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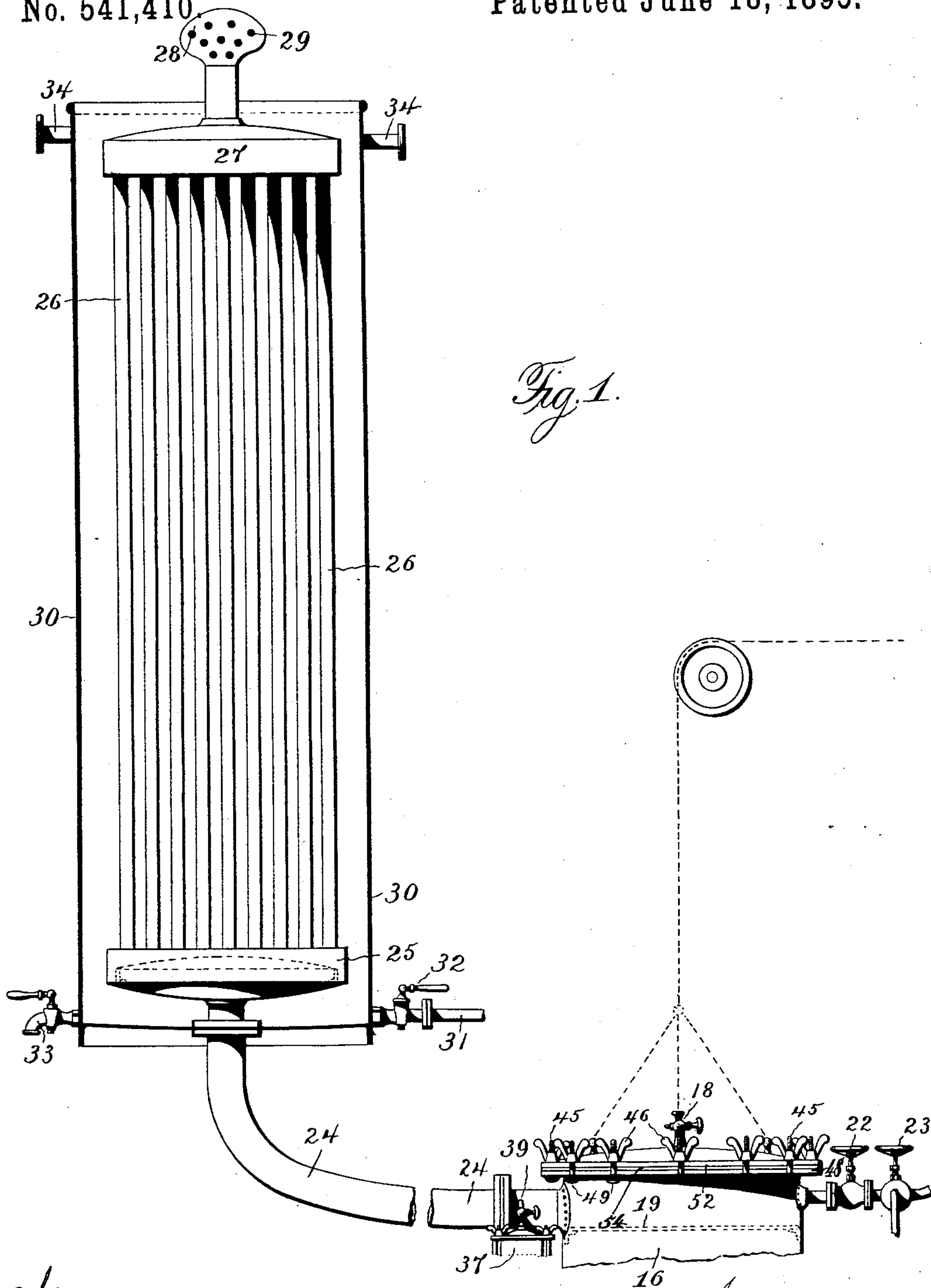
3 Sheets—Sheet 1.

W. ALBACH.

APPARATUS FOR OBTAINING EXTRACTS.

No. 541,410.

Patented June 18, 1895.



Witnesses:
Jas. Hutchinson.
G. W. Rea.

Inventor.
Wilhelm Albach,
By James L. Norris.
Attorney.

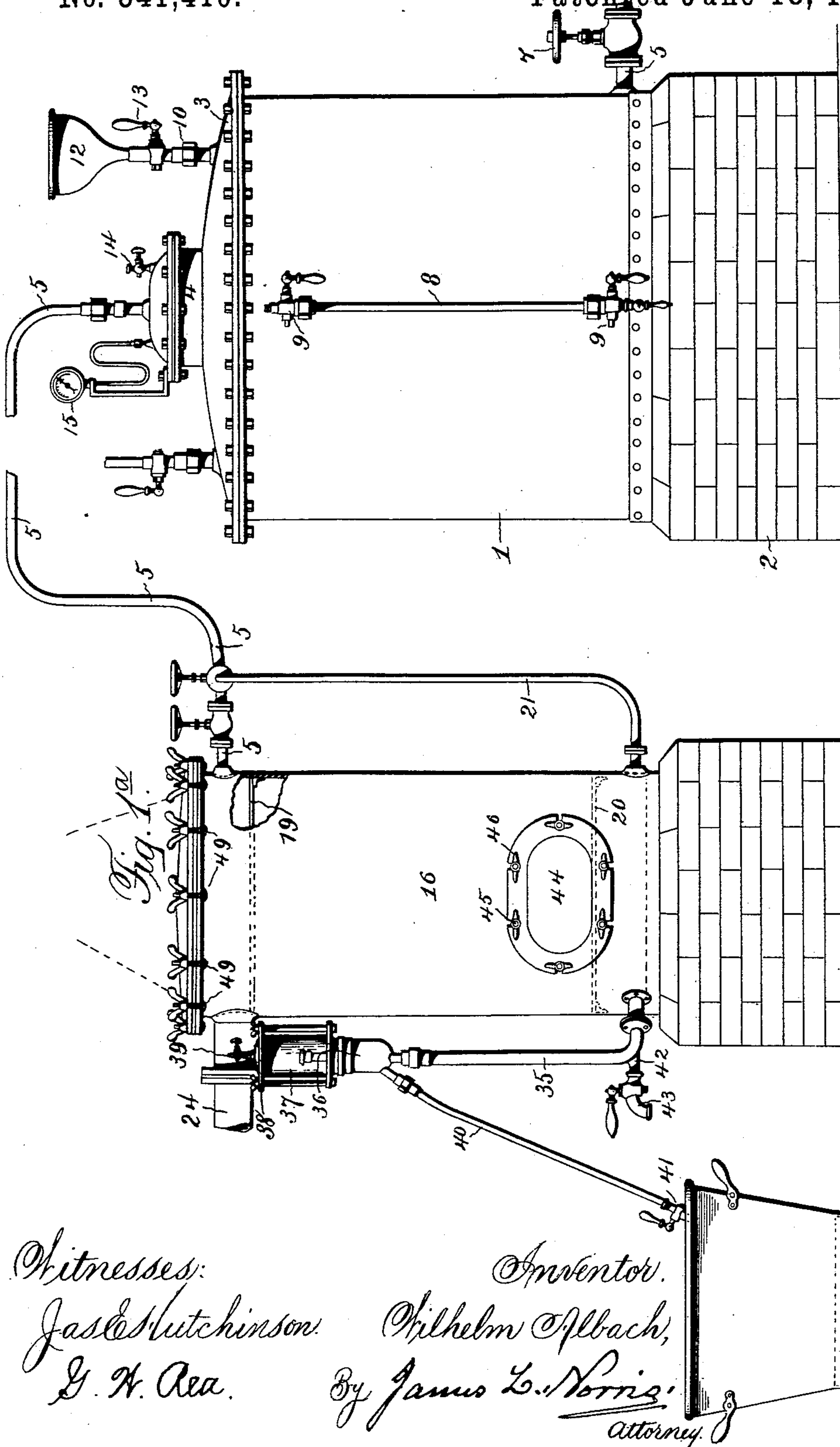
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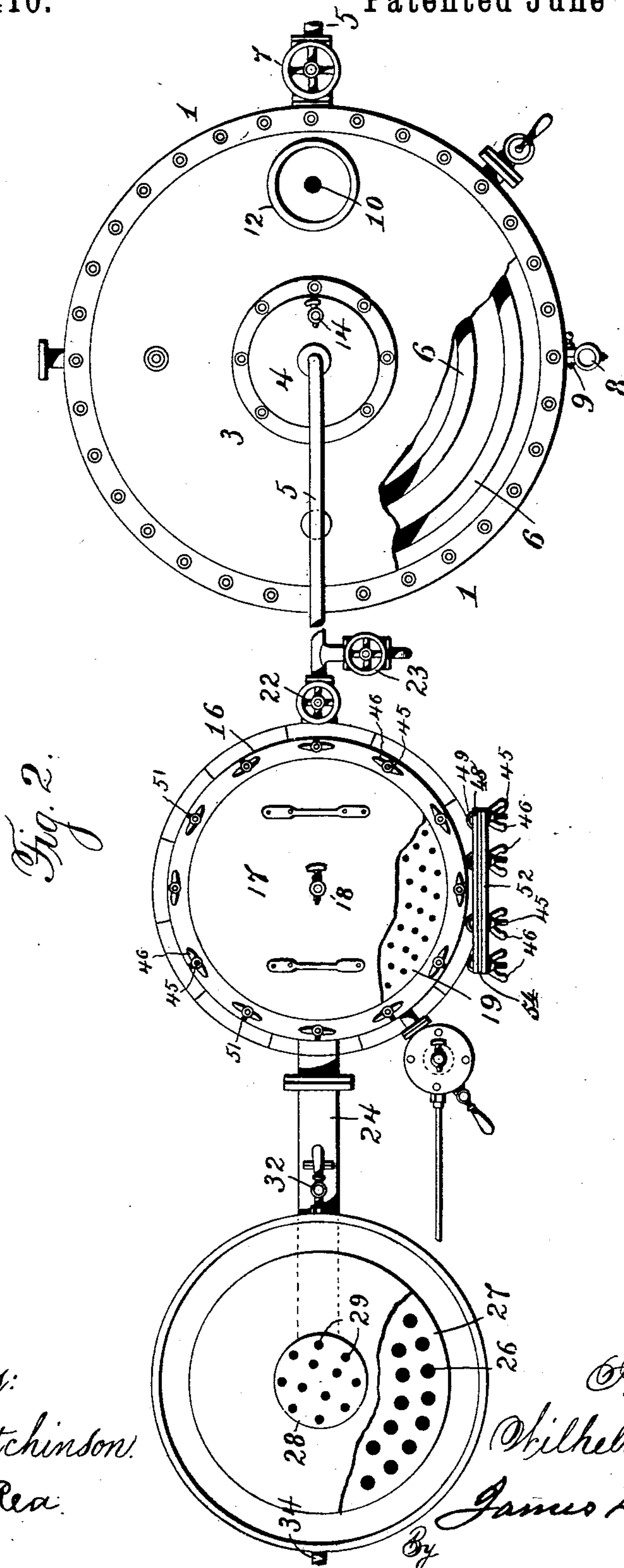
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UNITED STATES PATENT OFFICE.

WILHELM ALBACH, OF HÖCHST, GERMANY.

APPARATUS FOR OBTAINING EXTRACTS.

SPECIFICATION forming part of Letters Patent No. 541,410, dated June 18, 1895.

Application filed July 3, 1894. Serial No. 516,481. (No model.)

To all whom it may concern:

Be it known that I, WILHELM ALBACH, a subject of the Emperor of Germany, residing at Höchst-on-the-Main, Empire of Germany, have invented new and useful improvements in processes of and apparatus for extracting soluble constituents and oils from various substances, such as resin, hops, tanbark, dye-stuffs, &c., of which the following is a specification.

My invention relates to apparatus for extracting the soluble constituents and essential, or other oils, from various substances, such as resin, hops, tan-bark, dye-stuffs, &c. It is the purpose of my said invention to provide an economical apparatus for extracting the soluble constituents of various substances, and an extraction-apparatus which shall be capable of continuous action, which may be prolonged until every portion of the ingredient sought has been removed from the substance operated upon, and in which provision shall be made for constant inspection and for the withdrawal of samples of the extract, at any moment, for testing purposes.

It is my further purpose to provide an extraction-apparatus in which provision is made for the automatic discharge of the fluid extract, by the pressure of the steam, or vapor, or by siphoning, or both, means being provided by which such discharge may be timed, initiated, and arrested as circumstances may require.

The invention consists, to these ends, in the novel process, or mode of operation, and in the features of construction and in the parts and combinations of parts hereinafter fully described and particularly pointed out and defined in the claims.

To enable others skilled in the art to fully understand and practice said process, and to make, and use my said apparatus, I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figures 1 and 1^a are side elevations upon two separate sheets, showing an apparatus containing my invention, said sheets being so placed as to unite the two parts of the drum 16 and make the illustration complete.

Fig. 2 is a plan view of the parts shown in Fig. 1, portions of the inclosing-walls being broken away to show interior parts.

The reference numeral 1, in said drawings, indicates the distillation drum, which is of substantially cylindrical form, and usually mounted on a suitable base 2, of masonry, or fire-brick, with a furnace, or fire-chamber, within, so that heat may, if necessary, be imparted to the contents of the drum. The latter is provided with a cover 3, having a steam dome 4. Entering said drum at, or near, its base is a steam-pipe 5 which is arranged in the interior in a coil, or series of coils, 6, from which said pipe is carried through the center of the steam dome and extended a little distance above the same. A cock 7 is provided near the point where the pipe enters the drum, by which the steam may be cut off, or turned on, as required. A sight glass, or water-indicating tube 8 is arranged upon one side of the drum and provided with cocks 9. The cover 3 is provided with a filling-tube 10, having a funnel 12 and cock 13. Upon the steam dome is an air-outlet and cock 14 and a pressure-gage 15.

The pipe 5 and its coils 6 are preferably supplied with steam from a source whence it can be obtained in a pure state, uncontaminated by oils, or other impurities. It is highly desirable, also, that the steam be generated in copper, and where the product of the process is to be used as food, or with food, steam should not be used which has been generated in iron, or carried through pipes of that metal.

The reference-numeral 16 indicates the extraction drum, which is of less diameter than the distillation drum, but of similar form. Its cover 17 is removable and is hermetically fastened by devices which will be explained hereinafter. It is provided with an air-outlet and cock 18.

Within the extraction drum, at a little distance below its top, is inserted a removable, perforated, or foraminous diaphragm 19, and at about the same distance above the bottom of said drum is arranged a substantially similar diaphragm 20. The steam-pipe 5, after rising above the steam-dome of the distillation-drum is curved and extends horizontally toward the extraction drum and then downward, so as to enter the body of the drum above the diaphragm 19. From said steam-pipe, at a short distance from the extraction drum, a

branch-pipe 21 is carried downward and enters the drum beneath the lower diaphragm 20. A cock 22 is placed in the steam pipe near the point where it enters the drum, and a similar
 5 cock 23 is provided in the branch-pipe 21.

Communicating with the drum 16 between its cover and the perforated diaphragm 19 is a pipe 24, of large diameter, in comparison with the steam-pipe, which leads to a con-
 10 densation chamber 25. This chamber communicates by means of a group of vertical tubes 26 with a second condensation chamber 27, arranged above the first and provided with an air-cap 28, which has perforations 29. The
 15 two condensation-chambers and the connecting group of tubes are inclosed within a drum 30 which is provided with a water inlet 31, having a cock 32, an outlet faucet 33, and over-
 20 flow outlets 34. The inlet 31 is connected with any suitable source of supply by which cool water may be furnished to the drum 30. The
 25 condensing chamber 25 is so located that the pipe 24 has a continuous inclination downward to the point where it enters the drum 16.

A pipe 35 enters the drum 16 below the lower diaphragm 20 and after extending hori-
 30 zontally a few inches is bent upward, its end, which stands at any suitable height, being provided with a vessel 36, which is surmounted by an inspection-glass 37, which is provided
 35 with a cover 38, closing its top. An air-outlet 39, having a suitable cock, forms part of this cover. The pipe 35 enters the bottom of the vessel 36 and traverses its interior, its open
 40 end lying in the chamber inclosed by the inspection-glass, where it can be plainly seen. A discharge pipe 40 enters the lower portion of the vessel 36 and extends downward, at an
 45 angle with the pipe 35, its lower end lying somewhat below the point where the pipe 35 enters the drum. A cock 41 is provided near
 50 the lower end of the pipe 40. A draw-off pipe 42, having a cock 43, is also provided, located close to the bottom of the extraction drum.

Just above the lower diaphragm 20 is a man-
 45 hole, provided with a removable cover 44, which is held by bolts 45 and thumb-nuts 46. Similar fastenings, indicated by the same reference-numerals, are used to secure the cover
 50 of the drum, their construction being shown most clearly in Fig. 2.

The bolts 45 are provided with T-heads, or cross-heads, which lie against collars, or
 55 flanges 48, forming a rigid part of the drum. The cross-heads are confined against all save rotary movement upon their own axes, by means of keepers 49, secured to the collars 48
 60 by screws 50. These keepers are provided with transverse slots 51, coinciding with similar marginal slots in the collars 48 and in col-
 65 lars, or flanges 52, which form part of the covers. By turning the bolts 45 upon their cross-heads as a center of movement, said bolts may be moved into the said marginal slots, after
 70 which thumb-nuts are turned upon their threaded ends until said nuts are brought

against the collar 52 of the cover, which may be clamped with the required force against the collar 48 on the drum. By loosening the
 75 thumb-nuts the bolts may be turned out of the marginal slots and the cover may then be removed. To render the joint perfectly tight, the adjacent faces of the collars 48 and 52 are provided with a packing 54, of any suitable
 80 material.

The mode of procedure according to my invention is as follows: The material from which the extract is to be obtained is placed in the drum 16, upon the lower diaphragm 20, the
 85 cover 17 and the upper diaphragm 19 being removed to permit its insertion. These parts being replaced, the air-outlet 18 in the cover is opened, the cock 22 in the steam-pipe 5 is closed and the cock 23 in the branch pipe 21
 90 is opened, thereby admitting steam to the interior of the drum 16 beneath the lower diaphragm 20. As it penetrates and passes upward through the material placed in the drum, it displaces the air which flows out through
 95 the outlet 18. When the air is removed from the drum, which will be indicated at the air-outlet 18, the latter is closed. The steam which then penetrates the material contained in the drum 16, passes into the pipe 24 and
 100 into the condensation chambers 25 and 27 and tubes 26. The air displaced has free escape by way of the air-cap 28, which also admits air when condensation creates a partial vacuum. The condensed fluid collects in the lower
 105 chamber 25 and flows thence, still retaining a considerable degree of heat, back through the pipe 24 and into the drum 16, where it is dripped from the diaphragm 19 upon the material under treatment, and flows through
 110 the same to the bottom of the drum. As it slowly accumulates its temperature is maintained, by the inflowing steam, at the boiling point, and the action of this fluid materially aids the process of extraction. When
 115 the process has advanced as far as thought necessary, the cock 23 is closed and cock 22 and air outlet 39 are opened. The steam then enters above the upper diaphragm 19 and part thereof passes downward and acts upon the
 120 material exposed in the drum. The larger part of the steam, however, passes to the condensation chambers and the condensed liquid is filtered upon the material treated. As the drum 16 is gradually filled, the fluid rises in
 125 the pipe 35, before entering which it is filtered by the lower diaphragm 20 and its impurities removed. When it appears issuing from the open end of the pipe 35, which is visible
 130 through the inspection-glass 37, the cock 41 is opened and the fluid extract is discharged through the pipe 40 into a vessel of any suitable kind. If it is found that the process is complete and that the substance has been ex-
 135 hausted of the ingredient sought, which can be ascertained by testing the fluid discharged, the air-outlet 18 is closed whereupon the pressure of steam and the siphoning of the

pipe 40 will remove all the extract. If any should remain it can be drawn off by the pipe 42. During the process of extraction samples may be drawn at any time by means of the pipe 42.

If the process is carried out upon materials requiring alcoholic or other vapors, instead of steam, the distillation drum, or an equivalent apparatus, will be necessary. In such a case, the alcohol, ether, or other menstruum, may be placed in the drum, the coil 6 being disconnected from the pipe 5, which enters the steam-dome. The vapor will then pass from the interior of the drum directly into said pipe. In other respects the process does not materially differ from that already explained.

The process of extraction by my invention is continuous and is visible to the operator throughout. Samples for the purpose of testing may be obtained at any time, and there is, practically, no loss of the menstruum by the escape of vapors, which has been, in some methods employed, a source of unnecessary expense, when highly volatile fluids were used.

What I claim is—

1. The extraction-apparatus described, consisting of a closed drum having an upper and lower perforated diaphragm, a steam or vapor pipe entering above the upper diaphragm, a branch of said pipe entering below the lower diaphragm, both pipes having cocks, a condensation apparatus connected by an independent pipe to the space above the upper diaphragm, in said drum and a discharge pipe and draw-off pipe, below the lower diaphragm, substantially as described.

2. An extraction-apparatus consisting of a drum having a removable cover provided with an air-outlet, and having interior perforated diaphragms near its top and bottom, a steam, or vapor-pipe entering said drum above the upper diaphragm, a branch-pipe entering below the lower diaphragm, both pipes having cocks, a condensation apparatus connected by a downwardly inclined pipe to the space above the upper diaphragm, and a discharge-pipe

and draw-off below the lower diaphragm, substantially as described.

3. An extraction-apparatus consisting of a drum having a removable cover provided with an air-outlet, and having interior perforated diaphragms near its top and bottom, a steam or vapor-pipe and branch-pipe both having cocks and entering the drum above the upper and below the lower diaphragm respectively, condensing-chambers connected by tubes the upper chamber having a perforated air-cap and the lower chamber connected by an inclined pipe to the space above the upper diaphragm, a discharge pipe entering below the lower diaphragm and extended upward, its end provided with a chamber surmounted by a closed inspection-glass into which the open end of the pipe rises, and a pipe leading from said chamber below the bottom of the drum and provided with a cock, substantially as described.

4. An extraction-apparatus consisting of a distillation drum a steam pipe traversing said drum and passing out at its top, an extraction-drum having a removable cover provided with an air-outlet, the interior of the drum having perforated diaphragms above its bottom and below its top where the steam pipe enters, a branch-pipe entering below the lower diaphragm, a condensing apparatus connected by an inclined pipe with the space above the upper diaphragm, a discharge-pipe entering below the lower diaphragm and having a chamber on its upper end, a closed inspection-glass above said chamber into which the open end of the pipe rises, an air-outlet for the cover of the inspection glass and a pipe leading from the said chamber below the bottom of the drum and provided with a cock, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

WILHELM ALBACH. [L. S.]

Witnesses:

FRANK H. MASON,
THEODOR WILHELM.