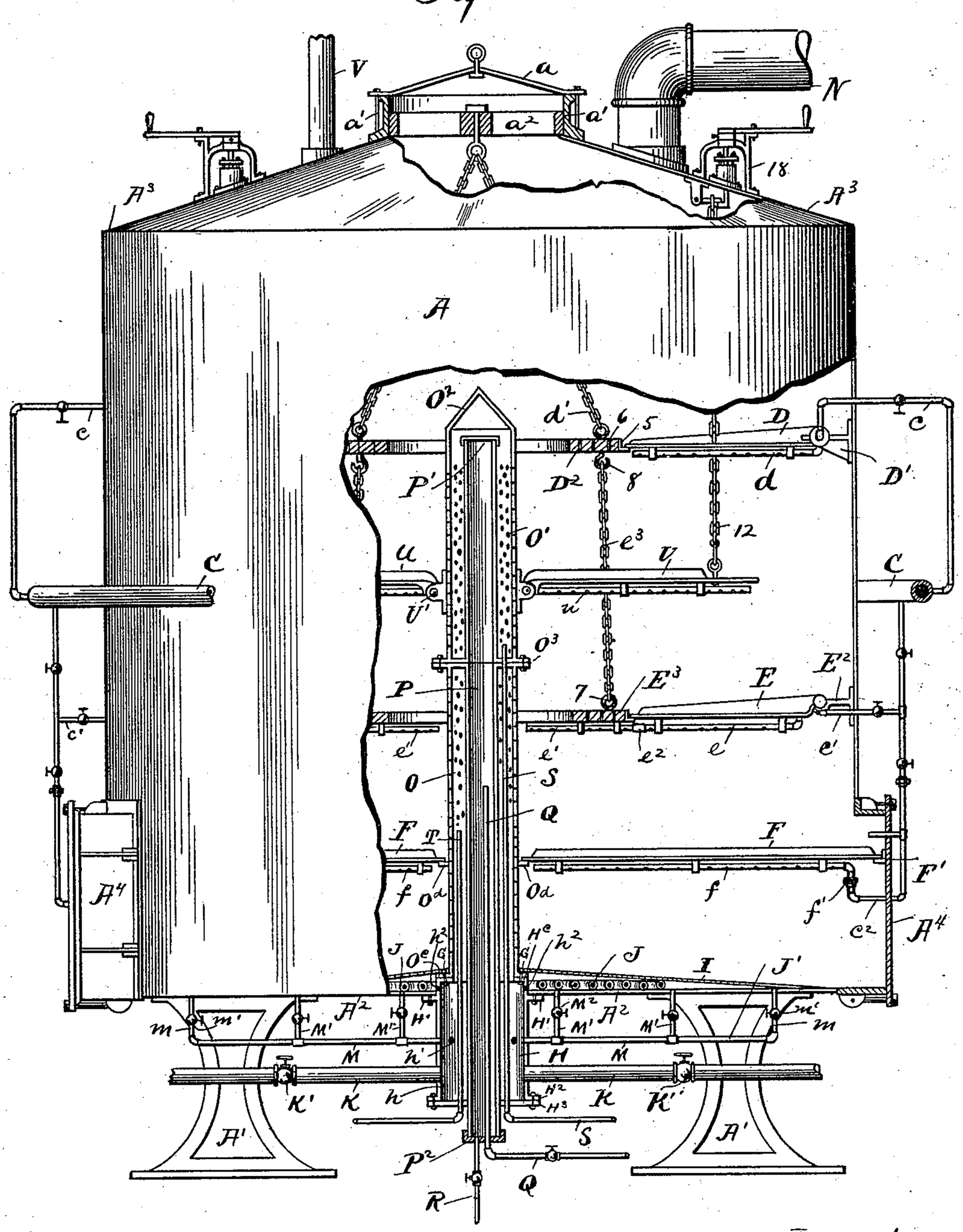
(No Model.) 2 Sheets—Sheet 1.

J. W. EVANS.

PERCOLATOR.

No. 486,246. Patented Nov. 15, 1892.

Fig. 1.



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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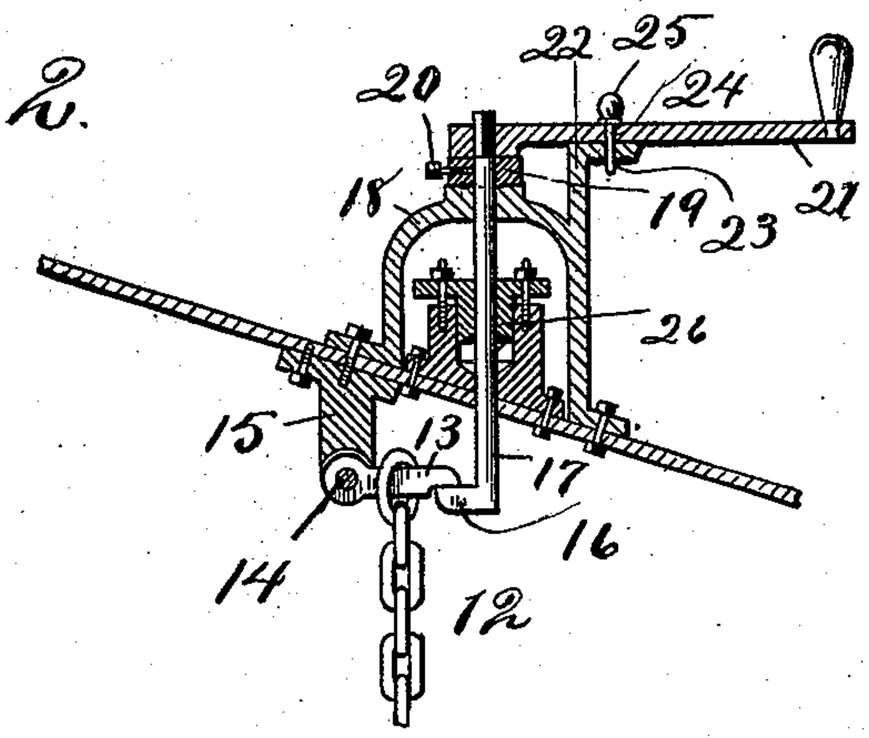
Fig. 2.



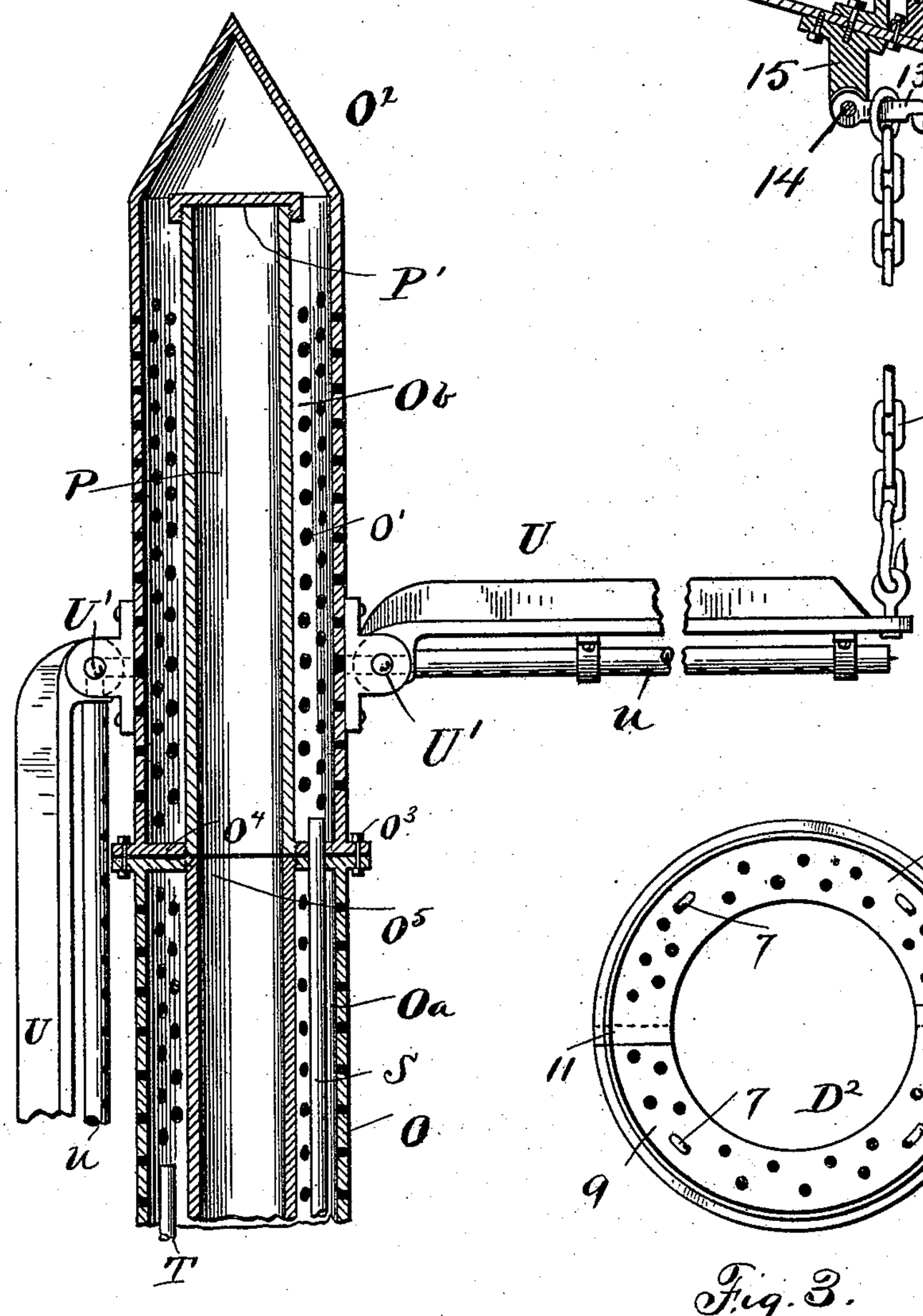


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN W. EVANS, OF CLEVELAND, OHIO.

PERCOLATOR.

SPECIFICATION forming part of Letters Patent No. 486,246, dated November 15, 1892.

Application filed January 18, 1892. Serial No. 418,496. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. EVANS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Percolators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in percolators designed more especially for the extraction of cotton-seed oil by the naphtha process.

My present invention relates more especially to improvements on a percolator embodying features disclosed in United States Letters Patent Nos. 245,365 and 381,062, granted to me, respectively, August 9, 1881, and April 10, 1888, wherein a series of radial arms or so-called "breakers" having steam-pipes attached underneath are arranged inside the percolator, the breakers being supported at their inner ends by a center piece and at the outer ends being hinged to brackets that are secured to or connected with the surrounding wall of the container, the brackets having hollow trunnions that connect with chambers in the breakers, with the arrangement such that with the breakers in working position the perforated steam-pipe connected with the breakers and the adjacent steam-supply pipe connected with the brackets are in open relation with each other and by depressing the center support the breakers and attached perforated pipes are turned down alongside the walls of the container without breaking or separating the aforesaid steam connections and wherein two or more series of such radial arms or breakers, if desired, are located at different elevations, together with cross-bars located in a lower plane, the cross-bars having also perforated steam-pipes attached underneath, a slightly-conical false bottom of perforated plates being provided and a heating-coil being interposed between the perforated and imperforate bottoms of the container, a system of pipes leading up through the bottom of the percolator and arranged with suitable valves, said system of pipes being used for drawing off the oil and naphtha and also to admit steam into the meal or material subsequent to the extraction of the oil. The features just briefly described I also employ in my improved percolator.

The object of my present invention is to provide a construction of percolator whereby a larger amount of meal may be treated at a single time as compared with the constructions of percolators heretofore devised, wherein the naphtha or solvent employed is rendered a better extractor, whereby the process of extracting the oil is more thoroughly and rapidly performed, and whereby the meal or material after the extraction of the oil therefrom is more thoroughly and rapidly purged of any naphtha or solvent still remaining in the meal or material.

With this object in view my invention consists more especially in a heater located centrally within the percolator and in a steaming and draining device surrounding such heater; and my invention also consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

The accompanying drawings illustrate a preferable construction of percolator embodying my improvements.

Figure 1 is a side elevation, partly in central vertical section, of a percolator. Fig. 2 is a central vertical section of a portion of the centrally-located heating and draining and steaming apparatus employed in my improved percolator. Fig. 3 is a plan view of an improved center piece, hereinafter more fully described.

A represents the tank or container of the percolator. Container A is usually made of heavy boiler-plate and mounted on legs A′. The container has a somewhat-dish-shaped bottom A^2—that is, a bottom declining toward the central portion—and the container has a conical top A^3, the latter being provided at the apex with a large flanged manhole and a manhole plate or cover *a*. Flange *a′* around the manhole is of considerable depth to accommodate a cross-bar a^2, that is secured to the inside of the flange out of the way of the cover. The cross-bar supports the center pieces, hereinafter described.

The tank or container is provided with

doors, as at A^4, usually two in number and located on opposite sides. These doors reach to the bottom of the container and are usually three or four feet square, more or less, so that workmen can easily enter the doorway for shoveling out the contents of the container. Some distance above the line of the door is a large steam-pipe C, that encircles the container and from which branch pipes lead into the container at different points, to wit: Pipes *c* lead to the breakers D, pipes *c'* to breakers E, and pipes c^2 to cross-bars F. These pipes of course are provided with suitable valves. With a percolator the tank or container whereof is about twelve feet in diameter and the side walls whereof about as many feet in height steam-pipe C is preferably located at about the central portion of the container. Breakers D are hinged to brackets D', the latter being secured to the inside of the container. The brackets and trunnions of the breakers are chambered, and suitable openings are provided, that connect the chambers when the breakers are in a horizontal or working position. The chamber in brackets D' is in open communication with a pipe *c* and the chamber in breakers D is in open communication with a perforated pipe *d*, that is secured to the under side of the respective breaker. Breakers D at the inner end are supported by a center piece D^2, the construction of which is hereinafter more fully described. Center piece D^2 is supported by chains *d'*, that are detachably secured to cross-piece a^2. When the parts are in working condition, an open passage-way is had from pipes *c* through the chambers of the brackets and breakers to pipes *d*. Breakers E, that are located below breakers D and preferably in the same vertical plane, but sufficiently far below breakers D to enable the latter to turn down inside the container, are substantially the same as breakers D, being hinged to brackets, as at E^2, provided with a perforated pipe, as at *e*, and supported at the inner end by a center piece, as at E^3, pipes *e* of breakers E being in open relation with pipes *c'* when the breakers are in a horizontal or working position, center piece E^3 being supported by chains e^3, that are attached to center piece D^2. Perforated pipes *e'* are loosely secured to center piece E^3, so as to be movable endwise. Pipes *e'* are provided, respectively, with a coupling e^2, the outer end of which is made large enough to slip onto the unthreaded inner end of the adjacent pipe *e*.

In a plane below the top of doors A^4 are located cross-bars F. These bars are supported at their outer ends by angle-plates F' and are supported at their opposite ends, as hereinafter described. Bars F have, respectively, attached underneath a perforated pipe *f*, having an elbow *f'* at the outer end, said elbow presenting downward and engaging an upturned elbow on pipe c^2. The end of one elbow is made conical and the end of the opposing elbow is made correspondingly concave, forming what is known as "ball-and-socket" elbows. These joints are of course ground together, and pipe *f* stands off from bar F, so as to cause the elbows to be pressed firmly together when bar F rests on the supporting angle-plate. The construction thus far described is substantially the same as disclosed in the patents hereinbefore referred to, excepting so far as concerns the construction of center pieces D^2 and E^3, that will be hereinafter fully described.

Bottom A^2 of the container at the central portion has an opening through which extends a hollow cylinder H. Cylinder H is open at the top and has an external annular flange H', that is bolted to the bottom A^2 of the container of the percolator. Cylinder H is closed at the bottom, having an external annular flange at its lower end, as at H^2, to which bottom H^3 is bolted.

I represents the inclined perforated plates, that rest on bottom A at or near the inner periphery of the container, the inner ends of these plates being supported by cylinder H. Between bottom A^2 and plates I are located the coils of pipe J for heating. Cylinder H also supports an upright perforated hollow cylinder or drum O of the centrally-located draining and steaming apparatus, hereinafter more fully described, drum or cylinder O being in open relation with cylinder H and extending, preferably, into the upper portion of the tank or container of the percolator as far as the uppermost breakers, or beyond, as shown, cylinders H and O at contiguous ends having annular flanges H^c and O^c, projecting inwardly and outwardly, respectively, and perforated for the reception of bolts, as at G, that rigidly secure said parts together. Cylinder or drum O has also external lugs or an annular flange, as at O^d, for supporting the inner end of the cross-bars F, hereinbefore referred to. Cylinder H, preferably at or near the lower end, has lateral perforations *h*, located, preferably, diametrically opposite and being of suitable size for the reception of large pipes K, the latter being provided with valves K'. Between pipes K and bottom A^2 of the container cylinder H is provided with an annular series of perforations *h'* for the reception of pipes M, the latter having branches, as at M', that lead into bottom A^2 of the container. Pipes M have also branches *m*, that lead upward into the bottom of the container, preferably at or near the inner periphery of the container. Pipes M and *m* are provided, respectively, with valves M^2 and *m'*. Preferably just above the bottom of the container cylinder H is also provided with an annular series of perforations h^2 in open relation with the space containing heating-coils J.

Pipes K and M and branches M' and *m* and perforations h^2 are for draining oil and

naphtha from the container and for the subsequent admission of steam to the meal or material in the container.

P represents a heater located centrally within and extending from the bottom to near the upper end of drum or cylinder O, heater P comprising an imperforate hollow drum or cylinder closed top and bottom, as at P′ P^2, the bottom head P^2 being perforated for the passage of a steam-pipe Q, that extends upward and discharges, preferably, about midway of the length of the heater. Head P^2 of the heater is also perforated for the reception of a pipe R, the office of which is to carry off the water arising from condensation of steam in the heater. Drum or cylinder O has numerous perforations O′, preferably from a point a little above perforated plates I to the top O^2 of the drum, top O^2 being preferably conical or tapering, as shown. Drum or cylinder O is preferably made in sections, the sections at the meeting ends being flanged outwardly and secured together by bolts, as at O^3, and having annular internal flanges, as at O^4, heater P being also preferably made in sections similarly to drum or cylinder O, annular flanges O^4 being screw-threaded on their inner periphery for receiving the correspondingly-threaded portions of the sections of heater P, as at O^5. The sections of heater P might, however, be cast integral with the respective sections of drum or cylinder O. Flanges O^4 thus constitute a diaphragm that divides drum or cylinder O into two compartments O^a and O^b, and said diaphragm and the bottom head of cylinder H are perforated for the reception and passage of a steam-pipe S, that discharges into the upper compartment O^b of drum or cylinder O. The bottom of cylinder H is also perforated for the passage of a steam-pipe T, that extends upward and discharges, preferably, about midway of the length of the lower compartment O^a of cylinder or drum O.

Referring now to the construction of center pieces D^2 and E^3, to which reference has already been made, as shown more clearly in Fig. 3, they comprise, respectively, a ring or annular disk reduced in thickness at its outer periphery, as at 5, for supporting the inner ends of the respective breakers that are arranged radially about the container, as hereinbefore described. The center pieces are also perforated, as at 6, and have attached, preferably at intervals, as at 7, chains d' and e^3, respectively, hereinbefore referred to, preferably four in number, chains e^3 being secured to the upper center piece D^2 in any suitable manner, preferably by means of hooks, as at 8, and chains d' being detachably secured as hereinbefore stated, to crossbar a^2. When center pieces D^2 and E^3 are lowered by unfastening chain d' from crossbar a^2, the connected breakers can turn down by the side of the container. The center pieces are also preferably made in two sections, as shown at 9 and 10 in Fig. 3, the ends of the sections being reduced in thickness, preferably on opposite sides relative to each other, adjacent reduced ends of the sections overlapping each other, as shown at 11, Fig. 3. With such construction the sections of the center pieces upon unfastening chains d', as aforesaid, can turn down toward each other.

U represents breakers located, preferably, above the diaphragm of drum or cylinder O, preferably between breakers D and E and of substantially the same construction, being provided with perforated pipes u in substantially the same manner, being hinged to drum or cylinder O, as at U′, and pipes u being in open relation with drum O in the horizontal or working position of breakers U. Breakers U are also arranged radially about the container, preferably corresponding in number to breakers D and E, but being located, preferably, in a different vertical plane relative to said last-mentioned breakers. Breakers U are held in a horizontal or elevated position, respectively, by a chain 12, that is detachably suspended from a dog 13, pivoted, as at 14, to a depending arm or bracket 15, that is bolted or riveted to the top A^3 of the container, and dog 13 is held in a horizontal or elevated position by a laterally-projecting toe or member 16 of a round rod 17, that extends upwardly outside the container and through the top member of a suitable frame 18, bolted or riveted to the top of the container. Rod 17 has a collar 19 rigidly mounted thereon, for instance, by means of a screw-bolt 20, collar 19 resting upon the top member of frame 18, thus preventing the rod from falling into the container. Rod or spindle 17 is square or of suitable shape at the upper end to receive and be operated by a crank 21, and frame 18 has an upwardly-extending arm or member 22, provided with a hole, as at 23, and crank 21 has a corresponding hole 24, that is adapted to register with hole 23 in member 22 when the mechanism for holding breakers U in a horizontal or elevated position is performing its function, and 25 represents a key adapted to enter holes 24 and 23 in members 21 and 22 and lock the mechanism aforesaid in the position indicated. Rod 17 also passes through a stuffing-box, as at 26, that is bolted or secured to the top of the container. By removing key 25 and turning rod 17 by means of crank 21 the projection 16 of rod 17 will release dog 13 and the latter in turn release chain 12, permitting breaker U to turn down against the outside of drum or cylinder O.

V represents a pipe opening into the top of the container for admitting the naphtha or other solvent, and N represents an escape-pipe leading from the container to a condenser (not shown) and affording exit to the vaporized naphtha or solvent.

In operating the percolator the container is filled with meal or other material from which

oil is to be extracted, the same being admitted through the manhole. The manhole having been closed, hot naphtha is introduced into the container in sufficient quantity to cover the meal or other material. Steam is then admitted to coil J and heater P and the naphtha or solvent and mass kept to the desired temperature—say about 150° Fahrenheit, more or less—until the oil is extracted from the mass. During this time the solution of oil and naphtha is drawn off from time to time and fresh-heated naphtha or solvent is supplied until the oil is entirely extracted from the mass, after which the oil and naphtha are drawn from the container. The lower compartment of drum or cylinder O is used in drawing off the solution of oil and solvent from the container, in addition to perforations h^2 and pipes m M′ M K. The solution of oil and naphtha having been drawn from the container, as just described, steam is admitted to thoroughly purge the meal of and vaporize any naphtha or solvent that is still contained in the meal, steam being first admitted into the upper portion of the mass through the upper compartment of drum or cylinder O and steam-pipes connected with breakers U and D, next through lower compartment of drum O and steam-pipes connected with breakers E, and lastly through perforations h^2, pipes M′ and m, and steam-pipes connected with cross-bars F. The residuum, having been thoroughly purged of what naphtha was still contained therein, is then removed from the container in the usual manner.

The percolator, although especially designed for the extraction of oil from cotton-seed, is equally well adapted for extracting oil from linseed, or, in fact, from any substance that contains oil. The upper portion of the material being first steamed, the object of dividing drum or cylinder O into compartments, as shown, will be readily understood. A straining-cloth (not shown) is preferably wound around this drum or cylinder to prevent any of the meal or material obtaining access to the interior of the same.

Heater P constitutes a feature of vast importance, in that it greatly aids in maintaining the meal and solvent at the desired temperature, rendering the extraction of the oil more thorough and rapid, and any liquid naphtha that may come in contact with the heater is instantly vaporized by such contact and returned to the meal or material, also, after the oil has been extracted from the meal the latter can be still maintained in such a heated condition that much less steam is required in the subsequent cleaning of the meal of the remaining solvent, and the vaporization of this remaining solvent is more thoroughly and rapidly effected. I would also remark that by my improved construction, hereinbefore described, I am enabled to employ a tank or container of much larger size, and I have now in operation a percolator whereby may be treated at a single time approximately twice the amount of material that it was possible to treat by the constructions of percolators heretofore devised. I would also remark that my invention comprises, broadly, a heater and a steaming and draining apparatus located centrally or approximately centrally within the tank or container of the percolator, and that cylinder H and drum or cylinder O might be cast integral and other modifications in the details of construction might be made without departing from the spirit and purpose of my invention.

What I claim is—

1. In a percolator for extracting oil, a draining and steaming apparatus suitably supported at the bottom of the percolator and comprising a hollow perforated drum or cylinder divided by a diaphragm into two compartments, each compartment of said drum or cylinder having one or more steam-pipes discharging into the same, substantially as and for the purpose set forth.

2. In a percolator for extracting oil, a cylinder located centrally or approximately centrally below the container of the percolator and extending more or less into said container and being closed at the bottom and open at the top, said cylinder having connected therewith a system of steam and drain pipes in open relation with the container of the percolator and having connected therewith below such system of steam and drain pipes one or more larger steam and drain pipes and having a series of perforations or openings discharging into the container just above the bottom of the latter, substantially as shown and described.

3. In a percolator for extracting oil, an upright draining and steaming apparatus suitably supported at the bottom of the percolator and comprising a hollow perforated drum or cylinder, with the perforations discharging laterally into the body or container of the percolator, and a heater comprising an imperforate drum or cylinder located within said draining and steaming apparatus, said heater and draining and steaming apparatus having, respectively, one or more steam-pipes in open relation therewith and the heater being provided with a drain-pipe, substantially as set forth.

4. In a percolator for extracting oil, a draining and steaming apparatus located centrally or approximately centrally within the tank or container of the percolator and being suitably supported at the bottom of the percolator and comprising a perforated drum or cylinder and one or more steam-pipes discharging into said drum or cylinder, and a heater located within and extending approximately the entire length of said draining and steaming apparatus, said heater comprising an imperforate drum or cylinder closed at the ends and a steam-pipe

for supplying steam to the same, the heater being provided with a drain-pipe, substantially as set forth.

5. In a percolator for extracting oil, a draining and steaming apparatus located centrally or approximately centrally within the tank or container of the percolator and being suitably supported at the bottom of the percolator and comprising two compartments that are located the one above the other and separated by a diaphragm, the surrounding walls of the compartments being perforated with the perforations discharging laterally into the tank or container of the percolator, one or more steam-pipes in open relation wlth the respective compartments of the draining and steaming apparatus, and a heater located within and extending approximately the entire length of said draining and steaming apparatus, said heater comprising an imperforate drum or cylinder closed at the ends and a steam-pipe and a drain-pipe in open relation therewith, substantially as set forth.

6. In a percolator for extracting oil, a hollow cylinder secured to the central portion of the bottom of the tank or container of the percolator and extending more or less into and being in open relation with the container and being closed at the bottom, a heating-coil located at the bottom of the tank or container, and a system of steam and drain pipes adapted to establish open communication between the interior of the cylinder aforesaid and the interior of the tank or container, one or more larger steam and drain pipes in open relation with said cylinder below the aforesaid system of pipes, a draining and steaming apparatus located above and in open communication with said cylinder and comprising a perforated drum or cylinder and one or more steam-pipes discharging into said drum or cylinder, a heater located within and extending approximately the entire length of the perforated drum or cylinder of said draining and steaming apparatus, said heater comprising an imperforate drum or cylinder closed at the ends, a steam-pipe discharging into the same, and a drain-pipe, substantially as set forth.

7. In a percolator for extracting oil, so-called "breakers" hinged to or connected with the sides of the percolator and a depressible center piece for supporting the inner end of the breakers, the breakers having perforated pipes attached underneath the center piece, comprising an annular ring with vertical perforations and made in two sections, the ends of each section overlapping the adjacent end of the other section, substantially as set forth.

8. In a percolator for extracting oil, a steaming apparatus located centrally or approximately centrally in the tank or container of the percolator and comprising a perforated drum or cylinder, with the perforations discharging laterally into the container, and so-called "breakers" having perforated pipes attached underneath and being hinged or connected with the outside of said drum or cylinder in such a manner that in the horizontal or working position of the breakers the attached perforated pipes are in open relation with the interior of said drum or cylinder, substantially as set forth.

9. In a percolator for extracting oil, so-called "breakers" hinged inside the tank or container, in combination with a chain or suitable device connected with the breakers and detachably connected with suitable mechanism that is adapted to be operated from outside the container to release said chain or device and permit the breakers to turn on their hinges out of a working position, substantially as set forth.

10. In a percolator for extracting oil, a steaming apparatus located centrally or approximately centrally in the body or container of the percolator and comprising a perforated drum or cylinder, with the perforations discharging laterally into the container, so-called "breakers" having perforated pipes attached underneath and being hinged to or connected with the outside of said drum or cylinder in such a manner that in the horizontal or working position of the breakers the attached perforated pipes are in open relation with the interior of said drum or cylinder, and a chain or suitable device connected with said breakers and detachably connected with suitable mechanism adapted to be operated from outside the container of the percolator to release the chain and permit the breaker to turn down outside the drum or cylinder aforesaid, substantially as set forth.

11. In a percolator for extracting oil, so-called "breakers," in combination with suitable mechanism for holding said breakers in a horizontal or working position, said mechanism comprising a chain or suitable device attached to the breaker and detachably connected or adapted to be detachably connected with a dog pivoted to a rigid support inside the top of the percolator, a frame or bracket secured to the outside of the top of the container, and a rod extending through the top member of said frame into the container and terminating at its lower or inner end in a toe or projecting member adapted to support the dog and connected breaker in a horizontal or working position, the rod at its outer end terminating in a crank or handle, substantially as set forth.

12. In a percolator comprising so-called "breakers," the combination, with suitable mechanism for holding said breakers in a horizontal or working position, said mechanism comprising a chain or suitable device attached to the breakers and detachably connected or adapted to be detachably connected with a dog pivoted to a rigid support inside the top of the percolator, a frame or bracket secured to the outside of the top of the container, and a rod extending through the top member of said frame into the container and terminating at

its lower or inner end in a toe or projecting member adapted to support the dog and connected breaker in a horizontal or working position, the rod at its outer end terminating in a crank or handle, of suitable means for locking said mechanism in the working position of the breakers, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 6th day of January, 1892.

JOHN W. EVANS.

Witnesses:
C. H. DORER,
WARD HOOVER.