2 Sheets, Sheet 1.

E. S. Hutchinson,

Extracting Oil.

No. 112,349. Patented Mar. 7, 1871.

FIG. 1.

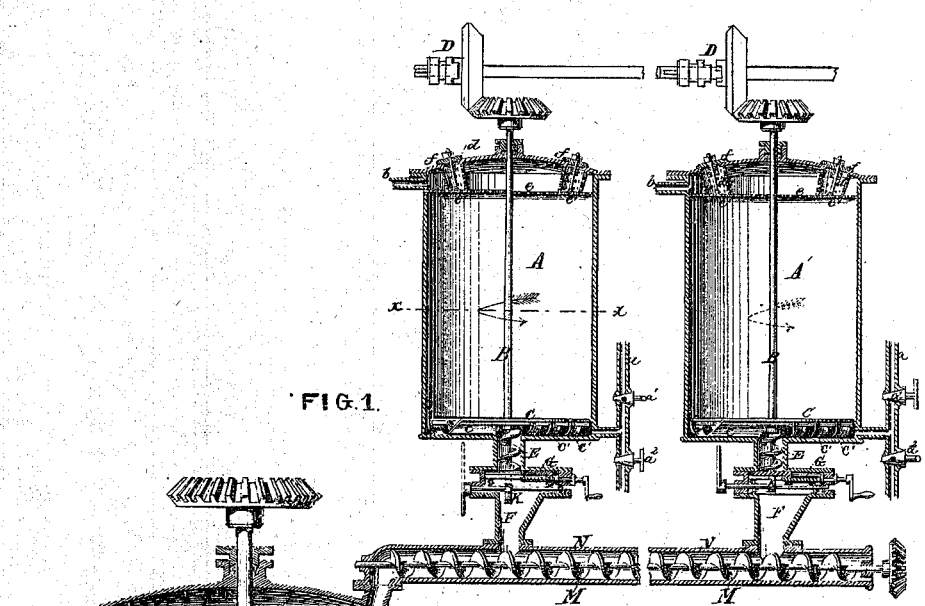


FIG. 2.

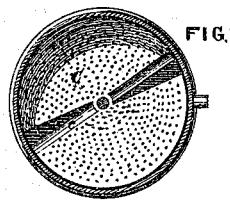


FIG. 3.

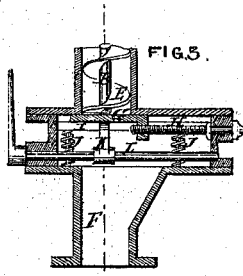
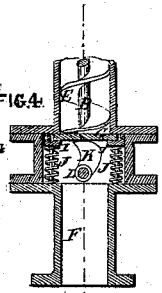


FIG. 4.



WITNESSES.

Wm. H. Burton Jr.

T. Scheitlin

INVENTOR.

E. S. Hutchinson

By Knight Bros.

Attys.

2 Sheets. Sheet 2.

E. S. Hutchinson,

Extracting Oil.

No. 112,349. Patented Mar. 7, 1871.

FIG. 5.

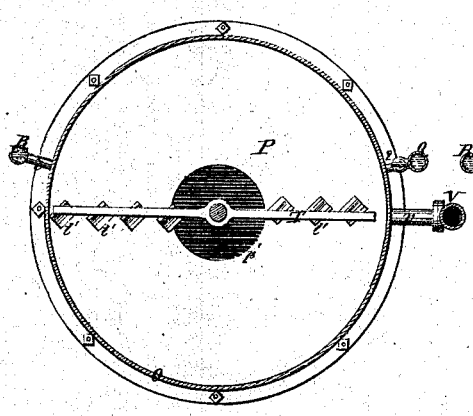


FIG. 6.

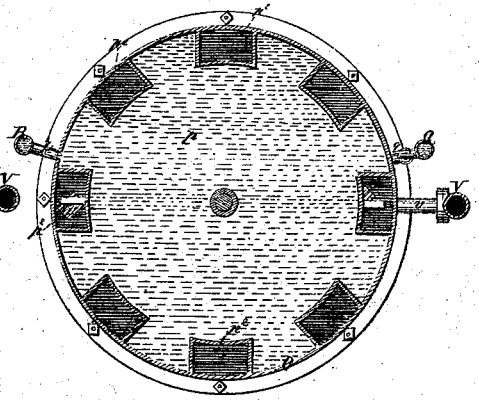
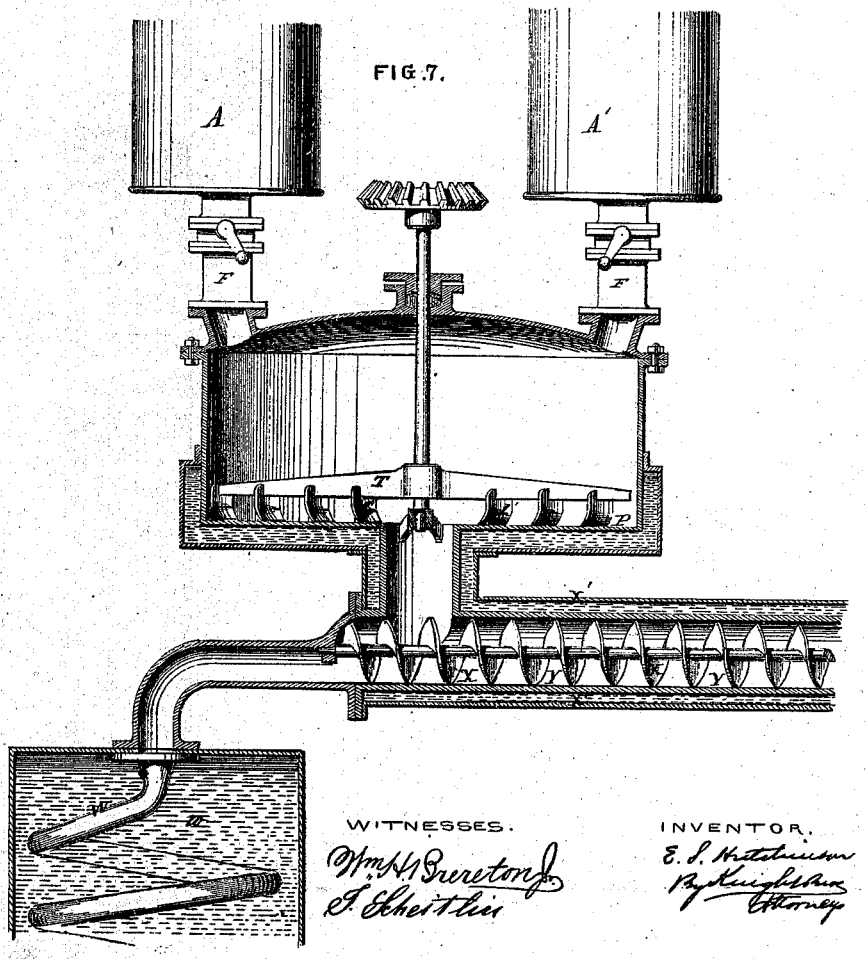


FIG. 7.



WITNESSES.

Wm. H. Brereton Jr.
S. Scheetlies

INVENTOR.

E. S. Hutchinson
By Knight Bros
Attorneys

UNITED STATES PATENT OFFICE.

ELIAS S. HUTCHINSON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN APPARATUS FOR REMOVING OIL FROM VEGETABLE AND OTHER MATTERS.

Specification forming part of Letters Patent No. **112,349**, dated March 7, 1871.

To all whom it may concern:

Be it known that I, ELIAS S. HUTCHINSON, of Baltimore, in the State of Maryland, have invented a new and Improved Process and Apparatus for Removing Oil from Grain, Seeds, and other matter, of which the following is a specification:

The invention relates to the removal of oil from vegetable or other matter by a chemical agent, the subsequent separation of the chemical from the material treated, and the recovery of it for future use.

The vats in which the first separation of the oil is performed are made with perforated false bottoms, slotted radially and attached to an axial shaft, for the purpose of rotating them in order to discharge the meal after removal of the oil.

The said vats are also furnished with perforated diaphragms near the top, feeding-apertures for the material to be treated, inlet-pipes for the chemical, and discharge-pipes for the combined chemical and oil, all of which may be arranged as described in patents heretofore granted to me, or in any convenient manner; but my present apparatus is so constructed that, after the removal of the oil, the chemical may be drained from the material treated, and the latter conveyed to another vessel or chamber for completing the separation of the chemical without atmospheric exposure.

A number of vats is arranged to discharge the meal into a common conveyer, furnished with a screw or other means of conducting it to the separating-tank, so that the charge of said vats, being successively delivered into one separating apparatus, may keep the latter in constant operation.

My separator is constructed with one or more heated shelves, over which the meal is passed by any mechanical contrivance adapted to carry the material forward with a sufficiently regular and uniform motion to insure the complete evaporation of the chemical before the final discharge of the meal.

I prefer to employ a number of heated shelves, one below another, with openings, through which the meal is caused to fall, near the center of one shelf, and near the circumference of the next, and so on, as hereinafter described.

The shelves, being hollow, are heated by water introduced in the form of steam, which condenses within the chambers. The inflowing steam keeps up the temperature, and the surplus water overflows through suitable discharge-pipes. The bisulphide vapor is carried from the separator to the condenser through pipes communicating with the former at different heights, so as to afford a free discharge; and, for the same object, the condenser is located below the level of the separator, so that the weight of the vapors may not cause any pressure within the separator. The dried meal is discharged continuously from the separator by means of a screw or its equivalent. The work of removal of oil from grain or other matter may thus be performed continuously without exposure to the atmosphere of the material under treatment, and without loss of the chemical.

The mingled oil and chemical are conducted to a suitable separator, where the chemical is, by a moderate application of heat, expelled from the oil in the form of vapor, which vapor is also conducted to the condenser.

Referring to the accompanying drawing, Figure 1 is a vertical section of an apparatus illustrating my invention, two only of the oil-removing vats being shown. Fig. 2 is a horizontal section of one of the vats at *x x*, Fig. 1. Figs. 3 and 4 are vertical sections, on a larger scale, of the discharging apparatus of one of the vats, the plane of section in Fig. 3 being coincident with that in Fig. 1, and the plane of section in Fig. 4 at right angles thereto. Fig. 5 is a horizontal section of the separating-tank at *y y*, Fig. 1. Fig. 6 is a horizontal section of the same at *z z*, Fig. 1. Fig. 7 is a vertical section illustrating modifications in the construction of the separating apparatus.

Similar letters of reference indicate corresponding parts in the several figures.

A A′ represent two oil-extracting vats, of which any desirable number may be used in connection with one separating apparatus. The supply-pipe *a* for the chemical, overflow-pipe *b* for the mingled chemical and oil, the upper perforated diaphragm *e*, and the charging-tubes *d*, one or more, with their inner perforated covers e^1 in the diaphragm, and outer tight covers *f* in the vat-top, may be constructed and arranged substantially as de-

scribed in my patent dated January 17, 1871, or in other suitable manner. a^1 is a cock, to permit the influx of chemical to the vat from a reservoir; and a^2, a cock, to open for the purpose of draining the chemical from the vat.

The lower perforated diaphragm C is attached to a shaft, B, adapted to be rotated, when required, by clutch-gearing D, or other means, the said diaphragm being made with radial slots *c*, as seen in Fig. 2, or any openings which will cause the rotation of the diaphragm to gradually discharge the meal through it, when the treatment of the meal in the vat is completed.

Beneath the diaphragm C is a series of plows, or oblique wings C′, to carry the meal to the central discharge-orifice. The lower end of the shaft B carries a screw, E, to forward the meal downward through the discharge-tube or hopper F. This discharge-tube or hopper F is guarded by a sliding or gate valve, G, the construction of which is best shown in Figs. 3 and 4. It is opened and closed by a screw, H, and is fitted to slide in guides I I, which are supported by springs J J, to hold the gate in contact with its seat while it is being opened or closed. While it remains shut, and the meal is being treated, the gate is held rigidly up to its seat by an eccentric, K, operated by a lever-shaft, L.

M represents a screw-conveyer, working in a tube, N, both of which are made of a length to accommodate any desired number of the vats A A′. Two are shown for the purpose of illustration, but a much larger number will be used in practice.

The separator, into which the meal is discharged from the vats, consists of a tight shell or casing, O, which may be made of a number of rings or sections bolted together through their flanges and containing a large number of heated shelves, P, as shown in Fig. 1; or it may be constructed with but a single shelf or floor, as illustrated in Fig. 7, in which case a sufficient number of oil-extracting vats A A′ may be placed directly over the separator without the interposition of a conveyer, M N.

The shelf or shelves P are warmed by water contained in the chambers *p* within them, and supplied by the condensation of steam which is introduced through branches *q* of the main steam-pipe Q. The requisite degree of heat is thus constantly maintained, and the surplus water overflows through the branches *r* into the water-discharge pipe R.

In the illustration given in Figs. 1, 5, and 6, the shelves P are provided with apertures p^1 and p^2, alternately located at the center and circumference.

S is an axial shaft, to be driven continuously, carrying at its lower end a discharging-screw, *s*, and above each of the shelves P one, two, or more horizontal arms, T, in which are mounted left and right hand plows or oblique wings t^1 and t^2, the plows t^1 being adapted to move the material in a regular and gradual manner inwardly toward the central openings p^1, and the plows t^2 to move it outwardly toward the openings p^2 at the circumference.

The discharge-spout U is guarded by a sliding grate, *u*, or other suitable valve, and is surrounded with a hot-water jacket supplied from the branch steam-pipe q^1, and provided with an overflow-pipe, r^1, through which surplus water is allowed to escape.

The chemical vapors evolved within the separator are carried off through branch pipes *v v′* at various heights, connected with the main vapor-pipe V which leads to the condenser.

The condenser may be constructed with a worm, W, placed within a cold-water chamber, *w*, or in any other efficient manner, and is located below the level of the separator, so that the vapors, which are quite heavy, may flow freely to the condenser, and not collect with any pressure within the separator.

In Fig. 7, the conveying-screw X, working within a pipe, Y, which is surrounded with a hot-water jacket, X′, constitutes a separator, which may be used in connection with or instead of that shown in the upper part of same figure.

The screw, and the jacketed tube within which it works, may be made of any required length, so that the meal entering from the vat or vats, at or near one end of the tube, will pass gradually along its entire length, and be discharged in a perfectly dry state at the other end, while the evolved vapor passes off in the other direction to the condenser W.

Operation: The vats A A′ being filled with meal or other material to be treated, bisulphide of carbon or other suitable chemical is introduced at *a*, and, rising through the perforated bottom C, permeates the entire mass of meal, completely removing therefrom its contained oil. The combined chemical and oil, rising through the diaphragm *e*, overflows through the pipe *b* to the oil-separator, which may be constructed as described in an application for Letters Patent which I have made, of even date herewith.

As soon as the chemical comes over without oil, indicating that the oil is all removed, the influx of chemical is stopped by closing the cock a^1, and that remaining within the vat is drained off as completely as practicable by opening the cock a^2; or separate pipes may, if preferred, be used for introducing the chemical and draining it off.

When the dripping is done, the eccentric K is retracted and the gate G opened. The shaft B is then rotated to turn the perforated bottom C, causing the meal to descend through the slots *c* to the action of the plows C′ and screw E. The entire contents of the vat are thus discharged into the conducting-tube or hopper F, and by this conveyed to the separator, through which they are passed with a gradual movement, by mechanism substantially as described, over surfaces heated to a moderate degree, and are discharged continuously, in a perfectly dry state, ready for any

use for which they may be designed, either as food, or for brewing, distillation, or any manufacturing purpose.

The vat being emptied, the cap *f e'* is removed and a new charge introduced, when the work proceeds as before.

In Fig. 1 the vat A is shown open below, as for the discharge of meal which has been divested of its oil, and the vat A' closed as when the work of removing the oil is in progress.

It is the intention to discharge the vats successively, employing a sufficient number of vats to keep up a constant supply of meal to the separator, and thus make the operation continuous, as before stated.

What I claim as my invention is—

1. In combination with a separator for evaporating the chemical from the material treated, and a condenser for receiving the chemical, a treating-vat, arranged to allow a portion of the chemical to be drained or dripped before the contents are discharged for drying.

2. A vat constructed and arranged to allow chemical to rise through the meal or other material, the mingled oil and chemical to flow off at top, and then the chemical to be drained off or partially drained off at bottom, and the treated material to be subsequently discharged without exposure to the air until the chemical has been separated therefrom by evaporation, substantially as explained.

3. A vat having a perforated bottom, diaphragm, a drip-pipe, and any arrangement for discharging the contents without exposure to the air.

4. A vat having, in connection with a discharge-opening or openings at or near the bottom, a rake, screw, or other mechanical appliance for discharging the treated material into a receptacle or drying apparatus, substantially as described.

5. The gate-valve G, or any substantially-equivalent valve or gate, kept up to its seat by springs to prevent the entrance of meal between the valve and seat, as set forth.

6. The eccentric K, in combination with the gate-valve G, or its equivalent, substantially as described.

7. In combination with any arrangement of vats or receptacles for treating vegetable or other matter with a chemical for removing oil, an apparatus for separating the chemical by evaporation, having a conveyer or conveyers for moving the meal over heated surfaces, and afterward discharging it therefrom, without external openings through which vapor will escape.

8. An apparatus by which meal is conveyed over a heated surface by a mechanical contrivance such as will move the meal along a fixed course and discharge it at a desired point or points, in combination with oil-extracting vats and vapor-condenser of any suitable form.

9. The relative arrangement of the separator and condenser, substantially as described, with the latter chiefly or wholly below the level of the former, for the purposes explained.

ELIAS S. HUTCHINSON.

Witnesses:

OCTAVIUS KNIGHT,

WM. H. BRERETON, Jr.