Drying Potatoes for Feed in a Direct-Fired, Rotary Drier. Economic Feasibility of the Process

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This paper describes a method of converting white potatoes to stable form in which they may be conveniently stored, shipped and used for feed or as raw material for industrial fermentations.

The Bureau of Agricultural and Industrial Chemistry Circular AIC-209, "Producing Feed and Flour from White Potatoes with Steam Tube Driers," describes a method developed at the Eastern Regional Research Laboratory by which idle equipment in distilleries or other plants can be used. That process requires steam, which usually is not available at potato storage plants in sufficient quantities to operate steam tube driers.
The method described in this paper uses a direct-fired, rotary drier. These driers are simple to operate and are widely used for drying farm crops and require no source of steam. In the northern states where potato storage facilities are available, potatoes could be dried from October 1 through May and forage crops or vegetable wastes (1) could be dried during the summer. This permits the use of the plant throughout a large part of the year and thus reduces the cost of making the products.

**General Description of Process**

The process consists essentially of the following steps: (1) Wash the potatoes; (2) grind them in a hammer mill; (3) continually mix the ground potatoes with some of the dried product; (4) dry the mixture in a direct-fired rotary drier; (5) screen the dried potato to remove the fines before recycling to the mixer; (6) then bag the remainder of the coarse material and all the fines as product.

**Equipment Requirements and Details of the Process**

It is assumed that the potatoes have an average moisture content of 80 per cent. It is also assumed that the potatoes will be delivered to the factory from an adjacent storage plant by means of an underground or totally enclosed screw conveyor; hence, no storage facilities are provided.

The equipment is that required for a factory processing 62 tons of potatoes in 24 hours and producing 13.8 tons of feed containing 10 per cent moisture.

**Washing:** The potatoes are conveyed to the washer by a 9-inch screw conveyor equipped with a speed controller. A washer (3) such as that ordinarily employed in potato starch factories is well suited for this purpose. This consists of a U-shaped trough divided into sections and equipped with rotating paddles, which keep the potatoes in rapid motion and lift them from one compartment to the next, while water flows continually through the washer. The stones and much of the dirt settle to the bottom of the trough and are periodically removed by flushing. Stones must be removed to prevent damaging the hammer mill and pumps. A trough approximately 2½ feet in diameter and 25 feet long with four compartments will wash 62 tons of potatoes in 24 hours thoroughly.

**Grinding:** To reduce the potatoes to a form suitable for drying, they are ground in a hammer mill equipped with a screen having holes 3/8 inch in diameter. Ordinary blunt hammers may be used. One mill 6 inches wide by 12 inches in diameter driven with a 7½ horsepower motor should have sufficient capacity. The speed of the mill should be sufficient to give a hammer tip speed of approximately 6500 feet per minute. Much higher tip speeds may require a coarser screen to avoid too fine a product.

The ground potatoes are discharged into a 300-gallon wooden tank equipped with a slow-moving, paddle-type agitator, which prevents the solids from settling. This tank holds sufficient ground potatoes to operate the drier for nearly one-half hour and serves as a reservoir in case repairs must be made to the washer or hammer mill.

**Mixing:** To prevent the material from sticking to the drier or forming balls that cannot be satisfactorily dried, the moisture must be reduced to