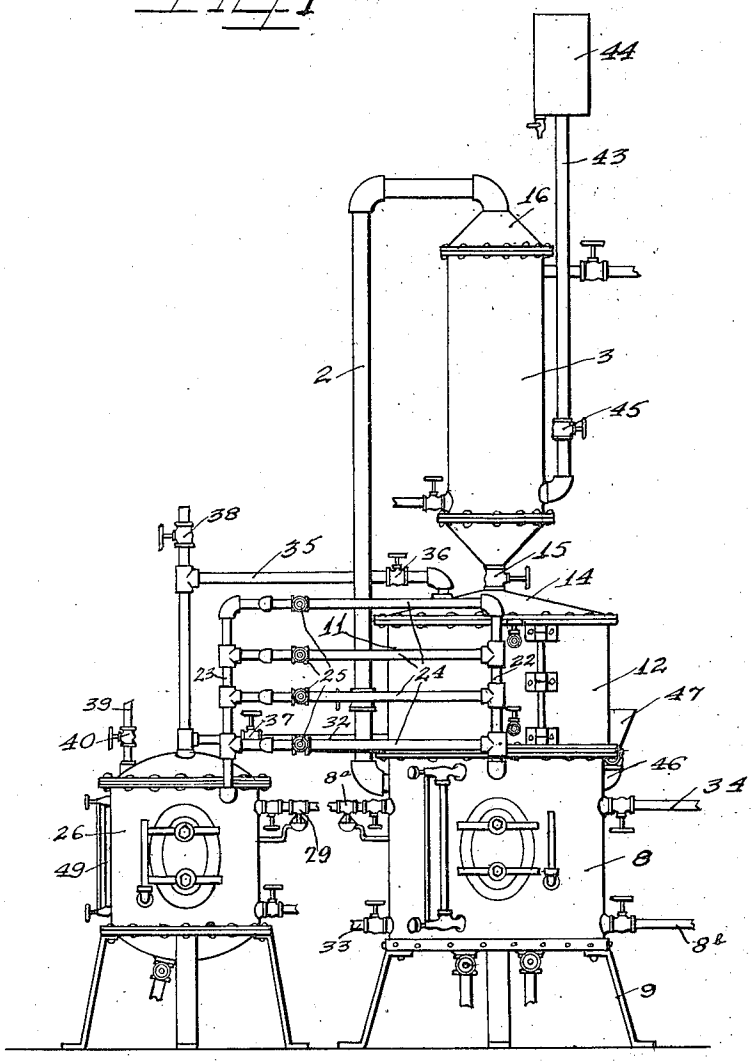
July 31, 1923. 1,463,154

E. H. CUMMINS

EXTRACTION APPARATUS

Filed Nov. 15, 1920 4 Sheets-Sheet 1

Fig. 1



Witnesses

Rudolph J. Berg

Charles W. Hills Jr.

Inventor

EARL H. CUMMINS

By Charles W. Hills Atty.

July 31, 1923. 1,463,154

E. H. CUMMINS

EXTRACTION APPARATUS

Filed Nov. 15, 1920 4 Sheets-Sheet 2

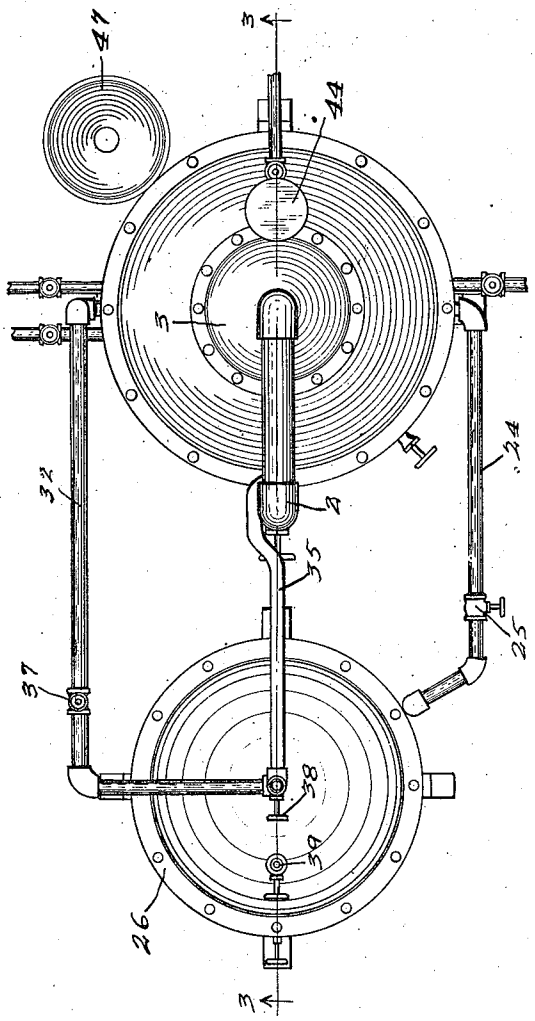


Fig. 2

Witnesses

Rudolph T. Berg.

Charles W. Fills Jr.

Inventor

EARL H. CUMMINS.

By Charles W. Fills Atty.

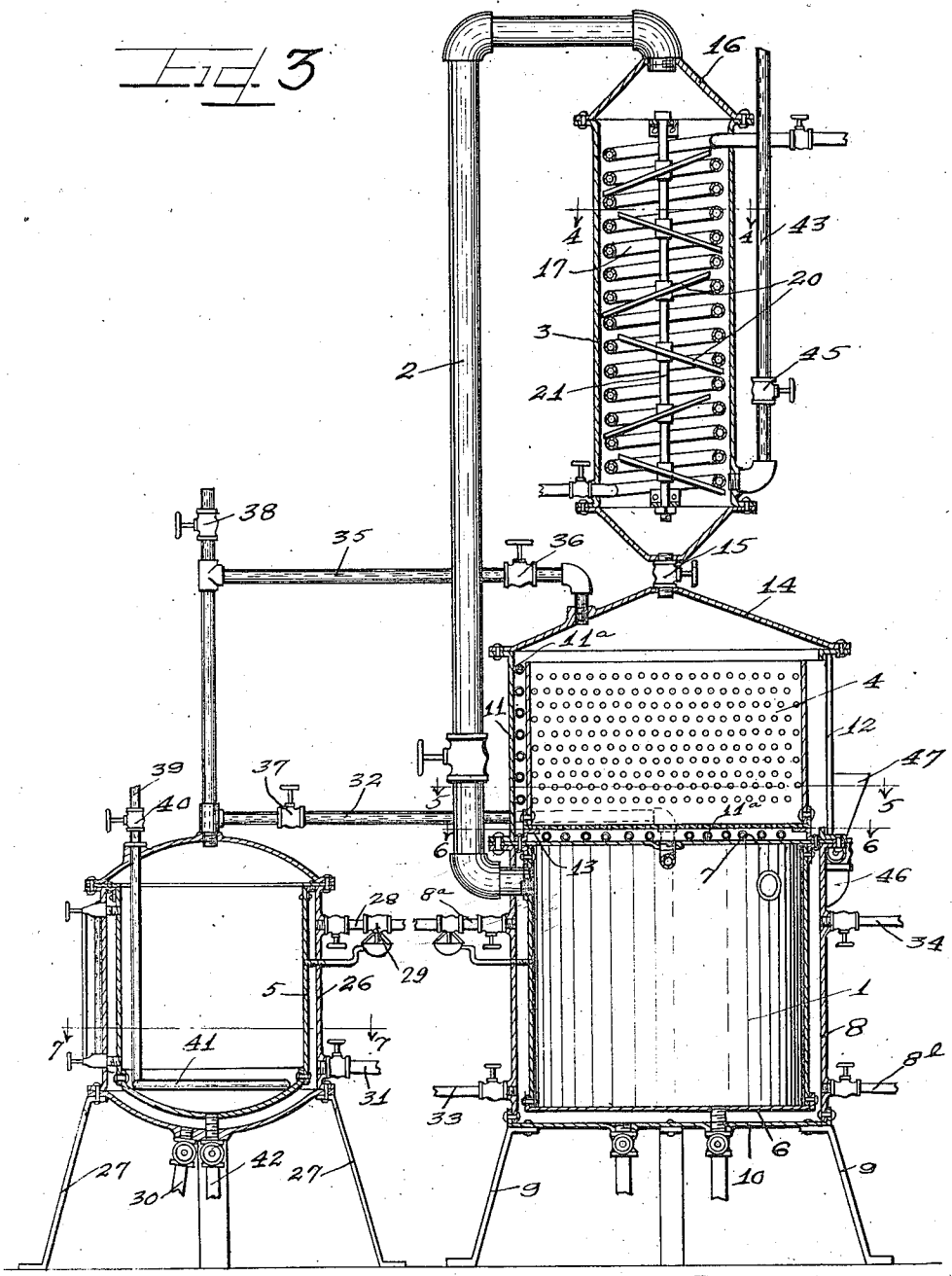
July 31, 1923. 1,463,154

E. H. CUMMINS

EXTRACTION APPARATUS

Filed Nov. 15, 1920 4 Sheets-Sheet 3

Fig. 3



Witnesses

Rudolph J. Berg.

Inventor

EARL H. CUMMINS.

By Charles E. Tiers Atty.

July 31, 1923. 1,463,154

E. H. CUMMINS

EXTRACTION APPARATUS

Filed Nov. 15, 1920 4 Sheets-Sheet 4

Fig. 8

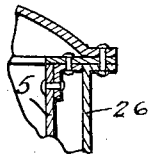


Fig. 9

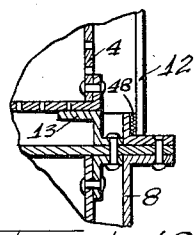


Fig. 4

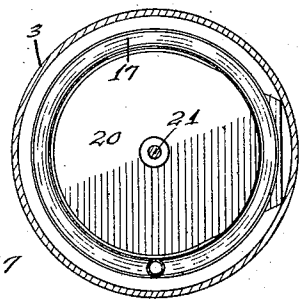


Fig. 10

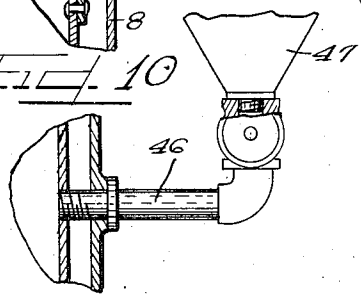


Fig. 5

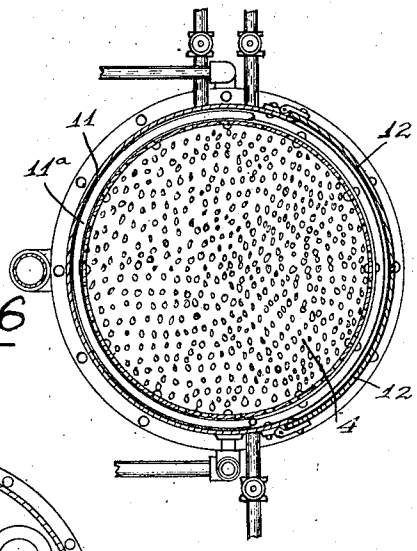


Fig. 7

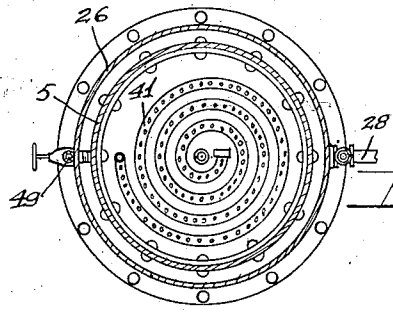
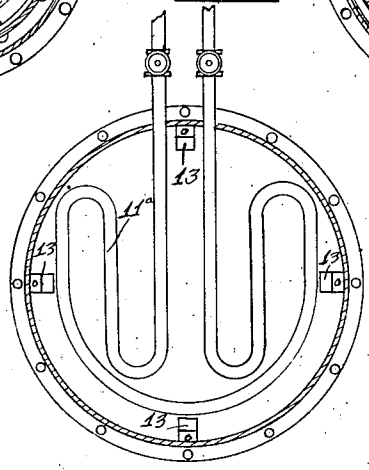


Fig. 6



Witnesses

Rudolph J. Berg.

Inventor

EARL H. CUMMINS.

by Charles W. Vieles Atty.

Patented July 31, 1923. 1,463,154

UNITED STATES PATENT OFFICE.

EARL H. CUMMINS, OF CHICAGO, ILLINOIS, ASSIGNOR TO DADANT & SONS, OF HAMILTON, ILLINOIS, A PARTNERSHIP.

EXTRACTION APPARATUS.

Application filed November 15, 1920. Serial No. 424,194.

To all whom it may concern:

Be it known that I, EARL H. CUMMINS, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in an Extraction Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to the extraction of materials by solvents and, although not restricted to such use, is particularly adapted for extracting beeswax from "slum-gum". In the bee industry the wax is separated from impurities as far as possible by melting the mass in hot water when the melted wax rises to the top and floats on the surface. The molten wax is then skimmed off and strained to remove dead bees and the like. The residue is put in layers with straw, and is pressed to obtain more wax, the straw acting as a filter; this product is known as "press-wax", while the residual matter is called "slum-gum". The latter contains 25% to 60% of beeswax.

One of the principal objects of the invention is to provide an improved apparatus for the extraction of materials by solvents.

Another object of the invention is to provide an apparatus whereby bees-wax may be extracted from slum-gum.

A still further object of the invention is to provide an apparatus of which there is a minimum loss of the solvent used.

Other and further important objects of this invention will be apparent from the disclosures in the specification and drawings.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevation of an apparatus embodying the features of the present invention.

Figure 2 is a top plan view of the apparatus.

Figure 3 is a vertical section through the apparatus on the line 3—3 of Figure 2.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a section on the line 5—5 of Figure 3.

Figure 6 is a section on the line 6—6 of Figure 3.

Figure 7 is a section on the line 7—7 of Figure 2.

Figure 8 is a sectional view showing the construction of the sides and cover of the receiving tank.

Figure 9 is a sectional view showing the method of securing the solvent container to the crate and the door therefor.

Figure 10 is a sectional view showing the construction of the filling pipe and its funnel.

As shown on the drawings:

A solvent for beeswax such as ether, chloroform, carbon bisulphide, oil of turpentine or fixed oils is introduced into a container 1, where it is vaporized. The vapor passes by pipe 2 into a condenser 3 and the liquefied solvent drops onto the slum-gum arranged in a basket, crate or sack 4. The solvent charged with beeswax then passes into a drum 5, where the solvent is again vaporized and re-introduced into the container 1 in gaseous form. The beeswax remains behind and may be drawn off from time to time.

The container 1 comprises a steel cylinder having a flanged bottom 6 riveted thereto. At its upper end the container is closed by a circular plate 7. This plate serves not only to close the container but also to support it within an outer shell 8 provided to allow the container to be heated and cooled as desired by admitting hot or cold fluid into the space between the container 1 and the outer shell 8. Hot water or steam intake and outlet pipes are provided at 8^a and 8^b, the intake of either the steam or hot water at 8^a being thermostatically controlled. The outer shell 8 is supported by a series of legs 9 secured to the bottom plate 10 of the shell.

Above the plate 7 is attached a steel cylinder 11 provided at one side with hinged doors 12 of sufficient size to allow the basket 4 to be inserted and withdrawn. When the basket is in position it is supported by a series of angle members 13 secured to the plate 7 so that there is a clear space for liquid below the bottom of the basket. The condenser 3 is connected to the cylinder 11 by

a conical member 14 to the upper end of which is secured a valve 15.

At its upper end the condenser 3 is formed with a conical top 16 connected to the pipe 2 by which vapor passes from the container 1 into the condenser 3. As the vapor passes downwardly through the condenser it strikes against a coil of pipe 17, through which cold water is circulated with the result that the vapors are condensed and the liquid formed drops and runs down through the open valve 15 and then drips onto the slum-gum in the basket 4. Passage of the gases down the center of the condenser without contact with the coil 17 is prevented by a series of baffle plates 20 obliquely arranged on a central supporting bar or rod 21.

Preferably the solvent is allowed to stand in contact with the slum-gum for some time to aid the solution of the beeswax. For this purpose a siphon connection is provided between the cylinder 11 and the drum 5. As shown, this syphon connection includes a vertical pipe 22 communicating at its lower end with the bottom of the cylinder 11, a vertical pipe 23 connected to the upper part of the drum 5 and a series of horizontal pipes 24 extending between the two vertical pipes. A valve 25 is arranged in each of these pipes so that the pipes may be used selectively in siphoning off the liquid. The solvent accumulates in the cylinder 11 until it reaches the level of the particular pipe 24 whose valve is open, then siphoning begins and continues until all the solvent has been transferred to the drum 5. The temperature of the solvent and dissolved material in the chamber 11 and crate 4 is controlled by a coil of pipes 11^a, which extends underneath the crate 4 and approximately half way round it up to the top of the same, the coil being discontinued at the front of the chamber 11 so as not to interfere with the withdrawal of the crate 4 through the fluid-tight gates 12.

The drum 5 is provided with a jacket 26 supported by a series of legs 27. Into this jacket steam may be introduced by a pipe 28 provided with a thermostatically controlled valve 29. The condensed water may be withdrawn through pipe 30 from time to time. If hot water instead of steam is used the water may be carried away from the jacket by pipe 31. The drum 5 is maintained at a lower temperature than the chamber 11, but the heat of the steam or hot water in the jacket 26 is sufficient to cause the solvent to vaporize and pass by pipe 32 into the upper part of the container 1, from whence it goes without recondensation to the condenser 3. A pipe 35 is provided leading from the top of the container 11 to the condensing chamber 5. This pipe is provided with a valve 36 which is kept open during the operation of the apparatus and allows any excess vapors to escape from the condenser 3 and chamber 11 to the cooling tank 5 where they are either liquefied or pass over to the tank 1.

When substantially all of the wax has been removed from the slum-gum, steam is shut off from the jacket 8 around the container 1 and cold water admitted to the jacket by pipe 33. An outlet for the cold water is provided at 34. This causes the vapor driven off from the drum 5 to condense in the container 1. When nearly all the solvent has been removed from drum 5, valves 36, 37 and 25 are closed and valve 38 is opened. Air is then blown through the molten wax in the drum 5 by means of a pipe 39 having a valve 40 and terminating in a perforated coil 41 arranged in the bottom of the drum 5. This air carrying with it the last traces of solvent escapes from the drum through the now open valve 38. Finally the purified molten wax is run out of the drum 5 into a suitable container by means of pipe 42.

A vent pipe 43 terminating in an elevated tank 44 is provided for the escape of entrapped air and any excess vapors. This vent pipe is provided with a regulating valve 45. The lowermost siphoning pipe 24 is adapted to completely drain the chamber 11 as its level is slightly below that of the bottom 7 of said chamber. A pipe 46 provided with an air-tight cap or valve and a removable funnel 47 is attached to the upper portion of the solvent container 1 for the purpose of filling same. The funnel is made removable so as not to interfere with the doors 12. The doors 12 are adapted to close air tight for which any suitable packing and lining material 48 is provided.

As shown, the gauge 49 is built into very close relation with the outside wall 26 of the drum 5, this being necessary in order to keep the gauge at a sufficiently high temperature at all times to properly indicate the amount of solvent and solute in the drum 5, which would congeal in the gauge 49 if same were allowed to cool thereby rendering it inoperative.

When the extraction of beeswax is accomplished in this apparatus and by the method described, the product is very pure and has the true golden yellow color of "first run" wax which has hitherto not been obtainable with such "last run" products, except by bleaching with oxygen, ozone, etc.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. An extraction apparatus including a solvent receiving chamber adapted to be alternately heated and cooled, a condenser,

means connecting the condenser with the solvent receiving chamber, a material receiving chamber connected to the condenser containing a perforated crate and provided with heating coils and air-tight doors, a drum for receiving the solvent and its dissolved material, and automatic siphon means and excess vapor escape means connecting the receiving drum with the material receiving chamber.

2. An extraction apparatus including a solvent receiving chamber adapted to be alternately heated and cooled, a condenser, means connecting the condenser with the solvent receiving chamber, a material receiving chamber connected to the condenser containing a perforated crate and provided with heating coils and air-tight doors, a drum for receiving the solvent and its dissolved material, automatic siphon means and excess vapor escape means connecting the receiving drum with the material receiving chamber, and means connecting the receiving drum with the solvent receiving chamber.

3. An extraction apparatus including a solvent receiving chamber adapted to be alternately heated and cooled, a condenser, means connecting the condenser with the solvent receiving chamber, a material receiving chamber connected to the condenser containing a perforated crate and provided with heating coils and air-tight doors, a drum for receiving the solvent and its dissolved material, automatic siphon means and excess vapor escape means connecting the receiving drum with the material receiving chamber, means connecting the receiving drum with the solvent receiving chamber, and blow-off means connected to the receiving drum for driving off the last traces of the solvent from the solute.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

EARL H. CUMMINS.

Witnesses:
J. JAMES O'CONNOR,
HORACE WATERS.