

No. 841,347.

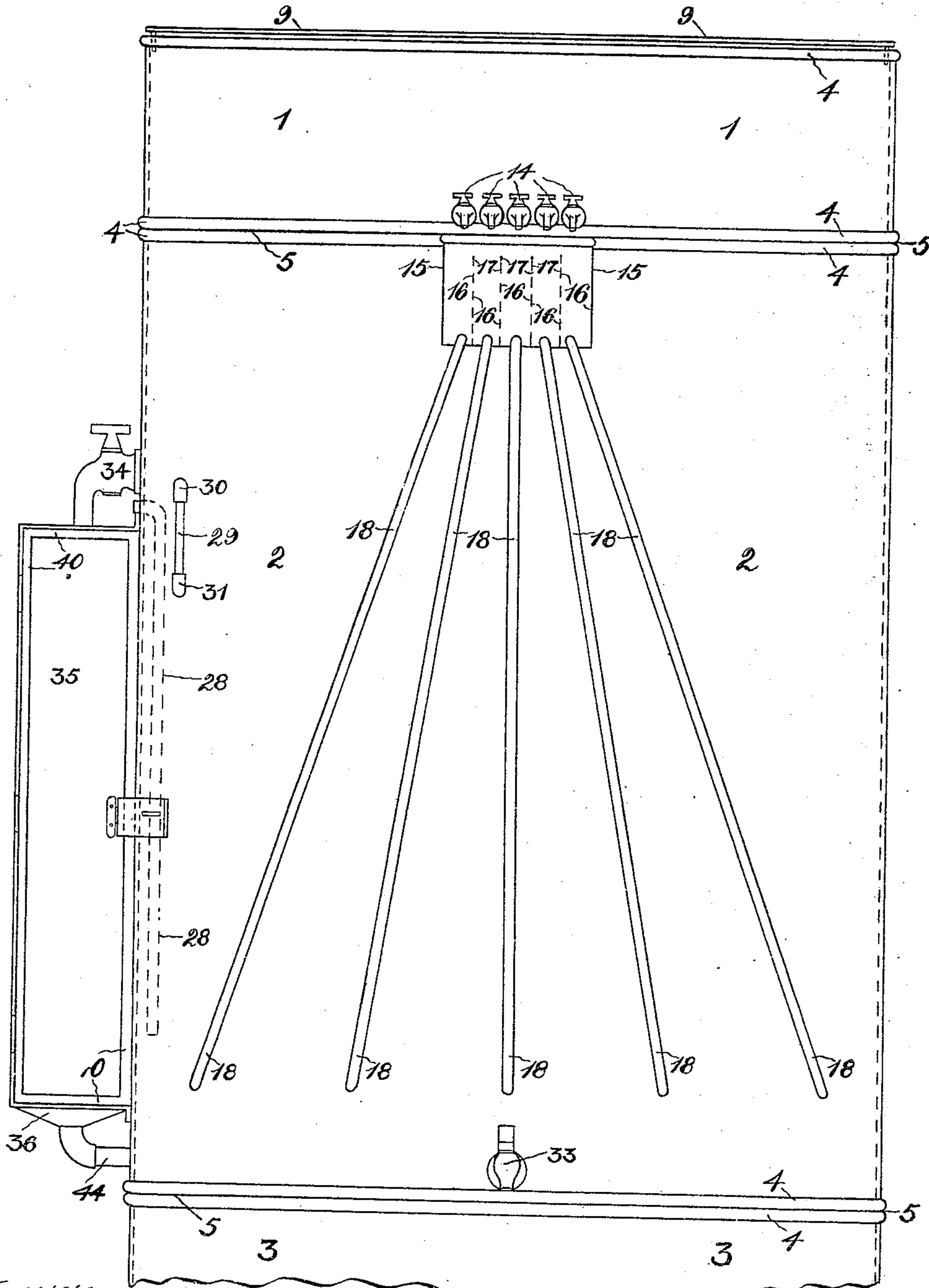
PATENTED JAN. 15, 1907.

N. W. SMITH.

APPARATUS FOR THE PURIFICATION OF WASTE OIL.

APPLICATION FILED AUG. 27, 1906.

3 SHEETS—SHEET 1.



Witnesses:

*R. Wendale*  
*F. Wendale*

Fig. 1.

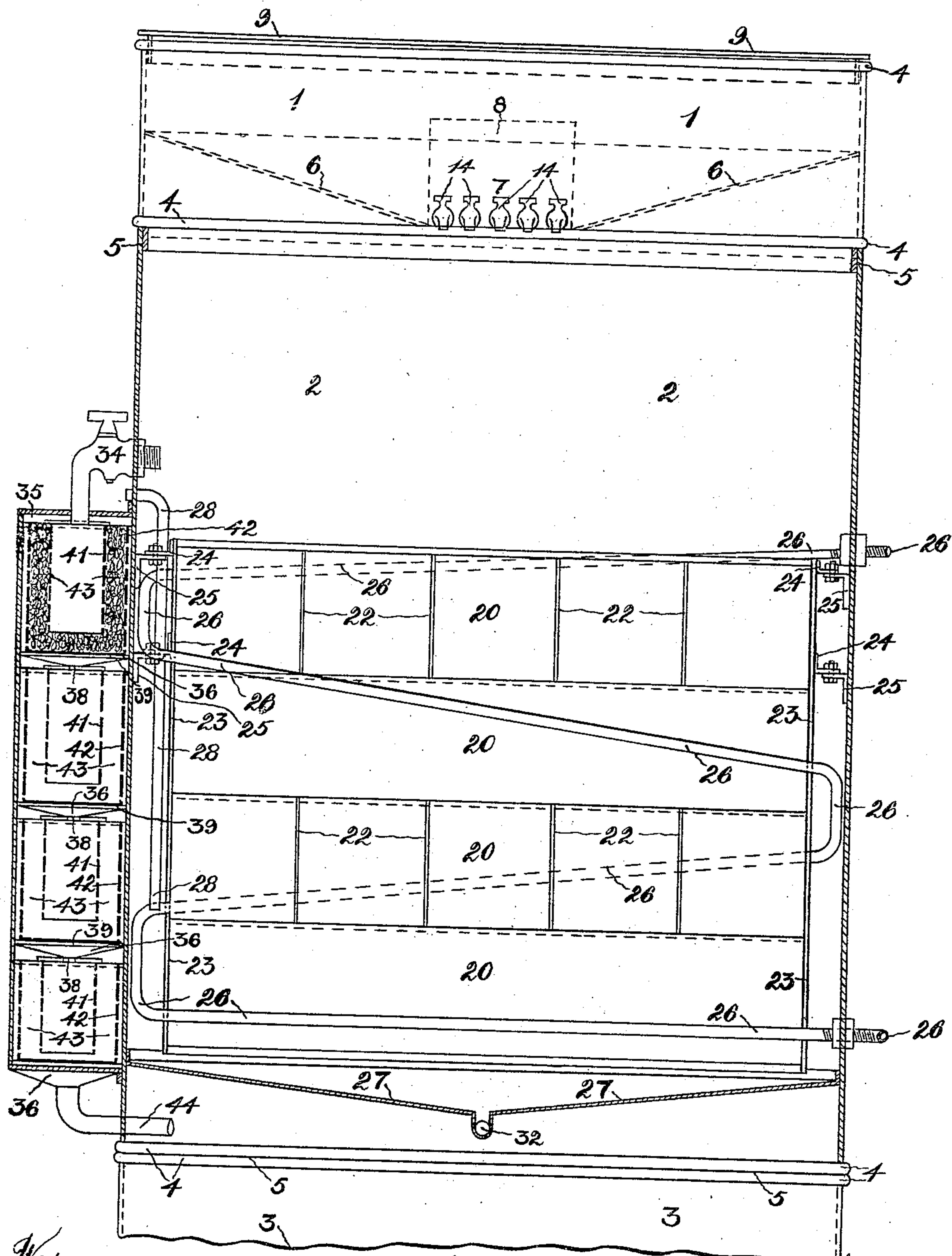
Inventor:  
Noah Wharton Smith  
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Fig. 2.

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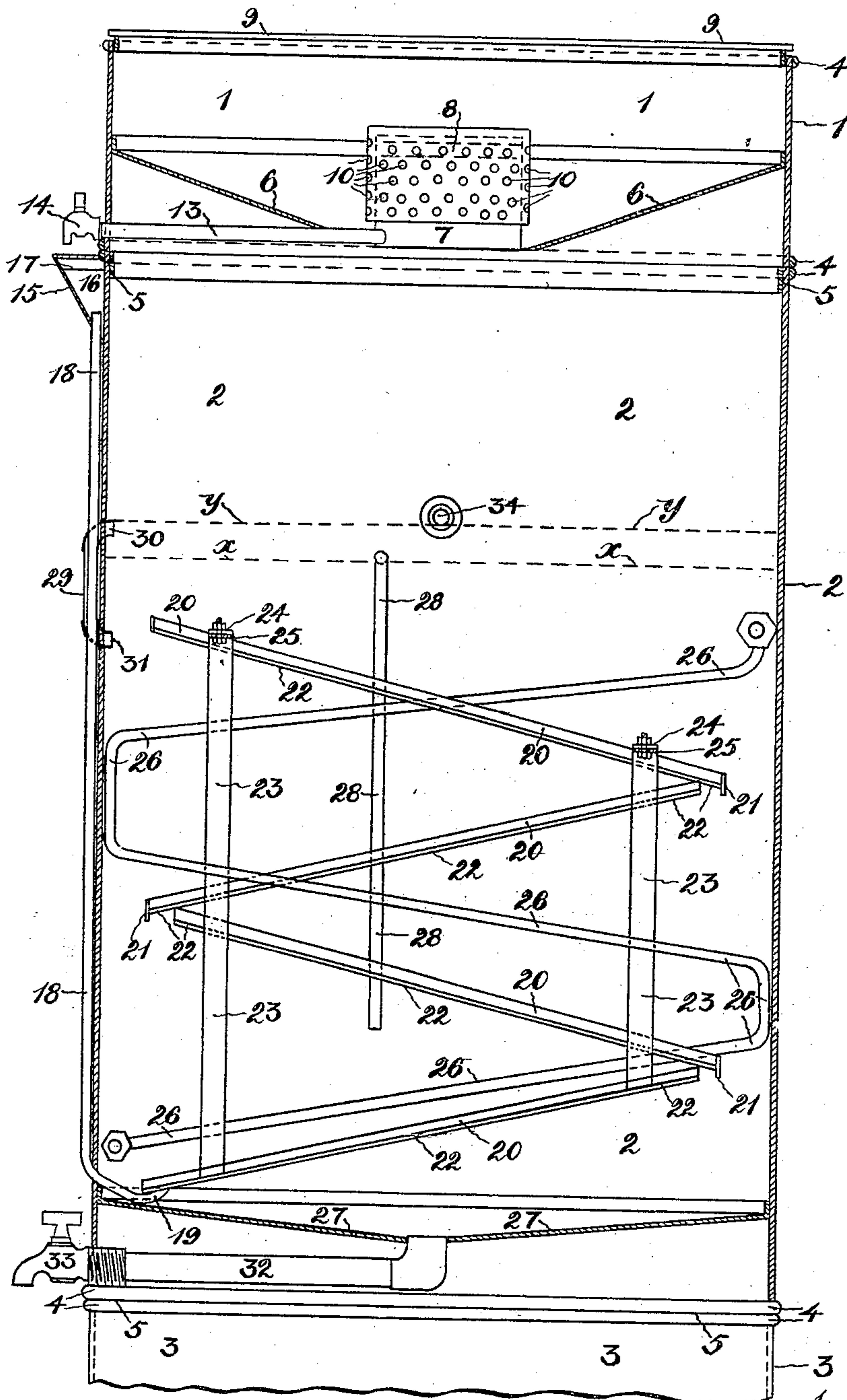
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3 SHEETS—SHEET 3.



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Fig. 3.

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# UNITED STATES PATENT OFFICE.

NOAH WHALTON SMITH, OF EAST RAND, TRANSVAAL.

## APPARATUS FOR THE PURIFICATION OF WASTE OIL.

No. 841,347.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed August 27, 1906. Serial No. 332,132.

*To all whom it may concern:*

Be it known that I, NOAH WHALTON SMITH, a subject of the King of Great Britain, and a resident of East Rand, Transvaal, have invented certain new and useful Improvements in Apparatus for the Purification of Waste Oil, of which the following is a specification.

This invention relates to apparatus applicable for removing impurities, such as particles of matter, from oil or like liquids, and the invention is primarily designed for use as a purifier for waste oil.

The invention will be described by aid of the accompanying drawings, and the novel features pointed out in the appended claims.

In the drawings, Figure 1 represents a front elevation of the apparatus. Fig. 2 shows a part sectional elevation, and Fig. 3 is a part sectional elevation at right angles to Fig. 2 with certain parts removed.

The apparatus preferably comprises the three superimposed sections 1 2 3. These several sections may be made of square, cylindrical, or other suitable shape in horizontal section and of galvanized iron or other sheet metal. The several sections 1 2 3 are preferably strengthened top and bottom by means of the wires, bands, or their equivalent 4, and they are constructed, as indicated at 5, to fit together and rest upon said wires or bands.

The top section 1, which constitutes the receiver for the waste oil or other liquid, is constructed with an inclined bottom 6. At the center of the inclined bottom 6 is fixed a box or receptacle 7. Over the box 7 is fitted a removable cover 8, made of perforated zinc or other suitable material. The top section 1 is preferably closed by means of a cover 9. The waste oil is delivered by means of a pipe or otherwise passing through an aperture in the cover 9 into the receiver 1. The oil then passes through the perforations 10 in the cover 8, and in its passage therethrough the larger particles of the solid matter are separated and deposited in the bottom of the receiver 1. The receiving vessel 1 may be fitted with a pipe and cock for drawing off the sediment or the removal of the same may be effected by hand from time to time. The oil then enters the box 7.

To the box 7 and communicating with it at one end are soldered or otherwise suitably fixed one or more pipes 13. As shown in the drawings, the box is fitted with five such pipes 13. The pipes extend through to the exterior of the top section 1 and at their outer

ends are fitted with cocks 14 for regulating the quantity of oil drawn off from the box by each of the pipes 13.

To the upper end of the center section 2 on the outside and immediately beneath the five cocks 14 is fixed a hopper 15, which is constructed into a number of compartments 16, corresponding to the number of cocks 14 leading from the vessel 7 in the receiver 1. The plates 17 forming the partitions of the several compartments 16 terminate at a point somewhat below the level of the top of the hopper 15, so as to prevent the oil overflowing from any particular section or sections should the pipe leading therefrom get choked. This places all the compartments 16 in communication at the top. The oil drawn off by each of the cocks 14 falls into its corresponding compartment 16 in the hopper 15. In the bottom of the hopper 15 are fitted a number of pipes 18, one for each compartment. These pipes 18 extend in a downward direction and preferably diverge or radiate outward to the bottom of the intermediate section 2. At their lower ends these pipes 18 pass through the wall of the intermediate section 2 and communicate with the interior thereof, as shown in Fig. 3. These pipes serve for conducting the oil from the hopper 15 to the bottom of the intermediate section, the inner ends being preferably turned in an upward direction, as indicated at 19 in Fig. 3.

Inside the intermediate section 2 are arranged four (more or less) baffles or superimposed inclined plates 20. The oil as it issues from the lower ends 19 of the pipes 18 rises into contact with the under side of the bottom baffle-plate 20 and then travels along the under side of said plate to the upper edge, over which it passes, and is then caught by the lower edge of the next baffle-plate 20 above, and so on from baffle-plate to baffle-plate.

The lower edges of the several baffle-plates 20 are provided with flanges or projections 21 to insure that the oil shall be caught by the lower edge of each plate 20 when it leaves the upper edge of the plate below. The several baffle-plates 20 are also fitted with ribs or projections 22, which may be soldered or otherwise fixed thereto, so as to form said inclined plates 20 into a number of sections corresponding to the number of pipes 18. (See Fig. 2.) In this manner the oil is distributed over the whole surface of the several baffle-plates 20 and in its passage from the



bottom to the top is compelled to travel in a zigzag or sinuous course. The several inclined baffle-plates 20 are connected at two opposite sides by means of stays or bars 23, which at their upper ends have affixed to them lugs 24, which are adapted to engage lugs or projections 25, provided on the inside of the intermediate section 2, being bolted or otherwise suitably fixed thereto to maintain the baffle-plates 20 in correct position. (See Fig. 2.)

The intermediate section 2 is partially filled with water, the water-level being indicated in Fig. 3 by the dotted line  $x$ . In the intermediate section 2 is arranged a heating-coil 26, provided for maintaining the water at a suitable temperature. The oil as it leaves the inner ends of the feed-pipes 18 is discharged into the heated water in the intermediate section 2 and as it travels along the under side of the several inclined plates 20 in a sinuous course the solid matter is separated and falls to the inclined bottom 27 of the intermediate section.

28 is a pipe which at one end communicates at or in proximity to the bottom of the intermediate section 2 and at its upper end passes through the walls of said section 2 to the exterior. This pipe 28 prevents the water rising above the level indicated by the dotted line  $x$  in Fig. 3, and thereby prevents water being drawn off along with the partially-purified oil. The oil finally flows over the upper edge of the top inclined baffle-plate 20 and collects above the water-level  $x$ . The dotted line  $y$  in Fig. 3 indicates the normal oil-level in the intermediate section 2.

The intermediate section 2 is preferably fitted with a gage 29 for indicating both the water and oil levels. This, as shown, consists of two elbow-pieces 30 31, the top one, 30, communicating with the interior of the intermediate section 2 above the water and below the oil-levels  $x$   $y$  and the bottom elbow 31 with the interior of the intermediate section 2 below the water-level  $x$ . The bottom 27 of the intermediate section 2 is inclined to the center, where it is fitted with a pipe 32 and cock 33 for drawing off the sediment or solid matter collected therein.

To the intermediate section 2 and at a suitable height above the water-level  $x$  is fitted a cock 34, which serves for drawing off the more or less pure oil floating on the surface of the water. This cock 34 is arranged to discharge the oil into a dry filter 35 (shown consisting of a rectangular casing subdivided by horizontal partitions 36) into a plurality of superimposed chambers or compartments. The bottom 36 of each compartment is, as shown, inclined to the center and is provided with an outlet 38, through which the oil passes successively from compartment to compartment. The front edge of the bottom of each compartment is turned up in the

form of a flange (indicated at 39) to prevent the oil overflowing or escaping at the front or between the front edges of the bottoms and the back of the door 40. In each of the compartments are arranged two perforated trays 41 42, made of zinc or other suitable material, one, 41, of which fits inside the other, 42. Between the trays 41 42 a space 43 is provided which is filled with cotton-waste or other suitable material. The oil entering the dry filter 35 by means of the draw-off cock 34 is delivered into the inner tray 41 of the top compartment. It then percolates through the cotton-waste and perforated outside tray 42 to the inclined bottom 36 of said top compartment, thence through the outlet 38 to the inside perforated tray 41 of the next compartment, and so on successively from compartment to compartment. The inclined bottom 36 of the last compartment communicates with a pipe 44, which conducts the now purified oil to the third or bottom section 3 of the apparatus, which forms a storage tank or receiver for it. The dry-filtering chamber 35, as shown in Fig. 1, is fitted with a door 40 to allow of access to the trays 41 42 for renewing the cotton-waste or other material when necessary.

By means of my improved apparatus it will be noted that the oil is cleaned or has the bulk of the impurities removed from it before it comes into contact with the waste, which by preventing the waste being so quickly dirtied obviates the necessity for its frequent renewal; further, that by means of the baffle-plates 20 and the employment of the coil 26 for heating the water in the intermediate section 2 the oil is subjected to a thorough washing as it traverses in the zigzag course through the hot water.

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

1. In apparatus of the nature specified, in combination, a hot-water-containing vessel, a plurality of superimposed inclined plates or baffles and ribs subdividing said baffles into a plurality of sections and means for conducting the oil independently to each section.

2. In apparatus of the nature specified, in combination, a hot-water-holding vessel, a plurality of superimposed inclined trays or baffles, projections or ribs dividing the lower surfaces of said baffles into a plurality of sections, and projections on the lower edges of the baffles, as set forth.

3. In apparatus of the nature specified, in combination, a vessel for receiving the impure liquid, means located in said vessel for removing the larger particles of matter, a water-holding vessel, a plurality of oppositely superimposed inclined plates or baffles constructed on the under side with parallel ribs or projections dividing them into a plurality of parallel sections, a plurality of pipes for drawing off the impure oil from the receiver



and conducting it to each of the sections of the baffles, means for heating the water in the water-holding vessel, means for drawing off the matter which accumulates in said latter vessel, a dry filter comprising a plurality of superimposed chambers, filtering matter in said chambers, means for drawing off the partially-purified oil from the water-holding vessel and conducting it to said dry filter, a storage vessel and means for drawing off the oil from the dry filter and conducting it to said storage vessel, as set forth.

4. In apparatus of the nature specified, a water-holding vessel, a plurality of superimposed oppositely-inclined trays or baffles constructed with parallel ribs or projections forming said plates or baffles into a plurality of sections on the under side, flanges along the lower edges of each baffle, means for introducing the oil to be purified below the bottom baffle, means for heating the water, and a dry filter comprising a plurality of superimposed compartments constructed with inclined bottoms, two perforated trays arranged in each compartment and filtering material between the trays.

5. In apparatus of the nature specified, a receiving vessel constructed with an inclined bottom, a receptacle in the bottom of said vessel and a perforated cover for said recep-

tacle, a plurality of pipes and cocks for drawing off the liquid from said receptacle, a water-holding vessel, a coil for heating the water therein, a plurality of superimposed oppositely-inclined plates or baffles constructed to form a plurality of parallel sections on the under side, a subdivided hopper for receiving the oil from the receptacle, a plurality of pipes from the hopper for conducting the oil from each compartment to the sections of the baffles, means for maintaining a constant water-level in the water-holding vessel, a gage for indicating the water and oil levels, means for drawing off the sediment from the water-holding vessel, means for drawing off the oil above the water-level, a dry filter comprising a plurality of superimposed compartments constructed with inclined bottoms, two perforated trays in each compartment and filtering material between the trays, a storage-tank, and a pipe from the dry filter to the storage-tank, substantially as set forth.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

NOAH WHALTON SMITH.

Witnesses:

CHAS. OVENDALE,  
R. OVENDALE.