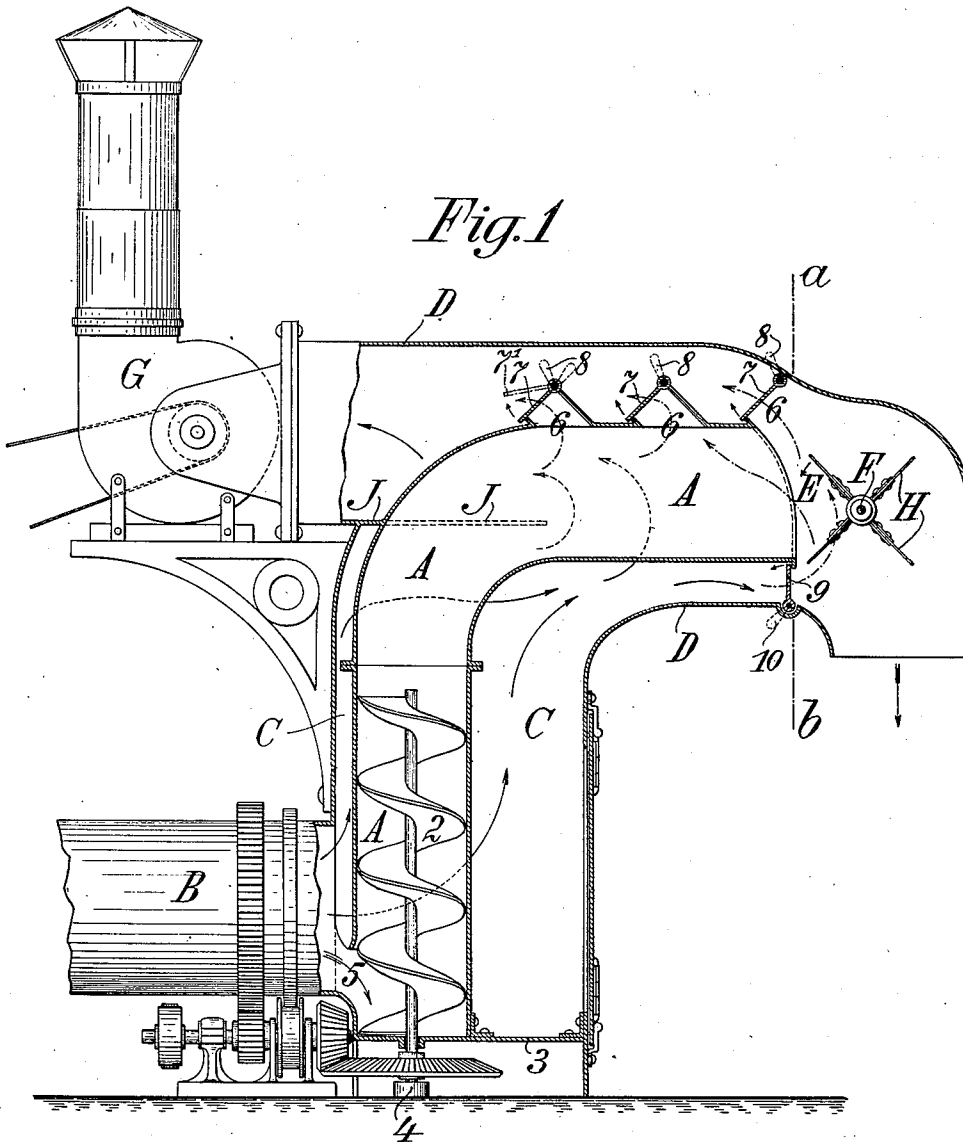


E. WÜRL.
 PROCESS OF MANUFACTURING FODDER CAKES.
 APPLICATION FILED MAR. 30, 1910.

1,007,622.

Patented Oct. 31, 1911.

2 SHEETS—SHEET 1.



Witnesses:

[Signature]
[Signature]

Inventor

Eduard Würl

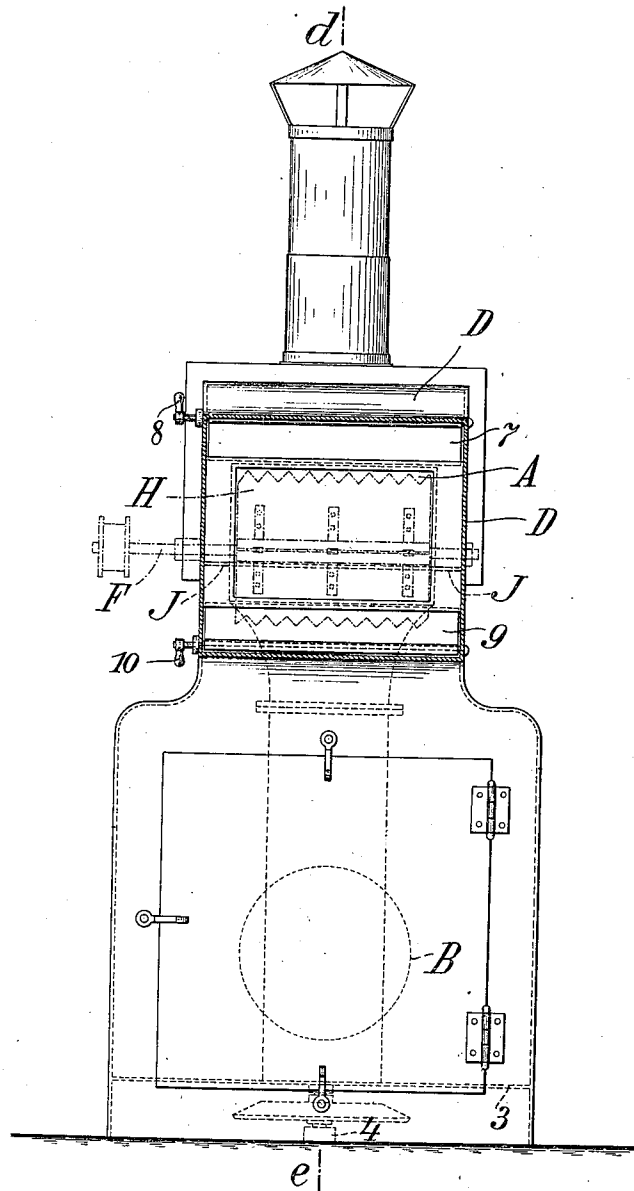
by *[Signature]*
 James L. Morris & Co.
 Attys

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Fig. 2



Witnesses:

[Signature]
[Signature]

Inventor
 Eduard Würl
 by *[Signature]*
 Attorney

UNITED STATES PATENT OFFICE.

EDUARD WÜRL, OF PRAGUE, AUSTRIA-HUNGARY.

PROCESS OF MANUFACTURING FODDER-CAKES.

1,007,622.

Specification of Letters Patent. Patented Oct. 31, 1911.

Application filed March 30, 1910. Serial No. 552,322.

To all whom it may concern:

Be it known that I, EDUARD WÜRL, a subject of the Emperor of Austria-Hungary, residing at Prague, in Bohemia, Austria-Hungary, have invented certain new and useful Improvements in Processes of Manufacturing Fodder-Cakes, of which the following is a specification.

The present invention relates to a process for the manufacture of lasting pressed cakes from plants and parts of plants serving as fodder and from industrial by-products and waste material, such, for instance, as grass, roots, tubers, fruits, from the waste products of the diffusion process in sugar manufacture, from the spent wash and other liquors obtained in spirit distilleries, from pulp and the like.

The invention comprises the following steps: At first the material is partly dried in the ordinary manner either in the air or in drying apparatus. Before the water contained therein has been completely evaporated, the material is subjected to a special operation intended to render it "homogeneous". The purpose of this operation is to impart to all portions of the material a uniformity in elasticity particularly favorable for the subsequent manufacture of pressed cakes. For this purpose, the material is withdrawn from the drier before it has reached the degree of dryness required for its storage as preserved fodder; that is, while still in a condition in which it would unavoidably decay if stored. This stage is reached toward the end of the drying operation, and, since, during the drying operation as ordinarily carried out, the dried material never possesses an equal degree of dryness at the same time, the aforesaid condition can practically be distinguished by the fact that a certain portion of the dried material will be very dry and brittle to the touch, whereas the remainder of the material still contains some water, and, therefore, is still soft. If, then, the drying of the material be continued in the usual manner, the final product would be a dried material incapable of being immediately pressed into cakes; on the contrary, to render the material suitable for pressing, it would be necessary to again moisten and heat it, since all portions thereof will have attained a higher degree of dryness than is desired for the pressing operation.

According to the present invention, the

drying of the material is not, as is customary, completed, but when the material is in the above-described condition, it is brought into a chamber wherein the drying operation in the presence of artificial heat is continued. In this chamber, which is heated and is provided with steam outlet openings, an operation takes place by which the treated material is in an extremely short time prepared for the subsequent pressing in the following manner. In the course of this treatment, those portions of the material which have been brought during the preceding drying operation to a high degree of dryness, take up a part of the steam which is still escaping from the portions of the material that are still in a moist condition, and, hence, the said dry portions again become plastic and soft. The excess of moisture which might be injurious to the preservation of the fodder material is allowed to escape in the form of steam through regulatable openings in the walls of the chamber. In consequence of this treatment, an equalization of the moisture in all portions of the material is produced, whereby the most favorable preliminary conditions are attained for the pressing operation, and the amount of moisture in the material which is being dried in the homogenizing chamber is reduced to the degree that is most suitable for the subsequent manufacture of the cakes.

Where the material to be treated is initially dried in a drier, the process forming the subject of the present invention can be carried out either in that drier itself or in a special apparatus adjoining the same. In this manner, the time and fuel consumed during the entire process (drying and pressing) can be considerably reduced, and, consequently, the process itself is considerably simplified as compared with the known process for the manufacture of fodder cakes, because both the time that would be required for the final operation of drying the material in the drying apparatus and the quantity of heat required for that purpose are already utilized for the preliminary treatment of the material in order to shape it into blocks or cakes.

Where the fodder material has been submitted to a preliminary drying operation in the open air, a saving in time and a simplification of the entire process of preservation are, also, attained, because the oper-

ation of heating to which the material is subjected and, if desired, the simultaneous application of pressure will, at the same time, effect the necessary reduction of the moisture in the material and serve to prepare the material for the final pressing operation. The subsequent pressing operation of the material thus prepared into cakes or blocks may be performed in any suitable manner, and, before being finally delivered for storage or shipping, the cakes are kept for some time under a constant pressure, inasmuch as their physical structure requires this proceeding.

Before the final pressing operation, grain or other nutritious vegetable substances may be added to the treated material without any further moistening of the same with steam or with any extraneous binding agents.

The above-described process may be carried out in the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a view of the drying apparatus wherein the homogenizing chamber is arranged partly in side elevation and partly in section taken on line *d—e* of Fig. 2; and Fig. 2 is a view of said apparatus partly in front elevation and partly in section taken on line *a—b* of Fig. 1.

The homogenizing chamber A is located in the flue C through which the hot air and condensed steam escape from the drier B, and it consists of a fixedly arranged tube in the lower straight part of which a feed screw 2 is provided, the lower end of said screw being supported beneath the bottom wall 3 of the flue by a step-bearing 4 or the like.

The tube or chamber A has an opening of appropriate size through which the material to be treated enters in a still incompletely dried condition from the drier B, which latter may be of any suitable type, as will be understood, and is here shown as in the form of a rotary drum. By means of the screw 2 which is driven, for instance, by the driving gear of the drum, the material, on entering the tube from the drum, is raised and conveyed or pushed into the curved upper part of the tube. This curved part may be of any suitable cross-sectional shape and may have any preferred dimensions relative to the lower portion wherein the feed screw is located.

In the present construction, the aforesaid upper portion of the homogenizing chamber has a rectangular cross-sectional shape, and its upper wall is provided with any desired number of openings 6 having covers 7, which covers may be individually controlled by means of their levers 8. When in raised position, as indicated by the numeral 7¹, these covers serve to permit the escape of the steam generated in the tube through said openings 6. Below the outlet end of the

said upper portion of the chamber A is also a cover 9 having an operating lever 10; this cover is provided for the purpose of admitting into the discharge spout E of the flue the hot gases which exhaust into said flue from the drier, so that in case the material passing into the spout still contains too much moisture said cover may be opened to the proper extent and the gases allowed to flow directly into contact with the material, to subject the same to a further drying. In this instance, a counter-current will be set up, since the action of the exhauster G that communicates with the horizontal upper flue section D will tend to draw a portion of the gases admitted into the spout into and through chamber A, these gases being caused to flow rearwardly through said chamber and to exhaust therefrom through the rearmost opening 6.

On the shaft F is mounted a fan H whose wings or blades agitate the material issuing into spout E from chamber A, thus preventing the formation of lumps.

The described apparatus works as follows: The material to be dried emerges from the drying drum B through the opening 5 in a still incompletely dry state, and enters the lower portion of the chamber A which is arranged in flue C, through which flue the heating gases, together with the condensed steam or hot air are exhausted by the exhauster G in the ordinary manner. Thus the aforesaid chamber is arranged in the path traveled by the hot waste gases escaping from the drying apparatus, and is sufficiently heated by them. In order to insure that the hot gases may completely circulate around and uniformly heat the entire chamber A up to its upper outlet or spout E, there is arranged on each side of the curved part of the said chamber a partition J in the position shown in the drawing; this partition serves to prevent the hot air which flows upward from the drying drum from passing directly into the upper flue section D that communicates with the exhauster, in which case the horizontal upper portion of the chamber A, together with the drying material conveyed therein, would not be sufficiently heated.

When the screw 2 is rotated in the proper direction, the drying material, while still incompletely dried and emerging in small quantities from the drying drum, will be raised through the vertical portion of chamber A, wherein said screw is located, and will then be delivered into the horizontal upper portion of said chamber.

During its passage over the curved lower wall of that part of the chamber which connects the vertical and horizontal sections, the material will be slightly compressed by reason of the friction resultant from the curvature of said wall, whereby a more inti-

mate contact of the individual particles of the material with each other, and, consequently, a better homogenizing of the same, is obtained. The excess of moisture still
5 contained in certain parts of the material is here changed into free steam which will uniformly permeate the whole material by reason of its tendency to escape upward and pass into the wider horizontal section of the chamber, where the material lies in a loose
10 and more open condition; from this section, the steam will escape through the openings 6, the covers 7 of which have previously been raised to the proper extent. The material will thus reach the spout E in a
15 uniformly plastic state, that is to say, completely homogenized, and is then fed through said spout in appropriate quantities in order to be submitted to the pressing
20 operation proper; at this point, the homogenized material may, if desired, be mixed with other fodder materials.

Where the materials to be treated have been subjected to the initial drying operation in the open air, rather than in a drum
25 or other form of drying apparatus, they may be fed into that portion of the chamber wherein the screw is located in any suitable manner, the construction of the flue and
30 chamber being the same as that above described. The flue and chamber may, in such

instance, be supplied with heat from any desired source, and the positive suction fan or exhauster may, if preferred, be replaced by a simple ventilator of conventional type,
35 illustration thereof being considered unnecessary.

I claim as my invention:

The process of manufacturing cakes from agricultural fodder material which consists
40 in subjecting the material to an initial drying operation, interrupting the initial drying operation at a point when the treated material is partially dry and brittle and partially moist and plastic, subjecting the
45 partially dried material to a further drying operation in a receptacle in the presence of artificial heat, to convert the moisture contained in said material prior to its subjection to the second drying operation into
50 steam which will penetrate said material entirely and render the same uniformly plastic, and finally pressing the plastic material into cakes.

In testimony whereof I have hereunto set
55 my hand in presence of two subscribing witnesses.

EDUARD WÜRL.

Witnesses:

FRIEDRICH CUMPELIRS,
ADOLPH FISCHER.