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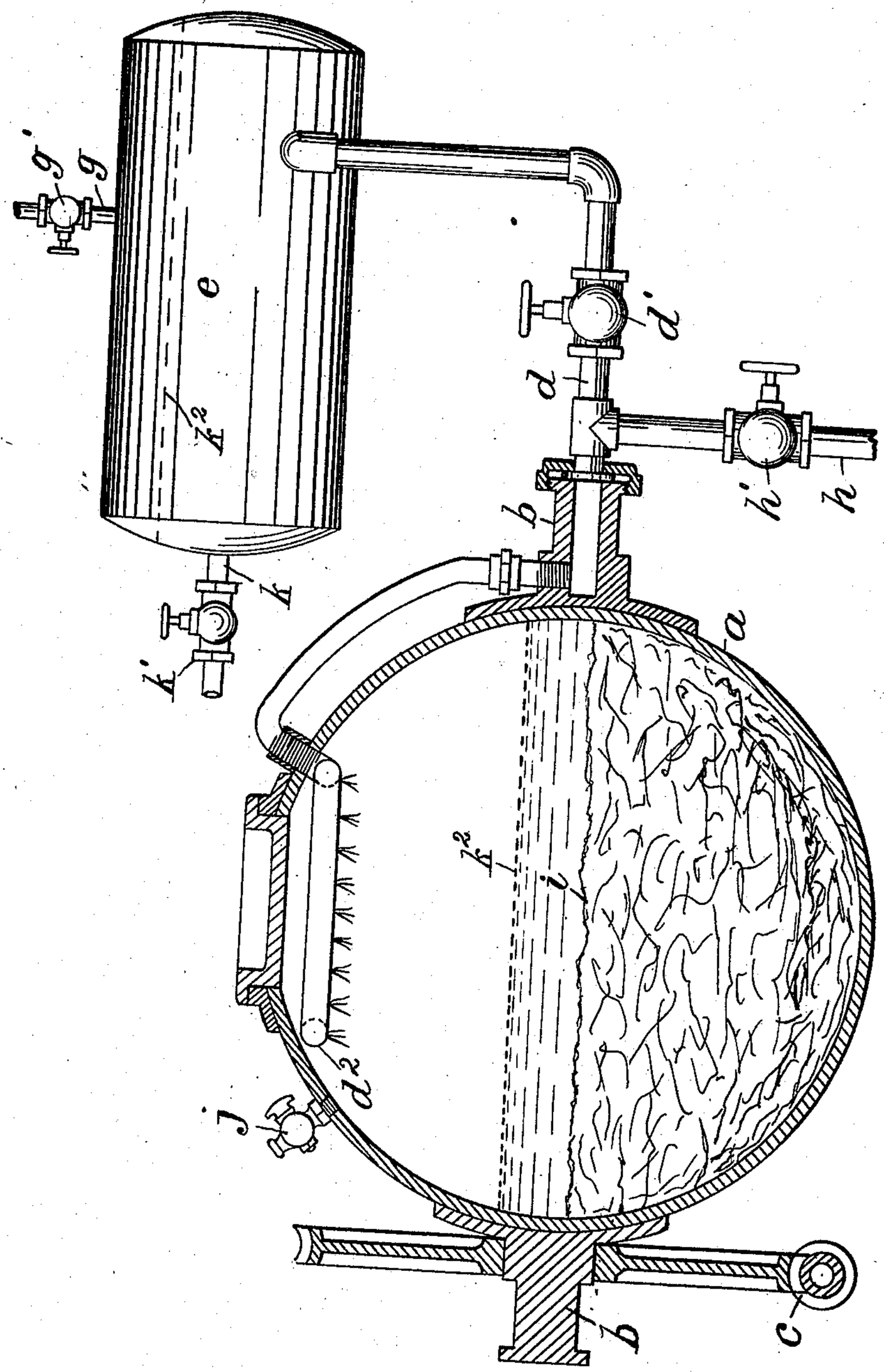
M. R. KENNEDY.

USE OF HOT AIR IN EXTRACTING FIBER FROM VEGETABLE TISSUES.

APPLICATION FILED JULY 28, 1906.



Witnesses:
M. C. Wall.
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per Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

MICHAEL R. KENNEDY, OF DANSVILLE, NEW YORK, ASSIGNOR TO THE NATIONAL STRAW PULP COMPANY, OF NEW YORK, N. Y., A CORPORATION OF SOUTH DAKOTA.

USE OF HOT AIR IN EXTRACTING FIBER FROM VEGETABLE TISSUES.

No. 885,851. Specification of Letters Patent. Patented April 28, 1908.

Application filed July 28, 1906. Serial No. 328,212.

To all whom it may concern:

Be it known that I, MICHAEL R. KENNEDY, a citizen of the United States, of Dansville, county of Livingston, and State of New York, have invented certain new and useful Improvements in the Use of Hot Air in Extracting Fiber from Vegetable Tissues, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to processes of extracting fiber from straw &c. at high temperatures, in which a charge of the straw is confined in a closed receptacle or so-called "cooker", with suitable chemical liquor, and heated and agitated to facilitate the action of the liquor upon the straw. Heretofore, saturated steam has been employed as the heating agent in such processes and apparatus, being injected directly into the closed receptacle, and through a journal when a rotary was used, or into the ingredients confined therein; but the condensation of the steam adds a considerable proportion of water to the chemical liquor, and operates during the process to gradually dilute the same, so as to materially impair its effect on the straw.

It is the object of the present invention to obviate such dilution of the liquor by the heating agent, which object is accomplished in the present invention by using heated air, or hot air mixed with steam, as the agent for heating, dissolving and bleaching the contents of the cooker.

The heated air conveys no appreciable degree of moisture into the cooker and does not therefore affect the chemical strength of the liquor, while it heats the same in the desired degree when agitated therewith in the manner usual in such cookers. Superheated or saturated steam may be mixed with the hot air when desired.

In supplying the liquor to the cooker it is very desirable to heat the liquor before it is delivered into the cooker, so as to avoid the loss of time required to heat the same in the cooker, and thus utilize the cooker the entire time, for treatment of the straw.

The liquor when heated cannot be readily propelled from a tank to the cooker by means of a suction-pump (other systems are very expensive to operate), as the vapor from the liquor destroys the vacuum in the pump, and I therefore employ pressure upon the surface of the liquor in the closed tank to propel the same into the cooker, preferably using heated air to produce such pressure. The pressure of heated air upon the liquor in the tank thus serves to heat the tank at the same time that it propels the liquor from the same.

The apparatus employed in practicing this process may be varied without departing from the invention, an illustration being shown in the annexed drawing, in which a cooker and a liquor supply tank are shown in section in a diagrammatic form.

a designates the cooker, shown of globular form mounted on trunnions *b*, with gearing *c* for rotating the vessel to agitate the contents. A pipe *d* is shown extended into one of the trunnions to deliver the liquor or heated air to the cooker, and terminated within the cooker by a spray pipe d^2. The pipe is carried to a supply tank *e* into which a pipe *g* is extended and provided with cock *g'* to supply air or steam under a pressure sufficient to drive the liquor into the cooker. A pipe *k* and cock *k'* are shown to feed the tank with liquor as required.

A pipe *h* for heated air is shown connected with the pipe *d* close to the trunnions, and the pipes are provided with cocks *d'* and *h'* adjacent to their junction.

A charge of straw *i* is shown in the cooker, and the liquor k^2 is supplied thereto by closing the cock *h'*, opening the cock *d'*, and exerting pressure upon the liquor in the tank to force it into the cooker, where it is thrown upon the charge in jets from holes in the spray pipe d^2. Such pressure is exerted by opening the cock *g'*, and the discharge of liquor can be stopped when desired, by closing such cock. The cock *d'* being then closed, heated air may be injected into the cooker through the spray pipes by opening the cock *h'*, the cooker being rotated to agitate the charge with the liquor and heated air.

The rise of temperature in the cooker produces a steam pressure corresponding to such temperature, and when the accumulation of air in the vessel tends to rise above such pressure, a portion of the air may be discharged from the upper part of the vessel, as by vent cock *j*, and an additional supply of air then injected.

The original and additional supplies of air are admitted to the cooker while it is revolving, and always beneath the charge under

treatment, so as to effectually penetrate the same. Superheated steam may be mixed with the heated air, to convey a large amount of heat into the cooker with only a small amount of moisture, and thus weaken the liquor but slightly, while the increased temperature greatly increases the activity and efficiency of the chemicals.

My invention thus maintains the desired heat without injuriously weakening the liquors employed.

This process is applicable to wood-chips and rags, as well as to straw.

I am aware that hot air has been used by diffusion in an open tank to promote the fermentation of vegetable fibers, but such an operation of the hot air does not in any way suggest the substitution of air for steam in a case where the steam operates injuriously to dilute chemical liquors, as in the process described herein.

It is evident that where air is used to heat the liquor in a tightly closed receptacle containing any water, as in the present process, the water is vaporized and steam is generated at a high pressure corresponding to the high temperature produced by the heat of the air; but without the introduction of any vapor or water which tends to dilute the chemical liquor.

Having thus set forth the nature of the invention what is claimed herein is:

1. The improvement in the process of extracting fiber from straw with chemical liquors at high temperatures, which consists in confining a charge of the straw with the required chemical liquor in a closed receptacle or cooker, and heating the contents of the receptacle by the injection of heated air, whereby the charge is heated to the high temperature desired with a pressure corresponding to that of steam at such temperature, and without the condensation of vapor and the weakening of the chemical liquor.

2. The improvement in the process of extracting fiber from straw &c. at high temperatures, which consists in confining a charge of straw with suitable chemical liquor in a closed receptacle or cooker and injecting heated air and steam into such cooker, with agitation of the charge, whereby the charge is heated with a small condensation of vapor and slight weakening of the liquor.

3. The improvement in the process of extracting fiber from straw at high temperatures, which consists in charging a closed cooker or receptacle with a charge of straw, placing the liquor required for treating such charge in a closed tank, forcing heated air into the said tank, and propelling the liquor into the cooker by air pressure.

4. The improvement in the process of extracting fiber from straw at high temperatures, which consists in charging a closed cooker or receptacle with a charge of straw, spraying the liquor required for treating the straw upon the straw in the cooker, injecting heated air into the cooker while the liquor and straw are agitated and thus heating the mixture to the required temperature without materially weakening the liquor.

5. The improvement in the process of extracting fiber from straw at high temperatures, which consists in charging a closed cooker or receptacle with a charge of straw, spraying the liquor required for treating the straw upon the straw in the cooker, and injecting a mixture of heated air and superheated steam into the cooker while the liquor and straw are agitated, and thus heating the mixture to the required temperature with slight weakening of the liquor.

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

MICHAEL R. KENNEDY.

Witnesses:
P. M. HAMMOND,
CHAS. H. UNVERZAGT.