

(No Model.)

F. X. BYERLEY.
MECHANISM FOR AND PROCESS OF EXTRACTING OIL FROM OLEAGINOUS
MATERIALS.

No. 245,274.

Patented Aug. 9, 1881.

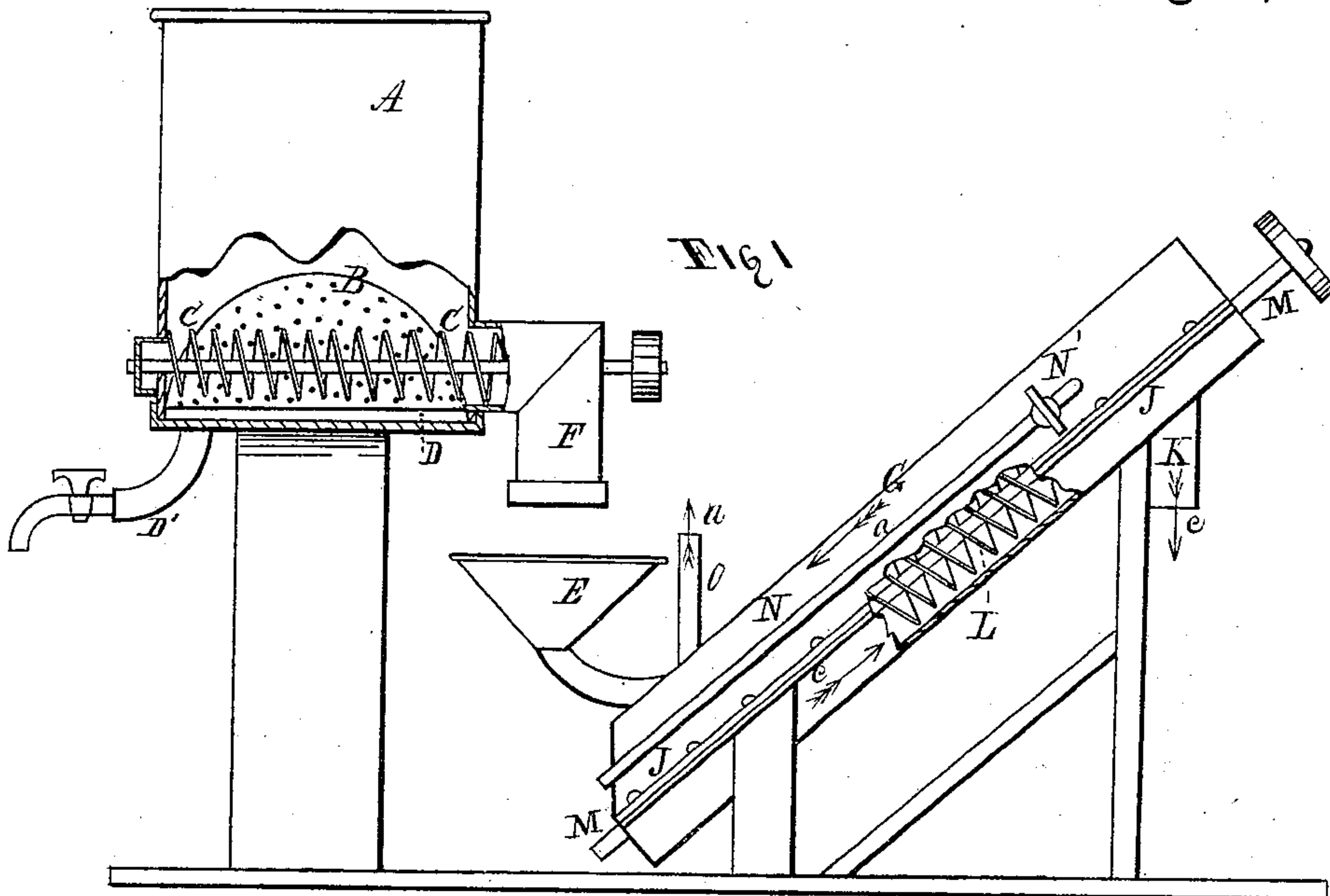


Fig. 2.

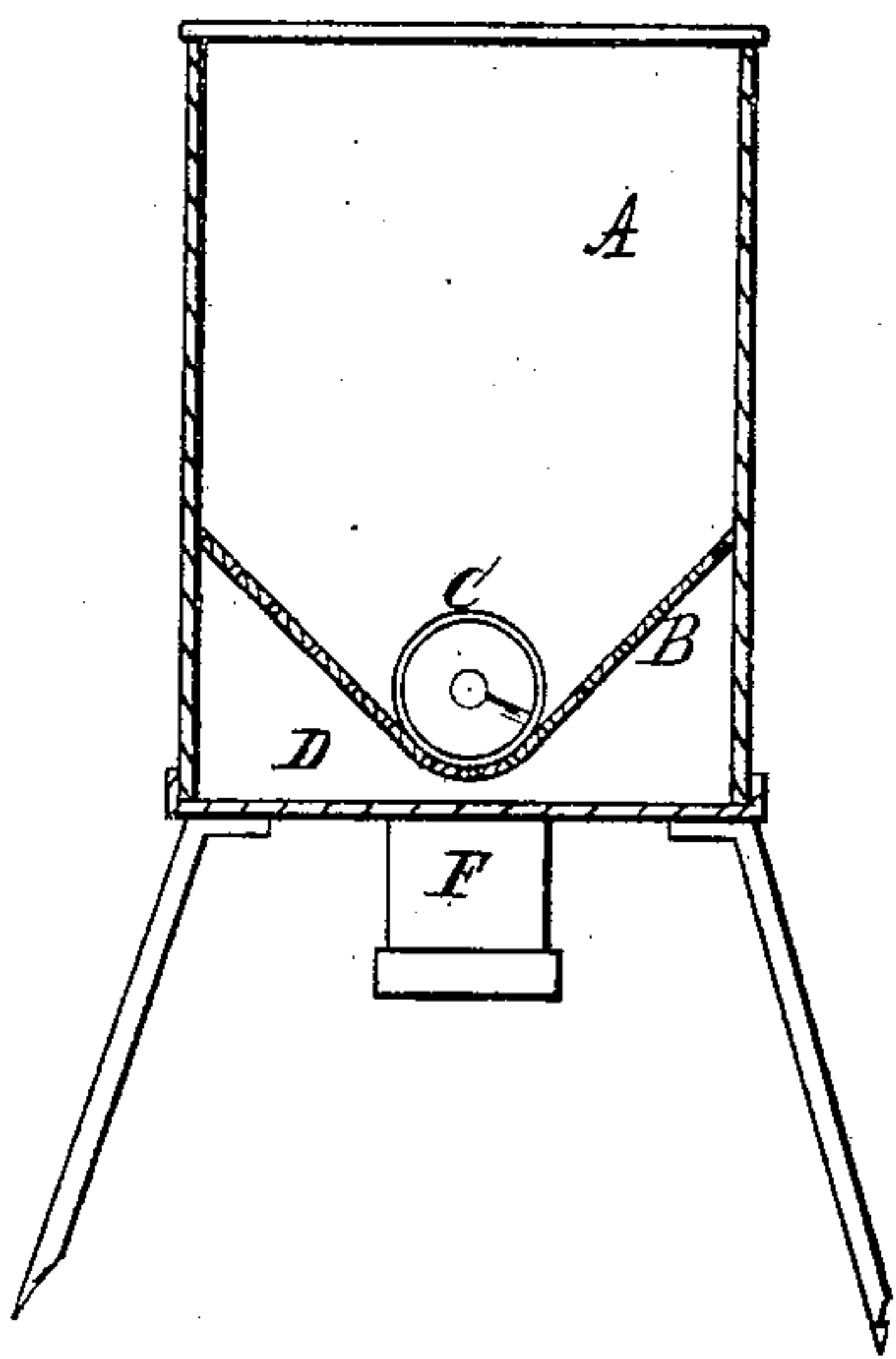
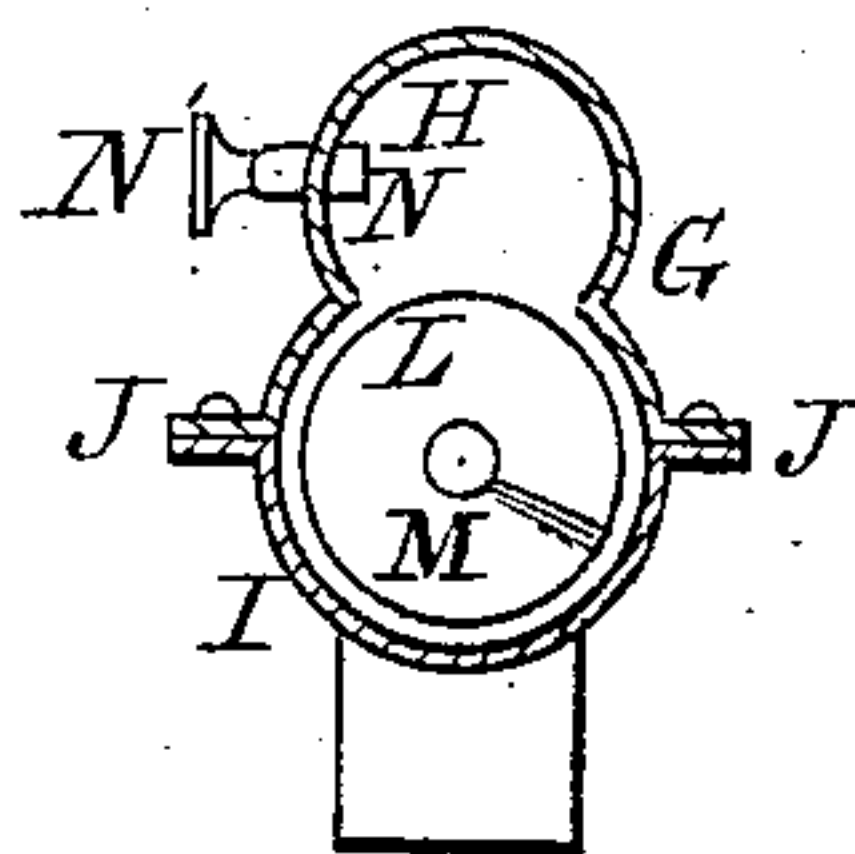


Fig. 3.



Witnesses.

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FRANCIS X. BYERLEY, OF CLEVELAND, OHIO.

MECHANISM FOR AND PROCESS OF EXTRACTING OIL FROM OLEAGINOUS MATERIALS.

SPECIFICATION forming part of Letters Patent No. 245,274, dated August 9, 1881.

Application filed May 11, 1881. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS X. BYERLEY, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Mechanism and Process of Extracting Oil from Oleaginous Materials; and I do hereby declare that the following is a full, clear, and complete description thereof.

My invention is connected with that class of inventions employed for extracting oil from oleaginous seeds and other substances.

It is well known in the art to which this invention relates that various modes have been employed for extracting oil from oleaginous seeds and other substances by means of hydrocarbon solvents, but the difficulty has been to eliminate all traces of the solvent from the residuum material after the oil has been removed.

The purpose of my improvement is to extract the solvent from the residuum, meal, &c., and to remove all traces of its odor without impairing the properties of said residuum. The mode hereinafter set forth refers more particularly to that part of such processes which has for its object the cleansing of the exhausted residuum or meal after the oil has been extracted from it, and freeing the residuum from the remaining solvent and its odor without injury to its properties. This result is attained by subjecting the said exhausted residuum, meal, &c., to the action of free steam, while the material, &c., is in a finely-divided and agitated condition. The steam is caused to act upon meal, &c., in a reverse direction to the motion or course of the meal, &c., in such way as to vaporize the remaining solvent and carry it off, with all traces of odor, to a condenser, where it is recovered and utilized. The tendency of the vaporized solvent is to pass off from the agitated comminuted material by its own gravity in a reverse direction to the passage of the meal or other material through the case to the discharging-spout. The oblique position of the cylinder-case facilitates this course of the vaporized solvent, and with the influence of a condenser connected with a vapor-outlet in the case the downward passage of the steam and vaporized solvent through the comminuted material is effected.

To enable others skilled in this art to carry out the said improvement, I will describe an apparatus which is deemed the most suitable

for the purpose, which consists of a screw-conveyer inclosed in a case, provided with a hopper or chute for the purpose of conveying the residuum, meal, &c., from the percolator into the conveyer, cylinder, or case, and a spout for discharging the meal therefrom. Connected with the case is an induction-pipe for the admission of steam, and an eduction-pipe attached to a condenser for emission of the steam and volatilized solvent. The meal, while being agitated and conveyed through and from the cylinder, is in a finely-divided condition, upon which the steam acts in eliminating the solvent and its odor.

For a more full and complete description of the said invention, reference will be made to the following specification and the annexed drawings, in which—

Figure 1 is a side elevation of the apparatus, with a part of the exterior casings removed. Figs. 2 and 3 are sectional views, which will be referred to in further description.

Like letters of reference refer to like parts in the several views.

The filter or percolator A is provided with a perforated diaphragm, B, and depressed from the sides to the center. In the base of the depression is arranged a screw-conveyer, C, Figs. 1 and 2, the shaft of which is mounted in suitable bearings to admit of its revolving, as may be required. Below the diaphragm is a chamber, D, which receives the oil as it percolates from the oleaginous material in the percolator. Connected with the chamber is a discharge-pipe, D', provided with a faucet for drawing off the oil from the said chamber. After the oil has been separated from the material in the percolator by means of a solvent usually employed for this purpose, the said material is then transferred to the hopper E by the rotating conveyer C through the spout F, which spout is closed during the percolation of the oil from the meal, &c. From the hopper the meal passes through a conduit into the lower part of the cylinder or case G, having an oblique position. The spout F may be extended to and open into the case to allow the residuum (meal, &c.) to pass directly from the percolator A into the case G. In this way the hopper would not be required.

The operations hereinbefore set forth are not claimed as new, but are described for the

purpose of more fully and clearly presenting the nature of my improvements, which consist in the mode of treating the residuum after it is discharged from the percolator A into the case G, which partakes of the form of the sections of two cylinders; however, other suitable shapes may be used in place thereof.

An end view of the case is seen in Fig. 3, and is composed of two sections, H I, flanged and bolted together at J or otherwise connected. The ends are preferably closed. To the upper part is connected a spout, K, opening into the case, and through which the exhausted meal is discharged.

Extending longitudinally the length of the case is a screw-conveyer, L, secured to a shaft, M, provided with journal-bearings in the case to allow free motion of the conveyer by any suitable motor, for a purpose hereinafter shown.

One end of the steam-pipe N is connected with a boiler, and the other end terminates in the case, as seen at N, Fig. 3.

N' is a cock connected with the pipe for controlling the steam in its passage to the interior of the case.

To the lower part of the case is attached an exhaust or outlet pipe, O, which terminates in a condenser. (Not shown in the drawings, as no special construction for this is required.)

The case G with its appendages is secured by suitable frame-work in an oblique or angular position of about forty-five degrees, more or less.

The exhausted meal or other residuum material from the percolator being received into the case, steam is admitted to act upon the residuum through the pipe N, and at the same time the conveyer L is put in motion, which so acts upon the material as to separate the mass into a finely-divided condition, and while in this state and also in agitation free steam is turned on through the pipe N into the case and is caused to course in direction of the arrows *a*, aided by a vacuum caused in the condenser connected with the exhaust-pipe O. The exhausted material is directly brought in contact with the conveyer L on entering the case, and is carried along by it through the case to the outlet-spout K. During its passage it is brought in contact with the admitted current of free steam, which vaporizes the solvent, and is carried along with the steam through the exhaust-pipe O to the condenser, where by condensation the solvent is recovered for use.

It will be noted that the passage of the vaporized solvent is in the direction of the arrows *a*, and the course of the residuum, which is rotating and being carried along also through the case to the outlet indicated by the arrows *c*; hence, the course of the steam and vapor-

ized solvent is in an opposite direction to the passage of the disseminated material. In this transit the motion of the conveyer L causes a rotary action upon the residuum in its longitudinal passage to the outlet. This agitation produces a finely-divided state of the material, and while in motion the free steam is brought in intimate contact with the particles, setting free the solvent therefrom and vaporizing it, the gravity of which tends to pass it off in the direction of the arrows *a*, assisted by the current of steam and vacuum of the conductor. The exhausted material is in continuous agitation from its entrance to the case to its discharge, and the steam is constantly in action from its induction during its passage through the case and the material to its eduction at O.

By this mode the particles are brought under the influence of the steam, thus vaporizing the solvent and freeing the mass from its odor.

In the ordinary mode of eliminating the solvent from the residuum meal or material referred to it requires from ten to twenty hours for the steam to effect the separation; but in my mode it may be done in about one-quarter (or less) of that time, from the fact that in the former case it is treated in a compact mass in the percolator, and the material being subject to the action of steam for so long a time becomes burned or cooked, forming a dank, spongy mass, which condition degrades its value, the albumen being in this way driven off from the meal, which albumen is an important factor in its value as an article of commerce. The rapidity of my process obviates these objections, as the mass from the percolator is so comminuted that each particle is subject to the action of steam in its passage through the case.

The rapidity of my process does not impair the properties of the meal, while it effectually separates it from the solvent. In the former case it is treated in the percolator; in the latter it is removed therefrom for treatment, as set forth.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of extracting the remaining solvent from the residuum (meal or other material) herein mentioned, by cleansing the said residuum, when in a finely-divided state in motion, from the solvent and its odor with free steam within a cylindrical case while the said material is agitated therein and conveyed in one direction and the steam is passed through the comminuted material in an opposite course within said case, substantially as described, and for the purpose specified.

2. In the process of eliminating from the spent oleaginous material from a percolator

the remaining solvent therein, rotating and conveying the same through a preferably closed case or cylinder in an oblique position, and disseminating through the agitated material
5 a current of steam in a reverse direction to the course or passage of said material through the case, substantially as described, and for the purpose specified.

3. In an apparatus for separating the solvent and its odor from the residuum or spent meal herein mentioned, a preferably closed case arranged in oblique position, a rotative conveyor longitudinally within said case, provided

with an inlet for the admission of the residuum and an outlet for its discharge, and having induction and eduction pipes for the injection of steam into the case and the escape of vaporized solvents, arranged in the relation and for the purpose substantially as set forth.

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

FRANCIS X. BYERLEY.

Witnesses:

J. H. BURRIDGE,
TIMOTHY SHEEHAN.