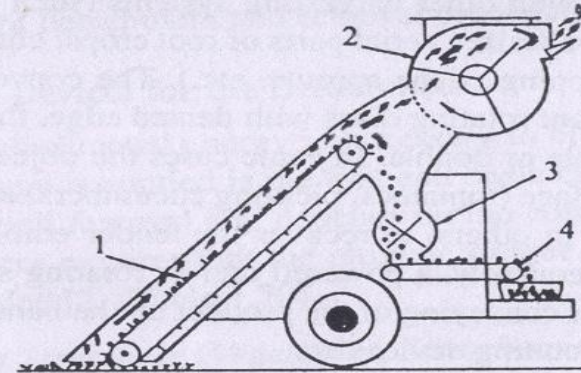


Figure 1.364. Strawberry harvester by the combing principle. (1) Finger band to comb the strawberry plant. (2) Fan. (3) Discharge valve. (4) Conveyor and filling device [1].

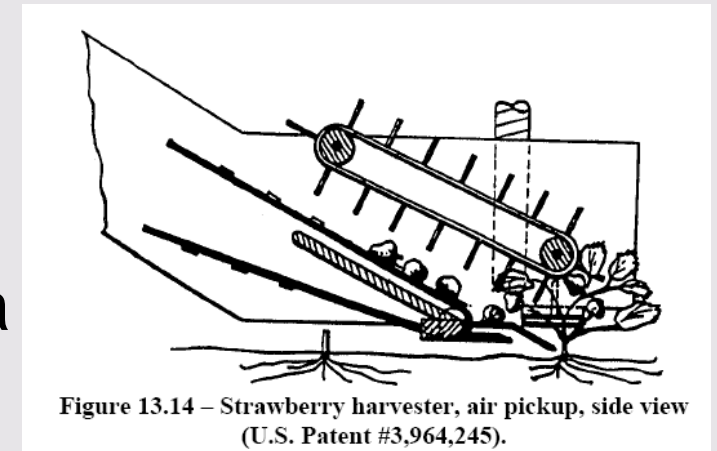


Figure 13.14 – Strawberry harvester, air pickup, side view (U.S. Patent #3,964,245).



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Tomato harvester

Entire plant harvested with coulters (1) & root cutter (2)

Elevated to the top

At the top two counter rotating rollers (4&5) pull the vines down and rearward the walker assembly(6)

Separated tomatoes are collected by a series of conveyers(3)

Some machines sorting provision is present

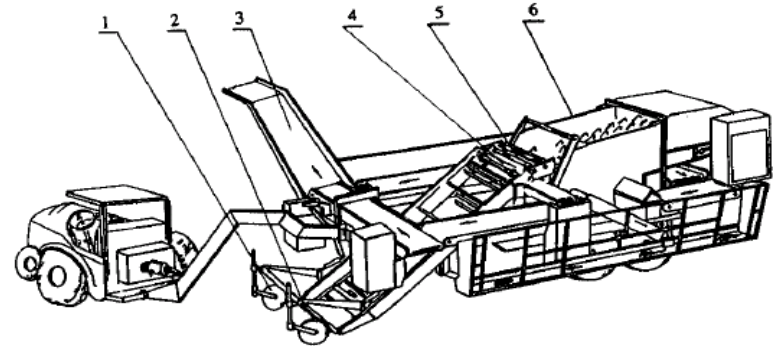


Figure 13.8 – Tomato harvester (U.S. Patent #4,584,826).





Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

TREE SHAKER

Widely used method is to use inertial trunk or limb shaker

Attach to the trunk or limb

Transmit large amount of energy in the form of vibration

Basic principle is to impart energy more than the bonding strength of the fruits

$$F = ma > \text{bonding strength}$$

A catch is provided to collect the harvested fruits