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APPARATUS FOR TREATING ANIMAL MATERIAL

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his Att'y.
The invention relates to apparatus for treating animal matter such as carcasses, slaughterhouse offal, fish offal etc. In order to obtain grease and food meal, and particularly to such apparatus in which the material is at first disintegrated and subsequently dried, solely by indirect heating accompanied by motion produced by means of an agitator continuously revolved. During the treatment of the material the grease is melted out and the solids are decomposed while at the same time the water vapor developed from the water associated with the material is led off. During the subsequent drying process, the residual water is removed from the product.

Apparatus of this class preferably comprise a horizontal vessel with a double shell receiving the heating steam the heat of which is transmitted through the interior wall of the shell to the material to be treated. Moreover, apparatus of this class are usually provided with an agitator having separate narrow blades secured each to a single agitating arm so as to pass one after another with the corresponding arm through the material. In the known apparatus it takes much time to disintegrate the material, to sterilize it and to dry it. The capacity of the apparatus being for instance about 1500 to 2000 kg, it takes 6 to 7 hours on an average for the treatment.

According to the invention, this time will be reduced to about one half—about 3 to 3½ hours—because the agitator members sweeping along the shell of the apparatus are shaped as lifting beams extending substantially over the whole length of the shell and which each consist in a hollow beam through which the heating medium passes. Furthermore, the hollow lifting beams, at the same time heating and stirring the material, are preferably provided with edges at their outer borders substantially adjacent the inner surface of the shell and moving around the latter. Another feature of the invention consists therein that the hollow beams are connected by two hollow rings, so dimensioned that the ring adjacent to the charging head has a relatively large diameter and does not obstruct in the least the charging opening and the ring adjacent to the discharging tube has a relatively small diameter in order to render the structure as rigid as possible and to allow withdrawal of the treated material without residue through the discharge tube disposed in the bottom of the shell.

In the case of horizontal evaporators for liquids, lifting ledges, sweeping the whole shell, have already been used for passing through the liquid to be evaporated, closely to the shell to lift and agitate the liquid. Now, a lifting ledge can very readily pass through a liquid, but it could not be foreseen that the thick and tough mass being formed from animal carcasses etc., and opposing a very heavy resistance even to the ordinary agitators, could be treated by means of an agitator comprising long lifting planks without producing serious troubles and an unduly high power consumption.

In a well-known type of apparatus for treating animal matter, provided with a vertical double-walled body, the agitating arms revolving in a horizontal plane were heated by steam, these arms carrying at their ends vertical bars caused to move along the shell but not heated. With such a device, however, the object of the present invention can not be arrived at. In a vertical vessel, such an agitator will move the whole charge in a circle only, without the surface of the mass being sensibly changed so that, particularly at the horizontal agitating arms, the material heavily bakes on. Therefore, it is absolutely impossible to finish the process and these devices are fully inoperative.

In apparatus having a horizontal cylindrical body, the attempt has been made to shorten the treating time by an increase of the area of the shell heating surface. To this end the inner wall of the body was shaped as a corrugated tube. In this type of device, the advantage of a complete automatic discharge is lost, but in addition, the operation time is not remarkably reduced.

According to the present invention, the success aimed at is obtained with surprisingly simple means and with the following advantages not to be expected to this extent. The inside of the shell of the apparatus and the agitator no longer become incrusted and contaminated. The operation time is reduced to one half of the time previously required. The power consumption hardly exceeds the previous figure. Finally, the output of the new apparatus suffices for continuous work e.g. in case of mere drying. The use of lifting beams for the treatment of this kind of material was not thought feasible heretofore.

An embodiment of the subject matter of the invention is shown in the drawings which represents in:

Fig. 1 a vertical section through the whole apparatus.

Fig. 2 a cross section through the body of the apparatus, taken on line II—II of Fig. 1 with the agitator rotated about 90°.

Fig. 3 a detail of the agitator.

According to Fig. 1, the horizontal cylindrical
body of the apparatus has a double shell, namely an inner wall $a$ and an outer wall $b$. The space between these walls is fed with steam in a manner known per se. Through a head $c$, provided with a lid $d$ for pressure-tight closure, the raw material is supplied, and a tube $e$ with a pressure-tight lid $f$ is used for discharging the product.

A shaft $g$ driven for instance by gearing $h$ carries the agitator equipped with a plurality of lifting planks which are designed as hollow beams $i$ and which, as shown in Fig. 1, extend practically along the whole length of the inside wall $a$.

At the left-hand end of the body (near the delivery tube $e$) the beams $i$ are held in spaced relationship with respect to each other by means of a relatively small hollow ring $k$ attached to the inner edges of the beams and secured to the shaft $g$ by means of hollow arms $r$. The hollow ring $k$ is in communication with the beams $i$ and the hollow arms $r$ through suitable openings $s$ and $t$, respectively. At the right-hand end of the body (near the charging end $c$) the hollow beams $i$ are connected by a relatively large hollow ring $n$ attached to the outer edges of the beam but having no arms, which ring is also provided with openings for the passage of the steam. At this end of the body the agitator is supported by separate arms $n$ the distance of which from the charging head $c$ is great enough to permit the interior space of the apparatus to be easily charged. The head $c$ carries a vapor discharge with a valve $p$ or the like.

The beams $i$ are fed with steam through one compartment of a subdivided bore $j$ in the shaft $g$. The steam circulates through the hollow rings and beams, as indicated by the arrows, and the condensate is carried off through the other compartment of the bore $j$.

Fig. 3 shows a hollow lifting plank $i$ on an enlarged scale. Its outer edge $o$ moving along and substantially adjacent the body shell $a$ is shaped as a cutting edge. Otherwise, the cross-section of the lifting planks or hollow beams $i$ may have any suitable shape.

When animal carcasses, slaughter house offal, fish or the like are to be treated, the raw material is supplied through the head $c$ while the agitator is revolving and the double shell $a-b$ and the agitator are heated in due time with steam. As heating proceeds an elevated pressure develops within the shell, as the vapors are driven out of the material which vapors are then allowed to escape through the valve $p$. The finished product is discharged through the tube $e$. If a material poor in water, such as lard, is to be treated, the body of the novel apparatus may also be of the one-walled type, i.e. consist of the shell $a$ only, since the heating effect of the agitator will suffice by itself.

The method of heating the agitator may be optional as to the direction and to the nature of the heating medium; the steam may be replaced by a heating liquid, such as hot water or oil. The very great reduction of the time of treatment, so arrived at, also permits the construction of apparatus much larger than formerly but with similar favourable results.

What I claim as my invention is—

1. In an apparatus for disintegrating and drying animal material of the character described, a closed, horizontal, cylindrical shell adapted to accommodate the material to be treated, means at one end of the shell for charging the shell, means at the other end for withdrawing material from the shell, a rotatable shaft extending coaxially through the shell, agitating means mounted on said shaft and comprising a series of lifting elements arranged parallel to the cylinder axis and in substantially contacting adjacency to the shell wall, each element being coextensive in length with the entire shell and of hollow construction, a circular header connecting said elements at the charging end of the shell and having a relatively large diameter, a second circular header connecting said elements at the opposite end and having a relatively small diameter, and means for introducing a heating medium into said headers and elements.

2. In an apparatus for disintegrating and drying animal material of the character described, a closed, horizontal, cylindrical shell adapted to accommodate the material to be treated, means at one end of the shell for charging the shell, means at the other end for withdrawing material from the shell, a rotatable shaft extending through the shell, agitating means mounted on said shaft and comprising a series of lifting elements arranged parallel to the cylinder axis and in substantially contacting adjacency to the shell wall, each element being coextensive in length with the entire shell and of hollow construction, a circular header connecting said elements at the charging end, supporting spokes for said agitating means and header at the charging end of the shell, said spokes being disposed in a vertical plane inwardly spaced from the header at the charging end, and means for introducing a heating medium into said headers and elements.

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