

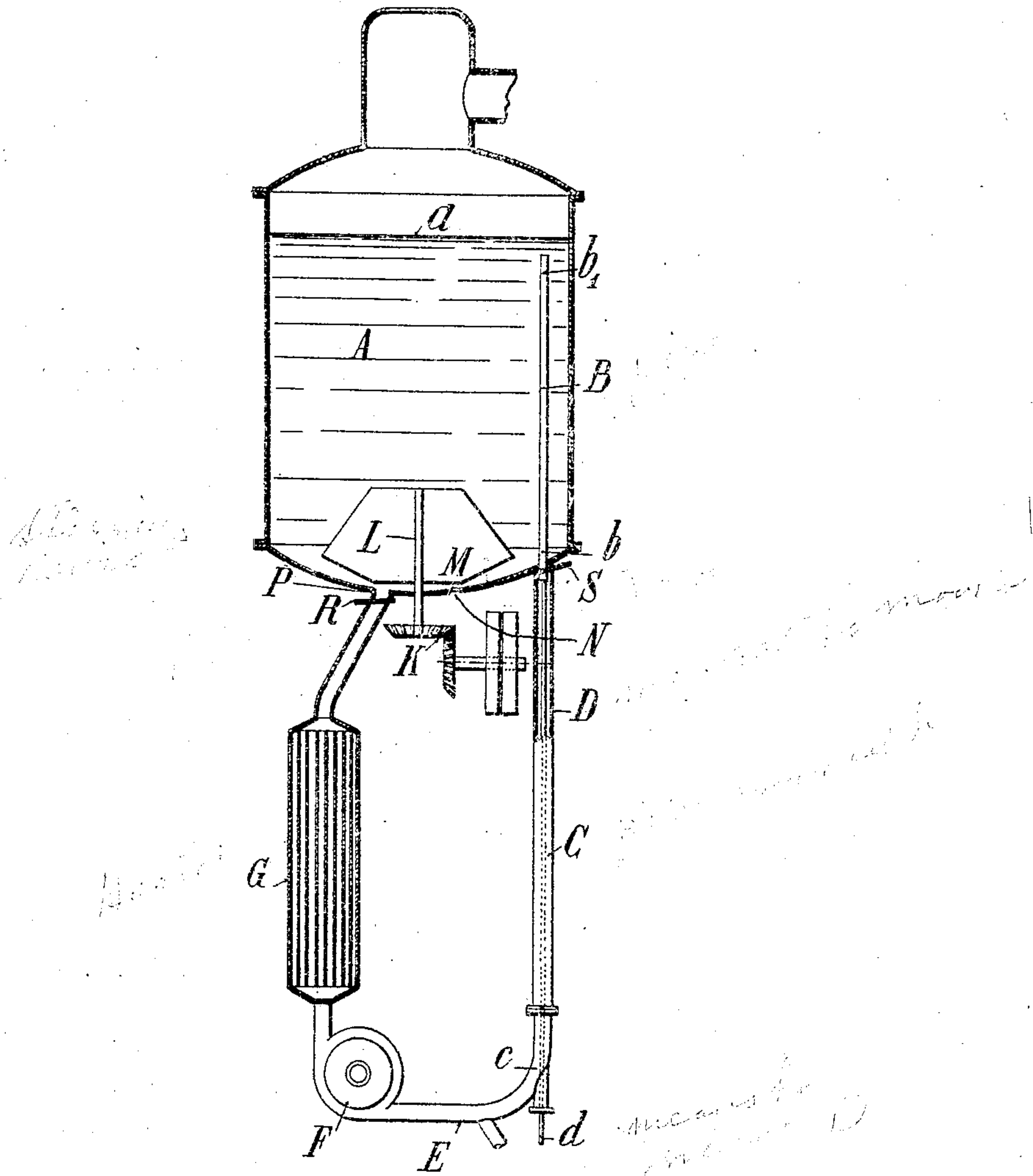
No. 786,601.

PATENTED APR. 4, 1905.

H. ROY.

PROCESS OF PREPARING MASSE CUITE.

APPLICATION FILED APR. 27, 1904.



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# UNITED STATES PATENT OFFICE.

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## PROCESS OF PREPARING MASSE-CUITE.

SPECIFICATION forming part of Letters Patent No. 786,601, dated April 4, 1905.

Application filed April 27, 1904. Serial No. 205,184.

*To all whom it may concern:*

Be it known that I, HENRY ROY, a citizen of the Republic of France, and a resident of Paris, France, have invented a new and Improved Process of Preparing Masse-Cuite, which process is fully set forth in the following specification.

This invention relates to a new process for boiling down syrups in sugar-works and refineries for the purpose of obtaining masse-cuite. The process in question has the advantage of enabling masse-cuite to be obtained having very large grains and capable of being produced from syrups concentrated to any desired degree.

The main feature of this process is that the concentrated or non-concentrated syrups are not automatically supplied directly to the vacuum-pan in which the boiling down takes place, but are delivered into pipes connecting the upper and lower portions of such vacuum-pan and through which piping liquor circulates from the upper level to the bottom of the vacuum-pan. The syrup supplied thus becomes mixed in such pipes with the moving masse-cuite, and the mixture is subjected to heating. As a result of this arrangement the masse-cuite of smallest density containing the small grains and found in the upper portion of the vacuum-pan is removed in a continuous manner and brought into contact with the syrup, which, being subjected to the action of heat immediately on entering, does not itself produce small grains, but simply feeds those circulating. This mixture is then returned to the lower portion of the vacuum-pan which contains masse-cuite of greater density, the greater or coarser grains produced remaining at the bottom of the vacuum-pan A, while the parts having smaller density rise in the vacuum-pan and get enriched by another circulation, and so on.

The process in question can be carried out in practice in various ways. An apparatus enabling the process to be practically carried out is illustrated, by way of example, in the accompanying drawing. The apparatus in question chiefly comprises—

First. A vacuum-pan A of ordinary construction with all its accessories—such as

steam-coils, gages, condensers, air-pumps, &c. *a* indicates the level of the masse-cuite when the apparatus is full.

Second. A vertical pipe B, open at both ends, arranged within the vacuum-pan and passing at *b* with slight friction through the pan-bottom. This pipe is connected at its lower end, by a kind of reversed stirrup shaped to leave the lower orifice of the pipe free, to a metal rod which can be raised or lowered.

Third. A vertical pipe C, secured at *b* to the bottom of the vacuum-pan at the point where the pipe B passes through it. This pipe is a little longer than the pipe B, to which it serves as a casing, and it is closed at the bottom end *c*, but is provided with a stuffing-box, through which the metal rod supporting the pipe B passes.

Fourth. The metal rod D, which when raised or lowered causes the pipe B in the vacuum-pipe to which it is connected to move vertically both in the boiler and in its casing *c*, so that its upper end is always at a suitable distance from the level *a* of the masse-cuite in the apparatus. The metal rod in question is operated at its lower end *d* by any mechanical device.

Fifth. A suction-pipe E of a centrifugal pump F, connected to the lower portion of the pipe C.

Sixth. A centrifugal pump F or some other suitable apparatus for pumping the masse-cuite from the upper part of the pan through pipes B, C, and E and forcing it through a series of heating-tubes of a tubular heater G into the lower portion of the vacuum-pan at H.

Seventh. A heater G for heating the masse-cuite during the passage therethrough by means of live or exhaust steam or syrup, according to the circumstances.

Eighth. A driving-gear, such as pulleys and bevel gear-wheels K or the like, driving a vertical spindle L, arranged in the center of the lower portion of the vacuum-pan at about eight to ten revolutions per minute.

Ninth. A vertical spindle L, supported by a special bracket secured to the bottom of the vacuum-pan and passing through a stuffing-box in the bottom of said vacuum-pan at a



point where the discharge-floor of the apparatus is generally placed.

Tenth. A stirring device M of special shape attached to the above-mentioned spindle, designed in accordance with the shape of the heating-coils for stirring the masse-cuite in the best possible way, mixing the masse-cuite coming from the heater G with that contained in the lower portion of the apparatus by raising it owing to the helical shape of the said device.

Eleventh. A door for discharging the masse-cuite arranged at the side at N instead of in the center, where the stirring device is situated.

Twelfth. Two valves R and S, whereby the operation can be completed as the mass thickens, under ordinary conditions the stirring device only, without the circulation apparatus, being used. The pipe B will be lowered in its casing D to a sufficient extent to permit of the valve S being closed. As regards the semiliquid mass remaining in the circulation apparatus, this will be collected in a monte-jus or in any other receptacle and conveyed to the boiler or utilized in some other way.

It will thus be seen that the boiling apparatus for carrying out the process according to this invention is constructed as heretofore with the addition of all the devices described. It follows therefrom that any apparatus of the old system can easily be converted into an apparatus for boiling down wherein the liquor under treatment is caused to circulate and the feed is continuous, which apart from other advantages will greatly increase the output and the efficiency.

The working of the apparatus is as follows: In starting, the pipe B is lowered by means of the operating-rod D until its upper end *b'* arrives at *b*—that is to say, is flush with the bottom of the apparatus. The syrup is evaporated in the usual way; but owing to the operation of the centrifugal pump the syrup entering through the pipes B and C is returned to the apparatus through the heater G, which thus contributes to the evaporation. When crystals form as the boiling proceeds, the pipe B is raised by any convenient means acting at *d* in such manner that its top *b'* is always at a distance of, say, ten or fifteen centimeters (four or six inches) from the level of the masse-cuite in the apparatus. The liquor taken from the top of the apparatus will therefore be returned to the bottom at P, passing through the pipes B C E, the centrifugal pump F, and the heater G, and as it enters it will be distributed by the mixing device M throughout the whole mass and conveyed into the heating-coils. Owing to the movement of the mixing device and its shape, the mass will be displaced upward in the apparatus, at least to a certain extent, and the circulation through the heater and vacuum-pan will be very fast, so that the transmission of heat per unit of

surface will be very considerable. The liquor at the top, which is farthest away from the heating-coils and on which the vacuum acts in the most effective manner to disengage steam-bubbles, is generally the coldest and the most liquid, and it is therefore an advantageous feature of the present process that this is always for heating and for conveying to the bottom to produce a more thorough mixture. The attendant will therefore have to watch the apparatus and see that the end *b'* of the pipe B is always placed as near as practically possible to the level of the masse-cuite.

In ordinary apparatus the supply of syrup takes place through one or more pipes, merging into the boiler itself at any desired point. The result is that the mixing does not take place well and is not regular. It is one of the chief reasons of the formation of small grains, especially when concentrated syrups are being boiled down. In the process according to this invention the supply takes place through the pipe C, into which the syrup is introduced. It gets perfectly mixed with the circulating mass during its passage through the centrifugal pump, is strongly heated on passing through the heater G, and has all the qualities necessary for increasing the grain into which it is delivered. The result of the process thus depends, in two senses, upon methodical supply:

First. The syrup is uniformly distributed over each particle of the masse-cuite as it passes through the circulation-pipes B C E. All the masse-cuite will pass through them except when its grain becomes fairly large, and then it will have the tendency of not rising to the top for redescending through the pipe B. It is, however, this portion of the mass which will require the least nourishment.

Second. In a circulating or still masse-cuite the lightest syrup and the finest grains come to the top. The greater the height of the masse-cuite in the apparatus the better will be the separation. As that portion of the masse-cuite is taken up by the means described for returning it to the bottom, the feed-syrup will only increase the proportion of light syrup in the presence of fine grain. As the mixture will have to pass into the heater G, there will be the probability that the finer grains will be those more nourished and will increase to a greater extent, and this will have the tendency of rendering the grain more uniform.

For the above reasons it will be possible, without causing inconvenience, for the feed-syrup when mixed well with the masse-cuite to have a density approaching very nearly to that of the mother-liquor of the masse-cuite—that is to say, that it will be possible to carry on the boiling down with much more dense syrups than is done at present, as the feed-



syrup being at once heated will be free from any tendency to give fine grains, as in ordinary processes.

The feed-syrup can be introduced into the pipe E at the same temperature at which the boiling is carried on. It will be sufficient for the purpose to arrange in the interior of the boiler A, beside the heating-coil, a coil through which the feed-syrup will pass before it mixes with the circulating masse-cuite.

I claim—

1. The process herein described of preparing masse-cuite, which consists in drawing off liquor of less density from the main body of greater density, mixing it with an additional supply of syrup, heating the mixture, and returning it to the main body of the liquor.

2. The process herein described of preparing masse-cuite, which consists in drawing off a part of the liquor under treatment, and keeping it in continuous agitation from the portion of the liquor of less density to the portion of greater density, feeding an additional supply of syrup to said drawn-off liquor, and heating the mixture before delivering it to the main body of the liquor.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRY ROY.

Witnesses:

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