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PNEUMATIC SAMPLE SLICER[1]

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ABSTRACT

The design and operation of a pneumatically powered sample slicing machine for potatoes, sugar beets, and similar crops are described.

Additional key words: **Sample preparation, Cylinder.**

EACH year many man-hours are spent cutting samples of agricultural crops for chemical analyses and quality determinations. There are many ways to do this cutting, but they all consume considerable time both in the cutting and the cleaning of the apparatus. The machine described here was developed to cut sugar beet roots, potato tubers, and similar crops into either cubes or French fry shapes, with a minimum amount of time and to be as nearly self-cleaning as possible. This machine, as described, can be built for approximately $285.00 including all materials and labor.

The machine uses a pneumatic cylinder to force the sample through a network of 18-gauge, 1-mm (0.041-inch) steel wires, cutting the sample into French-fry-size pieces much the same as a wire cheese slicer (Fig. 1). If the sample needs to be cube shaped, the pieces are returned to the apparatus with their lengths perpendicular to the original cut and forced through again.

The pneumatic cylinder is 7.6 cm (3 inches) in diameter with a piston stroke of 20 cm (8 inches) (Fig. 2). Since force is applied in only one direction, one side of the cylinder was vented to the atmosphere. Springs were used to return the piston to starting position.

Attached to the piston is a 15.2 × 15.2 cm (6- by 6-inch) by 5.4-cm (2⅛ inch) aluminum forcing block. The face of the forcing block is serrated both vertically and horizontally on 1.2-cm (½-inch) centers to match the cutting wire grid. The serrations are 0.3 cm (⅛ inch) wide by 0.9 cm (⅜ inch) deep.

A frame was built to hold a plastic container to catch the samples after passing through the cutter. A backstop was added to direct the sample pieces down into the container.

A lever-action valve is used to control the pneumatic cylinder. Air pressure of 100 psi is used for potatoes and 120 psi for sugar beets.

To operate the machine, a sample is dropped between the forcing block and the wire network. The air control lever is pulled forward, letting air into the cylinder which forces the sample against the wire. The sample is sliced by the wire network and drops into the container. The block goes beyond the cutting wires on each stroke; therefore, the machine cleans itself each time a sample is cut.

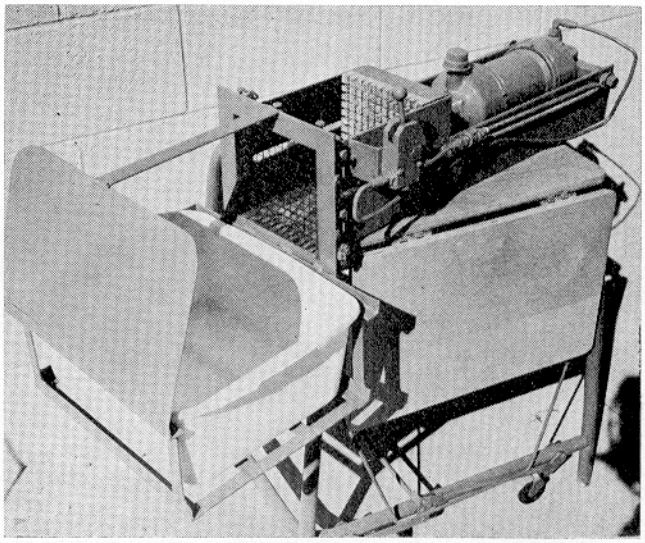

Fig. 1. Photograph of pneumatic sample slicer.

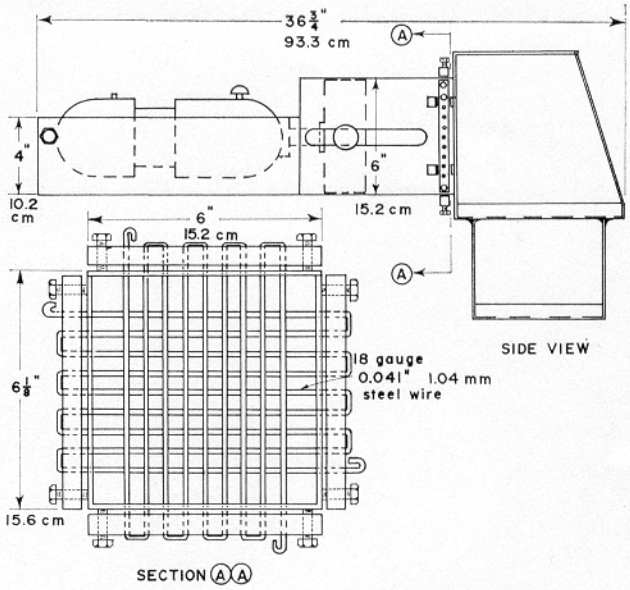

Fig. 2. Drawing of pneumatic sample slicer.

This sample slicer is very fast, cuts the samples uniformly, and is nearly self-cleaning. If additional cleaning is necessary, the machine can be washed with water and dried with forced air between samples. The use of this machine can save up to 70% of the man-hours over other methods in slicing both sugar beet roots and potato tubers.

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