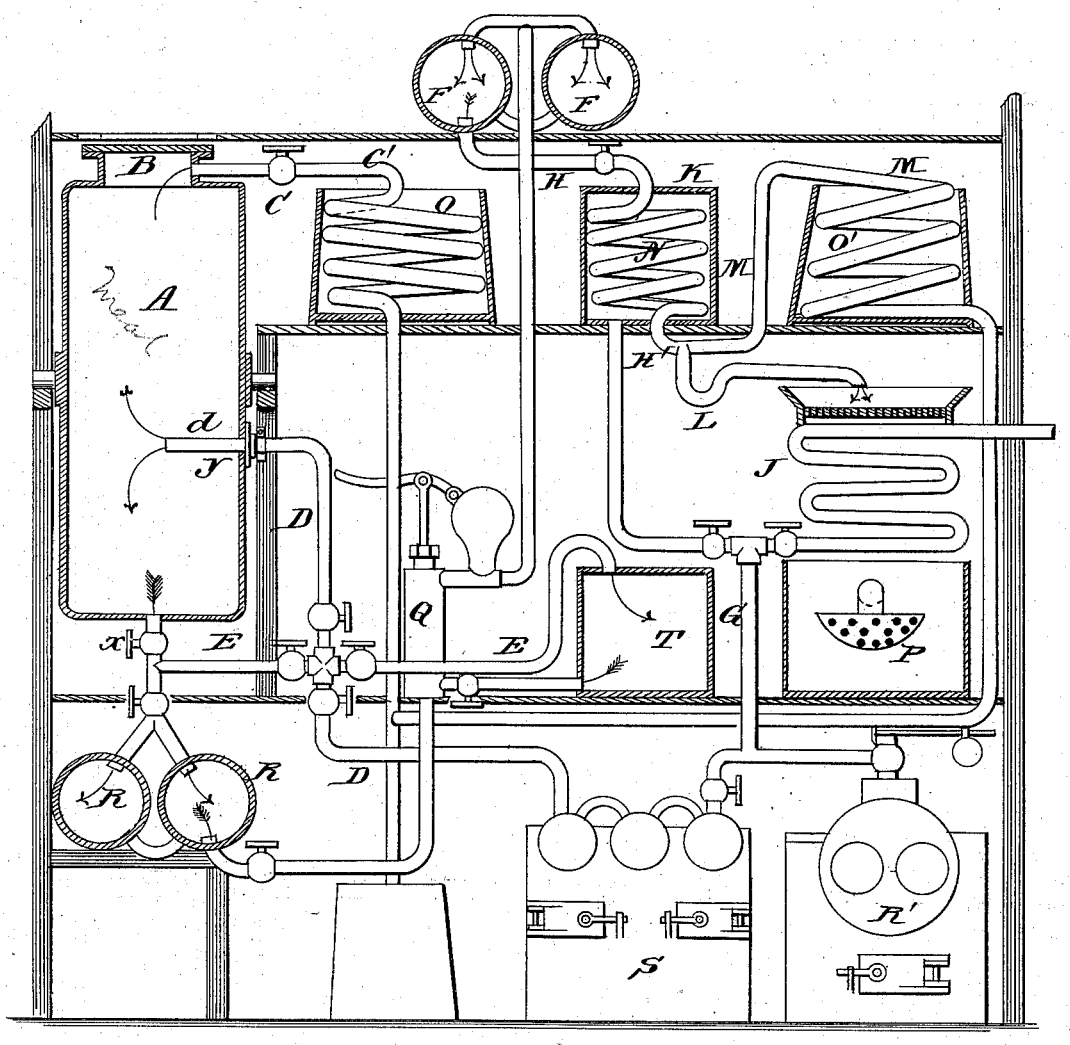
H. T. YARYAN.

Apparatus for Refining Fat Oils.

No. 205,328. Patented June 25, 1878.



Witnesses
Fred L. Dieterich
Edward A. Schmidt

Inventor
Honor T. Yaryan
by Peck & Hosea
Attorneys.

UNITED STATES PATENT OFFICE.

HOMER T. YARYAN, OF RICHMOND, INDIANA.

IMPROVEMENT IN APPARATUS FOR REFINING FAT-OILS.

Specification forming part of Letters Patent No. **205,328**, dated June 25, 1878; application filed February 25, 1878.

To all whom it may concern:

Be it known that I, HOMER T. YARYAN, of Richmond, Wayne county, Indiana, have invented a new and useful improvement in apparatus for extracting the oleaginous matter from vegetable and other substances by the use of a hydrocarbon solvent and dry superheated steam, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In the drawings, R′ denotes a boiler for generating steam; S, a furnace for superheating steam, consisting of a series of pipes or retorts, through which steam from the boiler R′ is passed and exposed to the action of heat; A, a tank or percolator, consisting of an upright cylinder, preferably mounted upon horizontal axes, and furnished with certain pipe-connections hereinafter described, and with an aperture at one end furnished with a steam-tight removable cover, B; C′, a vapor-pipe, connecting the percolator A with a condenser, O; D, a steam-pipe leading from the superheating-furnace S, and capable of being connected with the percolator A, as hereinafter described; E, a pipe connecting the percolator A with a draining-tank, T. This pipe has suitable connections by which it may be used also for admitting superheated steam to the percolator, as hereinafter described. R is also a draining-tank, connected with the percolator A by a pipe; Q, a pump for elevating the contents of tanks R and T to another tank, F, from which a pipe, H, leads downward in a coil, N, within the steam-tight drum K, and, after passing out below, divides into two branches, L, passing downward to a trough above a steam-coil evaporator, J, and the other, M, passing upward to a condenser, O′. A tank, P, for the final reception and treatment of the oil, is located beneath the evaporator J.

The operation and use of my improved apparatus are as follows:

The percolator A being filled with the meal or other substance to be treated for the extraction of its oil, naphtha or other solvent capable of being vaporized by heat is poured in until the contents of the percolator are covered and saturated, and are so allowed to remain until the process of solution is complete. For linseed-meal I allow it to remain about thirty-six hours in the closed tank. The stop-cock closing the vent *x* is then opened, and the liquid contents of the tank permitted to drain through the pipe E into the tank T until the hydrometer shows about five per cent. of oil in the outflowing stream. The vent *x* is then closed, and the percolator A refilled with fresh solvent. The resulting liquid is then allowed to drain downward through vent *x* into a tank, R. When liquid ceases to flow a nozzle, *d*, is inserted in the side of the percolator A through a screw-threaded aperture at *y* and into the center of the mass of meal contained in the with percolator. The nozzle *d* is then connected the pipe D, and, vents *x* and C being opened, dry superheated steam is allowed to pass into the percolator and continued until steam shows at C, which vent is then closed and the steam-jet further continued until steam shows at *x*, which is then closed and the jet discontinued. The nozzle *d* is then disconnected and removed, and its aperture in the percolator closed by a suitable stopper. Superheated steam is then allowed to pass into the percolator through the vent *x* at the bottom, the upper vent C being opened, and this jet continued until the steam passing out through C′ into the condenser O shows no trace of the solvent. The steam-jet is then discontinued, the pipes all disconnected from the percolator, and the meal removed therefrom through the aperture at B, the cover being taken off and dried for the ordinary uses of such residuum. The oil thus extracted from the meal, combined with the solvent, being contained in the tanks R and T, is elevated by an ordinary pump, Q, into a tank, F, whence it is permitted to flow downward in a graduated stream through the pipe H through a coil, N, contained in a steam-tight drum, K, where it is heated by steam admitted into the drum K from the boiler R′ directly to a temperature of, say, 300°, so that when it reaches the dividing-point of the pipe H below the vaporized solvent rises through the branch M to a condensing-worm, O′, surrounded by cold water, and thus recondensed and recovered in a receptacle below for use, while the oil descends through the branch L, which has a U-trap, as shown, into a trough located above a steam-evaporating coil, J, supplied also with

steam from the boiler R′. From the trough the oil drips downward over the exterior surfaces of the steam-pipes J into the final receiving-tank P, and the final traces of the solvent removed by forcing a blast of air either at ordinary temperatures or heated through the body of the liquid in a divided jet.

It is evident that this apparatus may be simplified, while still retaining its essential features, in various ways. A single tank, R, beneath the percolator A, may be used instead of the three tanks R, T, and F shown in the drawings, and the condensing and vaporizing worms located upon a lower level, and thus the pumping apparatus Q may be dispensed with.

A single condenser for the vaporized solvent may also be used instead of two, as shown at O O′. The apparatus described and shown is, however, that which I have constructed and used on a large scale, and with which the beneficial results claimed are fully demonstrated in commercial use.

By this apparatus a large and profitable percentage of oil of superior quality is extracted from the ordinary "residuum," or "spent meal," or "linseed-oil cake" of commerce, on which the ordinary process by compression has been exhausted, and the meal itself improved in quality, so that it can be used freely as food for animals.

Having described my invention, I claim—

1. The removable nozzle *d*, or its equivalent, in combination with percolating-tank A, for introducing superheated steam centrally into the mass of vegetable or other matter within the tank, substantially as and for the purpose described.

2. In an apparatus for the extraction of oils from oil-bearing substances by chemical solution and separating and recovering the solvent therefrom by heat, the combination of a coil, N, inclosing steam-drum K, outlet-pipe H, and separating-branches L M, for vaporizing and separating the solvent from the oil, substantially as specified.

3. The construction and arrangement of the apparatus, consisting of the following elements in combination, namely: steam-generator R′, steam-superheater S, reversible percolator A, draining tank or tanks R, separator K, with coil N and outlet-branches L M, condenser O, and receiving-tank P, with their connecting-pipes, substantially as and for the purpose specified.

Witness my hand this 16th day of February, A. D. 1878.

HOMER T. YARYAN.

Attest:

L. M. HOSEA,

H. P. K. PECK.