No. 627,419. Patented June 20, 1899.

A. W. HOPPENSTEDT & R. J. DECKER.

BEET PULP DRIER.

(Application filed Mar. 15, 1899.)

(No Model.) 3 Sheets—Sheet 1.

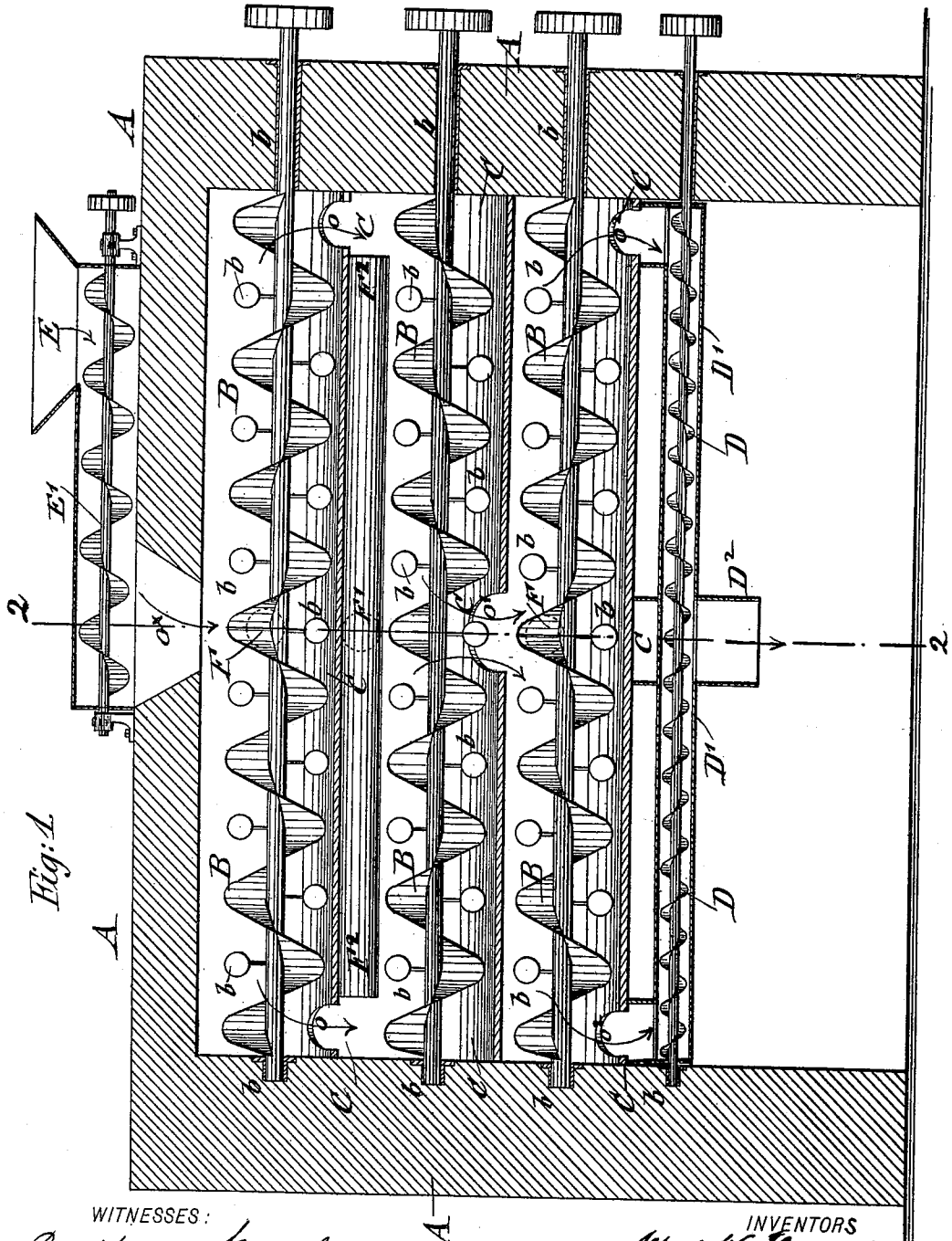


Fig. 1.

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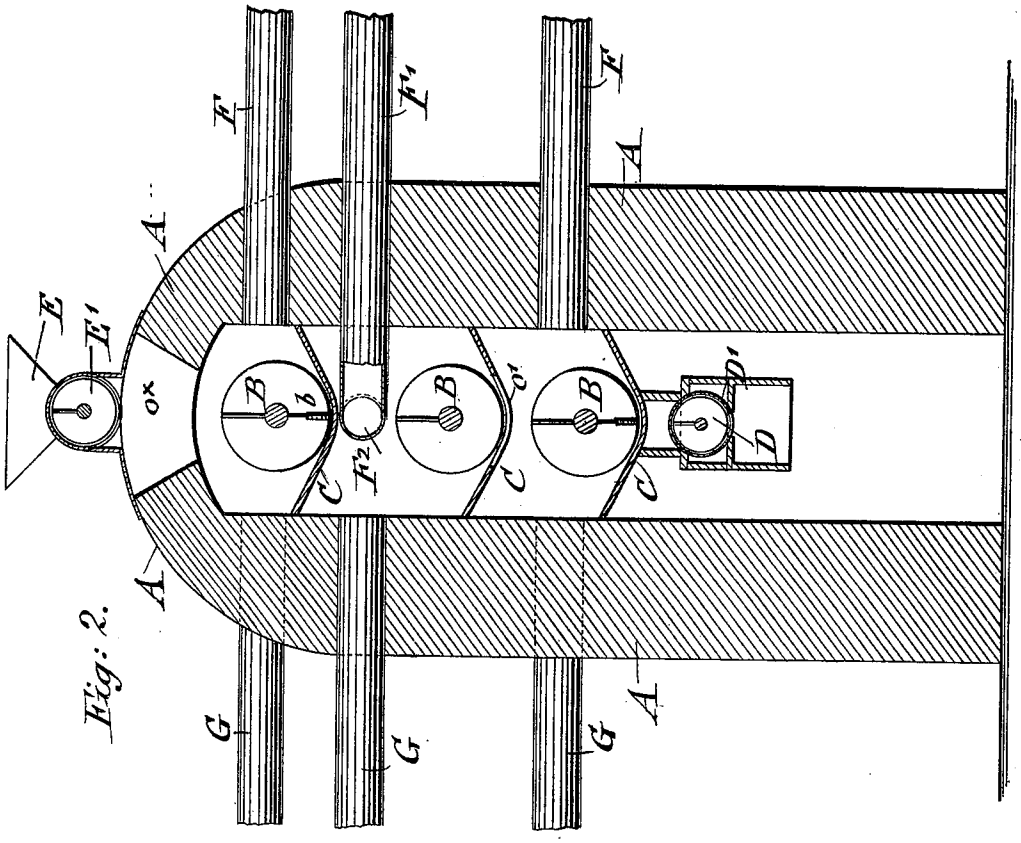


Fig. 2.

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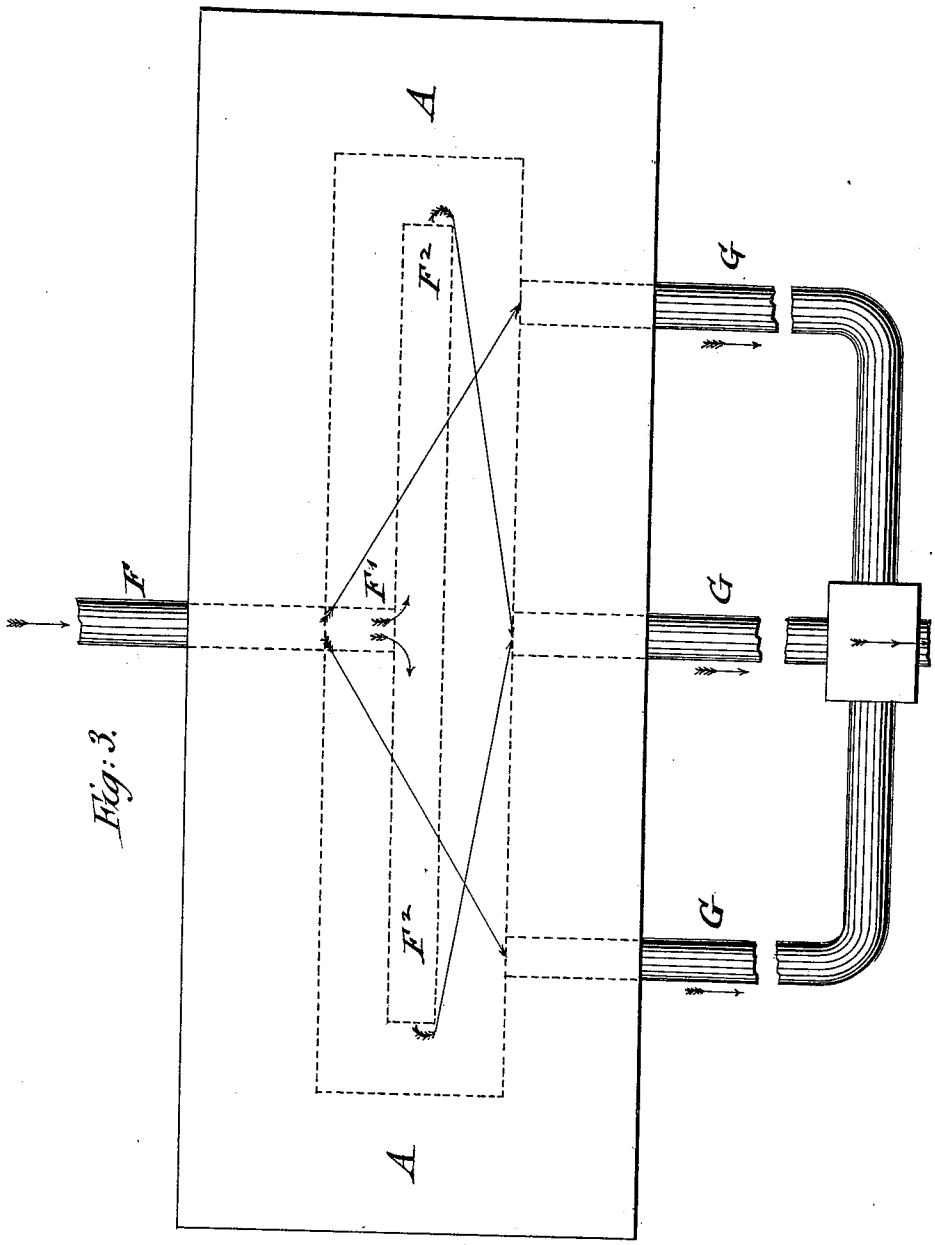


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALFRED W. HOPPENSTEDT, OF BINGHAMTON, AND RUDOLPH J. DECKER, OF NEW YORK, N. Y.

BEET-PULP DRIER.

SPECIFICATION forming part of Letters Patent No. 627,419, dated June 20, 1899.

Application filed March 15, 1899. Serial No. 709,176. (No model.)

To all whom it may concern:

Be it known that we, ALFRED W. HOPPENSTEDT, residing in Binghamton, in the county of Broome, and RUDOLPH J. DECKER, residing in the city of New York, in the borough of Brooklyn, State of New York, citizens of the United States, have invented certain new and useful Improvements in Beet-Pulp Driers, of which the following is a specification.

Our invention relates to an improved apparatus or kiln for drying the pulp of sugar-beets after the saccharine matter has been extracted therefrom.

Various attempts were made heretofore for drying the sugar-beet pulp obtained in beet-sugar factories after the saccharine matter was extracted from the pulp. Owing to the great quantity of the pulp and the considerable amount of moisture contained in the same, the drying of the pulp was attended with great difficulty. As the pulp, however, when thoroughly dried forms a valuable feed for cattle, hogs, &c., the proper utilization of this otherwise waste product is of importance.

The object of the invention is to supply to beet-sugar factories an improved drying apparatus by which large quantities of beet-pulp can be successfully handled and reduced to a dry mass that can be stored and utilized as feed; and the invention consists of a combination, with a drying chamber or kiln, of a number of superposed troughs provided alternately with openings at the ends and center, a number of conveyers having right and left hand screw-windings extending alternately from the center toward the ends of the troughs, and vice versa from the ends to the center, stirrer-arms on said conveyer-shafts, means for feeding the pulp to the uppermost conveyer, means for conducting off the pulp from the lowermost conveyer, flues for supplying hot furnace or other gases to the individual conveyers, and flues for drawing off the vapors and moisture; and the invention consists, further, of certain details of construction, which will be fully described hereinafter and finally pointed out in the claim.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of our improved kiln for drying sugar-beet pulp. Fig. 2 is a vertical transverse section on line 2 2 of Fig. 1; and Fig. 3 is a plan view of the kiln, showing the arrangement of the flues for conducting the hot gases to the kiln and the flues for conducting off the gases and moisture.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a drying chamber or kiln of any suitable size, which is preferably made of brick and provided in its end walls with bearings *b* for the shafts of a number of conveyers B, which are arranged vertically one below the other at the interior of the kiln. Any number of conveyers may be arranged in the kiln, and if necessary several sets may be arranged parallel with each other, according to the quantity of pulp to be dried by the kiln within a given time. Upon the shaft of each conveyer B are arranged right and left hand screw-blades, the screws of one conveyer meeting at the center and extending from the center toward the ends, while the screws of the next or alternate conveyer run in the opposite direction, from the ends toward the center, and so on alternately. Rotary motion is imparted to the conveyers B by means of a belt-and-pulley transmission, gear-wheel, &c., arranged at the ends of the shafts outside of the kiln, said pulleys, &c., receiving motion from a suitable power-shaft. Below each conveyer B is arranged a stationary trough C, which is made of flat V-shaped or other suitable cross-section, the ends of the uppermost trough C being provided adjacent to the end walls of the kiln with openings *o*, through which the pulp that is conducted by the uppermost conveyer B toward the ends of the trough is dropped onto the next conveyer and trough below. The second trough is not provided with end openings, but with a central opening *o'*, through which the pulp that is moved by the right and left hand screws of the second conveyer toward the center opening is again dropped onto the third conveyer and its trough and moved by the same in opposite direction and delivered through the end openings of the same to additional conveyers, or if more than three are arranged in the kiln, as shown in the drawings, to a conveyer D, also formed of right and left hand screws,

which conveyer is inclosed by a cylindrical casing D′ and provided with a central discharge-spout D^2, so that the pulp that is discharged from the lowermost conveyer is finally discharged into the bottom of the kiln, from which it is removed in any suitable manner either to storage-bins or directly for use.

The conveyers B, by which the pulp is conveyed over the troughs, are provided with suitable stirrer-arms *b*, of which preferably one is located between two adjacent convolutions of the conveyer-screws, as shown in Fig. 1. These screws serve to mix the pulp as it passes over the troughs. The pulp is charged to the kiln through an opening $o^\times$ in its arched top by means of a hopper E and screw conveyer E′, which latter moves the pulp to the opening $o^\times$ and drops it onto the center of the uppermost conveyer, as indicated by the arrows in Fig. 1.

While the pulp is conveyed through the kiln from one conveyer to the other and passed over the troughs, it is subjected to the action of hot air or furnace or other gases that are generated in a suitable furnace and conducted through flues F to the spaces above the different troughs, while the intermediate flue F′ is connected with a longitudinal flue F^2, which is arranged at right angles to the inlet-flue F′, located below the second trough and extended to the ends of the same, so as to conduct the hot gases to the ends of the second or intermediate conveyer C, the hot gases moving in the same direction as the pulp from one conveyer to the other and entering into every particle of the same in connection with the action of the stirrer, so that the gradual but effective drying of the pulp is obtained.

Before the pulp is supplied to the kiln it is subjected to a pressing action, so as to remove the surplus water contained therein. The pressed cake is then broken up and conducted to the feed-hopper E and from the same by the conveyer to the interior of the kiln and subjected to the action of the hot gases in the same. The hot gases and the moisture evaporated from the pulp are drawn off through a number of flues G, that are preferably arranged on the same level with the inlet-flues, said outlet-flues being connected with a suitable drum and suction-fan, so that the hot gases and the evaporated moisture carried along by the same are continuously drawn off. As new quantities of hot gases are continuously drawn in through the flues F F′ and the moisture drawn off through the flues G and as the hot gases permeate the pulp in its motion over the troughs, the pulp is thoroughly dried. When the pulp arrives at the ends of the lowermost conveyer, it is in a perfectly dry state and can be conducted to suitable storage-bins or charged into cars, wagons, or other conveyances for direct shipment.

Our improved kiln for drying beet-pulp has the advantages that the entire output of beets can be successfully handled and utilized in a dry form as feed, so that the waste of the same or spoiling by imperfect drying of the pulp is obviated.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

In a kiln for drying sugar-beet pulp, the combination of a drying-chamber, of troughs supported one above the other in said chamber and provided alternately with openings at the ends or center, rotary conveyers located above each trough and provided with right and left hand screw-windings, means for feeding the pulp to the uppermost conveyer, means for conducting off the pulp from the lowermost conveyer, flues supplying hot gases to the spaces in which the conveyers are located, an intermediate inlet-flue being provided with a longitudinal extension-flue arranged at right angles to the inlet-flue below the trough so as to bring the hot vapors toward the ends of the trough, and flues for drawing off the vapors and moisture, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

ALFRED W. HOPPENSTEDT.
RUDOLPH J. DECKER.

Witnesses:
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