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PROCESS FOR SWEATING CRUDE PARAFFIN WAX OR LIKE MIXTURES (COMPOSITIONS) OF SUBSTANCES WHICH MELT AT DIFFERENT TEMPERATURES.

APPLICATION FILED JUNE 27, 1911.

1,040,408. Patented Oct. 8, 1912.

Fig. 1.

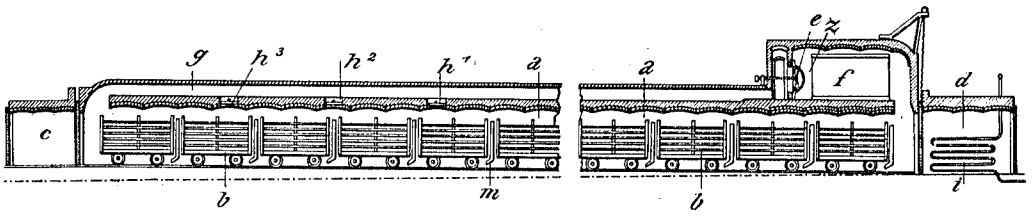


Fig. 3.

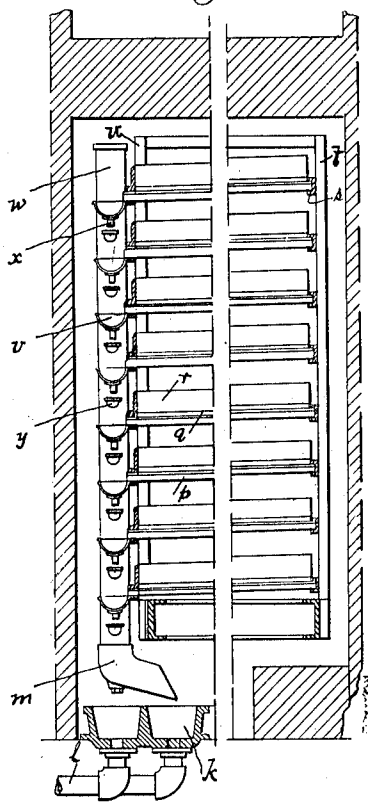


Fig. 2.

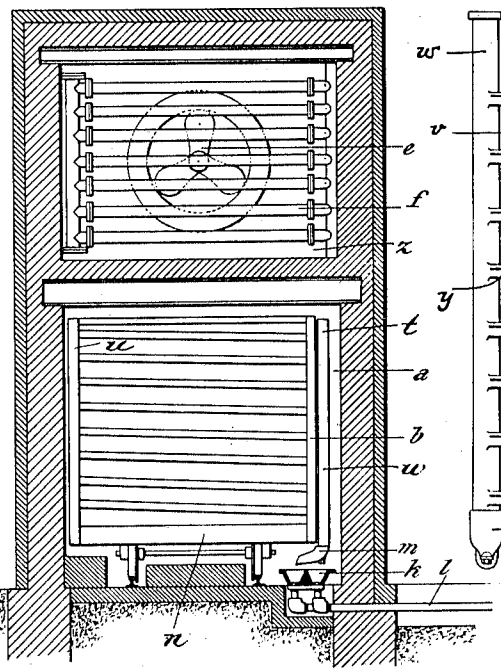
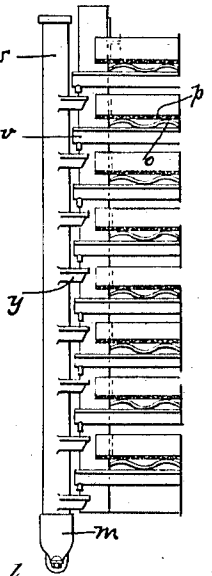


Fig. 4.



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UNITED STATES PATENT OFFICE.

DANIEL PŸZEL, OF BALIK PAPAN, BORNEO, DUTCH EAST INDIA.

PROCESS FOR SWEATING CRUDE PARAFFIN-WAX OR LIKE MIXTURES (COMPOSITIONS) OF SUBSTANCES WHICH MELT AT DIFFERENT TEMPERATURES.

1,040,408. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed June 27, 1911. Serial No. 635,633.

To all whom it may concern:

Be it known that I, DANIEL PŸZEL, chemical engineer, residing at Balik Papan, Borneo, in Dutch East India and Kingdom of the Netherlands, have invented certain new and useful improvements in processes for sweating crude paraffin-wax or like mixtures (compositions) of substances which melt at different temperatures, of which the following is a specification.

The object of the present invention is to provide a process for the continuous fractional separation by sweating of crude paraffin-wax and like mixtures of substances having different melting points.

The most important feature of the improved process consists in this that the sweating out process is continuous, the paraffin-wax being moved in a counter-current against a current of heated air through a sweating oven formed like a tunnel, so that the paraffin-wax is gradually brought to higher temperatures and during the passage of the material through the oven, as the temperature rises, the substances of low melting-points are first separated and then those of higher melting-points. The final melting out takes place preferably in a separate chamber.

In the accompanying drawings: Figure 1 is a longitudinal section of the oven; Fig. 2 is a transverse section through the delivery end of the oven, looking from the right toward the left in Fig. 1, and showing the air-heating chamber arranged over the tunnel; Fig. 3 is a transverse section on a larger scale, showing details of construction; and Fig. 4 is a detail in longitudinal elevation and on a plane at right angles to that of Fig. 3.

For carrying out the continuous sweating process, I employ an apparatus (for which I have filed application Ser. No. 635,632, filed June 27, 1910) comprising an oven, which consists of a long passage *a* provided with rails on which the sweating vessels placed on trucks, or cars *b* are run into the oven. The passage is closed at each end by air-locks *c*, *d*, each of which is large enough to take a sweating truck. The bottom of the passage is made sloping, whereby the moving forward of the trucks is facilitated and the sweating trucks have such a position that the product sweated out can immediately run off.

Over the oven there is an air-duct *g* which is connected with the air heating device arranged at the lowest end of the oven. This heating device consists of a chamber *z* in which is arranged a coil *f* heated by exhaust steam. In the chamber there is also a fan *e* which draws the air from the air-duct, and forces it toward the heating device, whence it flows heated into the sweating oven, in order to again enter the air-duct. The air-duct is connected at suitable places with the oven by apertures which may be closed by dampers or slides h^1, h^2, h^3. If the dampers are opened, a portion of the oven air flows through the damper apertures to the fan, whereby the quantity of the air flowing through the upper cold end of the passage is diminished. In this way a slower heating may be obtained at the commencement of the sweating process.

The air-lock *d* provided at the lower warm end of the passage *a* is provided with steam-heating coil *i*, heated by live steam, in order to enable the final product of the sweating-process to be fully melted out. At the side of the passage there is provided near the rails a gutter *k* which is divided by partitions into compartments equal to the length of a sweating truck. Each of the compartments has a discharge pipe to the outside, so that the sweating products running off the truck may be carried off from each truck separately. If necessary two or more drain gutters may be provided.

The sweating frames placed on the trucks are of a very simple nature, as all cocks, valves and pipes for supplying and carrying off steam, water and paraffin-wax are dispensed with. The car or truck consists of an under frame *n* with a number of, for instance six, columns or uprights, *t*, *u*, half of which are arranged on one side and the other half on the other side of the car. On the uprights on one side eight pieces, *s*, of U-iron are riveted for receiving the sweating trays, while the uprights on the other side carry corresponding angle irons which are arranged somewhat lower in order to give to sweating trays an inclined position. A discharge pipe *w* with a revoluble outlet nozzle *m* is fixed on one upright of the car or truck, by means of which nozzle the molten products flowing from the pipe *w* are suitably distributed into the gutters *k*, whereby it is possible to sweat out in the

same oven simultaneously different kinds of material and to collect them separately.

The trays have a bottom *o* made of corrugated galvanized iron, to which a gauze false bottom *p* is attached, the gauze resting on the summits of the corrugations. The trays have only three sides consisting of angle iron, which are riveted or screwed to the corrugated plate and hold the gauze on three sides, while the fourth side of the gauze bottom is directly connected by rivets or screw bolts and nuts with the corrugated plate. This side of the tray is pushed into the U-irons, *s*, of the truck and forms in this way the uppermost part of the inclined tray. On the opposite side of the tray a drain gutter, *v*, is arranged, the lateral outlet pipe *x* of which is brought over a catch cup, *y*, of the pipe, *w*.

The way in which the improved process is carried out and the crude paraffin-wax introduced into the trays is as follows: The crude paraffin-wax is poured into the ordinary cooling trays or cooling pans and when it has set is cut into blocks. These blocks are then placed on the gauze bottom of the trays and pushed into the truck frame. When the truck is filled with the material, it is run into the air lock and thence into the oven passage. Here the truck enters the coldest end of the oven and gradually travels to the lower and warmest end of the oven, while the hot air flows against the truck in the opposite direction. In this way a partial melting out of the paraffin-wax takes place and at the uppermost and less heated part of the oven the oils and paraffins of low melting point and at the lowest and warmest part of the oven the paraffin-wax of higher melting point is sweated out. The trucks must be run into the inclined passage in such a way that they stand at an inclination to the end where the collecting pipe is located. Consequently the drain gutters which serve for receiving the products dropping through the gauze bottom into the inclined corrugated plate and running off the latter have the same inclination, so that these products pass immediately through the outlet pipe into the catch cups of the collecting pipe. Now as the outlet nozzle *m* arranged at the lower part of the pipe is adjusted over one of the gutters, the molten substances flow directly out of the pipe into one of these gutters, whence they are carried off through pipes *l*. When a truck has passed through the oven passage it comes into the air lock *d* where the final product of the paraffin-wax is melted out by means of live steam. The outer door of the air lock is then opened, the truck run out and the door again closed. A sliding door located between the air lock *c* and the oven is then opened by being drawn up and the truck which stands next to the air lock runs into the latter, whereupon all the trucks contained in the oven can advance one truck length. The air locks are only in communication with the external air for a short time during the opening of the outer doors, while the trucks are run in and out. The loss of heat by radiation is therefore very small. The interior of the sweating oven is never in communication with the outer air as one of the two doors of each air lock is always closed. The fan draws the air from the air-duct and forces it through the heating-room into the oven-passage. Here the hot air flows past the trucks and causes the paraffin-wax cakes thereon to sweat out. When the air has passed through the passage it rises into the air-duct, in order to be afresh drawn up by the fan. The air is thus in continuous circulation.

In the accompanying drawings an apparatus is shown, the oven of which is designed to receive sixteen trucks. Each truck is loaded with 3.2 to 3.5 tons of crude paraffin-wax. The apparatus can therefore, when the trucks pass through the over once every 24 hours, treat 50 tons of crude paraffin-wax per day. Every 1½ hours a sweated out truck must therefore be run out and a fresh charged truck run in. By diminishing the number of the trucks or by employing smaller trucks the oven may also be arranged for a smaller production. In consequence of the great speed at which the hot air is blown through the tunnel, the temperature is prevented from differing in the upper and lower parts of the same section of the tunnel, whereby the sharpness of the fractional separation is insured.

By varying the temperature and the speed of the air the increase of temperature may be so selected from one truck to another, that the sweating process takes place under as favorable condition as possible.

Only because in this process all the trucks may be filled at a suitable place outside the oven with the paraffin which is to be sweated out, is it possible without complicated conveying mechanisms to allow it to set in separate cooling trays or on a cooling basin instead of filling it in a molten condition directly into the sweating trays and the solidified paraffin to be loaded in a solid form on the sweating trucks, thus rendering it unnecessary to construct the sweating trays in such a way that they have to be filled with water and molten paraffin-wax. The sweating trays may consequently be made much simpler and lighter than in prior processes. Further the casting of the crude paraffin-wax into simple cooling trays or into masonry cooling ponds filled with water is in every respect more convenient and cheaper than pouring it directly into the melting trays especially as an efficient sys-

tem of water cooling can be much more easily arranged in the first case.

This improved process has all the advantages of a continuous circulatory process, without having the disadvantages of intermittent operation.

The rapid flow of air caused by the fan through the sweating tunnel also diminishes the differences of temperature between the upper and lower parts of the sweating frame, so that the sweating out takes place in uniform rapidity in all trays. The speed of the sweating out may also be adjusted with certainty by adjusting the fan and the air dampers. Finally as the sweated product is always run off immediately, the fractional separation is substantially sharpened.

The construction of the trays and trucks also offers many advantages. The corrugated plate gives the gauze an efficient support, so that depressions in the same and accumulations of oil produced thereby are avoided.

While I have described air as the heating fluid, obviously any other suitable heated fluid, such as steam, may be used.

I claim:

1. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in moving the mass to be sweated in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place.

2. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in moving the mass to be sweated in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place, and separately removing the separated fractions.

3. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in continuously moving the mass to be sweated in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place.

4. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in continuously moving the mass to be sweated in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place, and separately removing the separated fractions.

5. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in continuously moving the mass to be sweated in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place, and reheating the air for further use.

6. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures, which consists in moving the mass to be sweated through a closed chamber in an opposite direction to that of a current of heated air of gradually increasing temperature so that fractional separation takes place, and subjecting the wax to a final highest temperature, for the purpose described, in a separate chamber.

7. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures which consists in gradually moving a series of masses to be separated through a closed chamber in which the masses are subjected to gradually increasing temperatures.

8. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures which consists in gradually moving a series of masses to be separated through a closed chamber in which the masses are subjected to gradually increasing temperatures, and subjecting each mass to a final high temperature in a separate chamber.

9. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures which consists in gradually moving a series of masses to be separated through a closed chamber in which the masses are subjected to gradually increasing temperatures, produced by an oppositely flowing current of heated air.

10. The process of sweating out paraffin wax and like mixtures of substances melting at different temperatures which consists in gradually moving a series of masses to be separated through a closed chamber in which the masses are subjected to gradually increasing temperatures produced by an oppositely flowing current of heated air, and subjecting each mass to a final high temperature in a separate chamber.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL PŸZEL.

Witnesses:
G. U. ANDRIES,
H. C. KNAPPERT.