

1,392,629.

C. P. DUBBS.
PROCESS OF CONVERTING HYDROCARBONS.
APPLICATION FILED MAR. 19, 1919.

Patented Oct. 4, 1921.

2 SHEETS—SHEET 1.

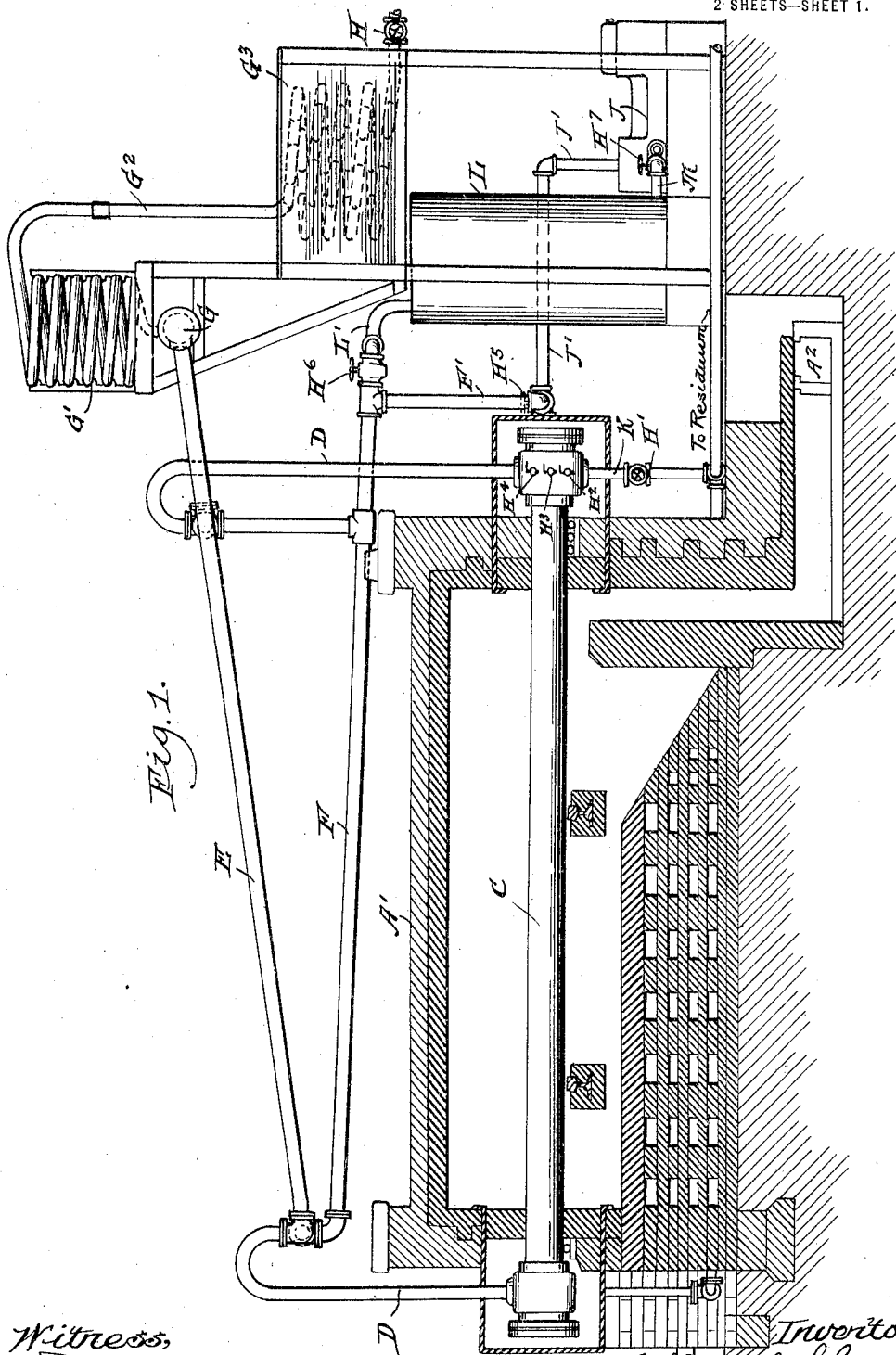


Fig. 1.

Witness,
J. Mann

Inventor,
Carlton P. Dubbs.
By Frank L. Belknap

C. P. DUBBS.

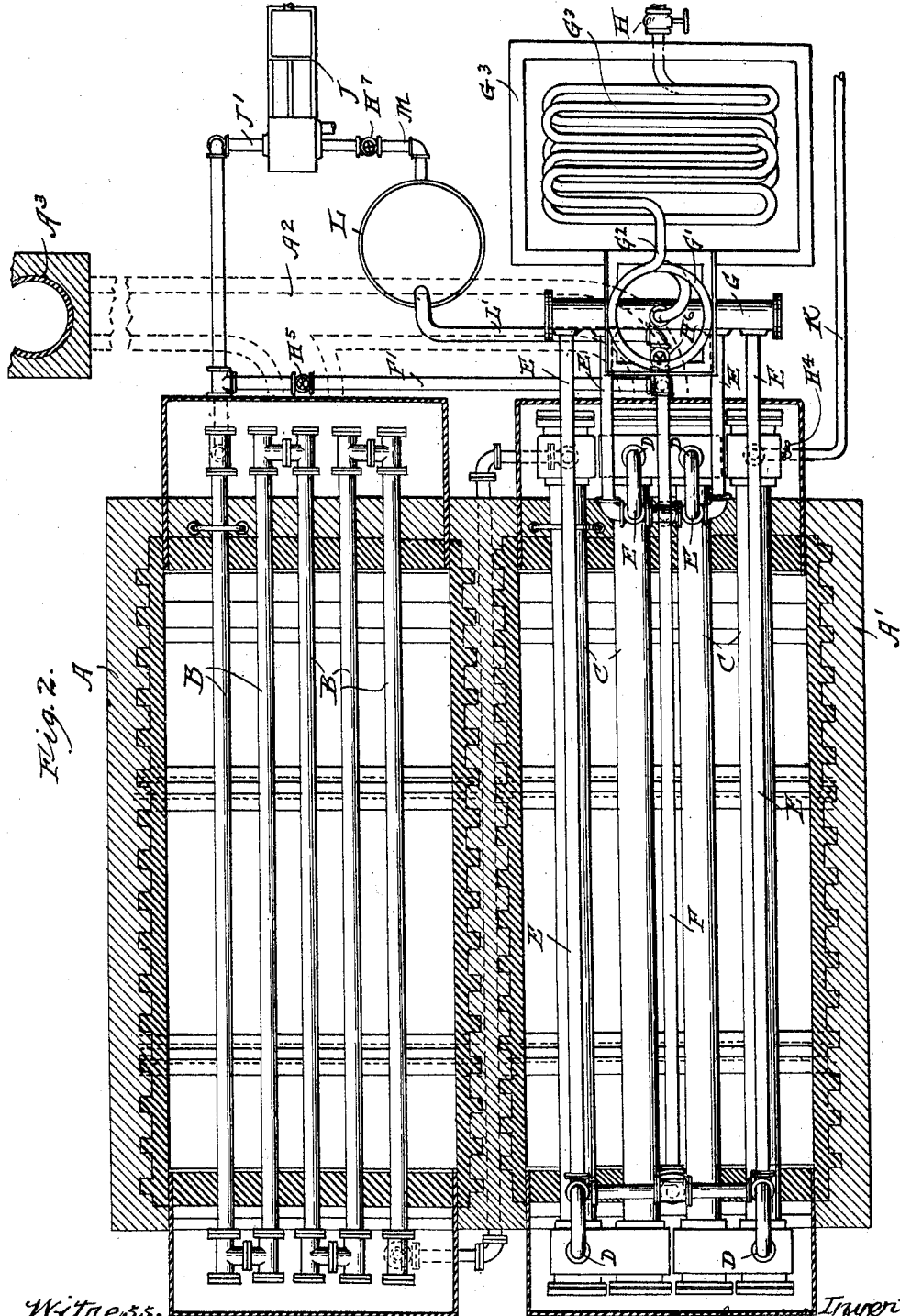
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Witness,
S. J. Mann

Inventor,
C. P. Dubbs,
By Frank L. Kellogg

UNITED STATES PATENT OFFICE.

CARBON P. DUBBS, OF WILMETTE, ILLINOIS.

PROCESS OF CONVERTING HYDROCARBONS.

1,392,629.

Specification of Letters Patent.

Patented Oct. 4, 1921.

Application filed March 19, 1919. Serial No. 283,673.

To all whom it may concern:

Be it known that I, CARBON P. DUBBS, a citizen of the United States, residing in the city of Wilmette, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Processes of Converting Hydrocarbons, of which the following is a specification.

This invention relates to improvements in processes of converting hydrocarbons and refers more particularly to an improved form of cracking process of the continuous type. Among the salient objects of the invention are to provide a process in which the oil is continuously fed through the cracking zone and thence through the vapor zone, and a portion of the generated vapors condensed and returned to the inlet side of the cracking zone for further treatment; to provide a process of the character above referred to in which the carbon containing residue is continuously removed from the cracking zone while the reflux condensate is returned to the cracking zone for further treatment substantially free from carbon; to provide a process which permits of the apparatus being operated for an extended period without the necessity of cleaning and in which that part of the system containing the precipitated carbon, is free from subjection to any excessive heat; to provide a process in which the reflux condensate is continuously removed from the refluxing condensing apparatus and returned to the inlet side of the system; to provide a process in which the vapors not initially condensed are finally caused to pass through a single passage for a secondary condensing action and in general to provide an improved process and also a novel apparatus of the character referred to.

The claims of the present invention are directed more particularly to the process, although it is to be understood that the apparatus itself is novel.

In the drawings:

Figure 1 is a sectional side view.

Fig. 2 is a sectional plan view.

Describing the apparatus, A and A¹ are the furnaces. A² the flue tunnel, A³ the stack.

B are the cracking tubes. C are the vaporizing tubes. D are the vapor tubes connected with the vaporizing tubes C. E are the slanting portions of the vapor tubes. F is the drainage line from the vapor tubes to

the B tubes situated in the furnace A, connected by line F¹ into line J¹ and on line F¹ is valve H². G is the manifold connecting with the slanting vapor tubes E and also connecting with aerial condenser G¹ which latter connects with vapor line G² to water cooled condenser G³ and on which is valve H. J is a standard high pressure liquid pump connected with any source of supply not shown. J¹ is the discharge from said pump into coils B. K is the residuum line connected with the 10" tube and positioned in it pressure valve H¹. H², H³, H⁴ are try cocks.

Describing the operation of the process, the material to be treated is drawn from any suitable source by means of the pump J and discharge therefrom through line J¹ into and through tubes B and during the time they are passing through said tubes, they are subjected to sufficient heat to cause the desired amount of cracking. Said oil is then passed into the tubes C which are only partially filled with the oil and as the oil passes through these tubes, there is a liberation of vapors from same and which vapors pass up through the vapor tubes D, E and into header G and through aerial condenser G¹, through line G², through water condenser G³ and discharged through pressure regulating valve H. The portion of vapors condensed while passing through vapor lines E, manifold G and aerial condenser G¹ are automatically drained back through these lines into drainage line F and from there through line F¹ enter into line J¹ and back into the heating tubes B. The residue left in the coils C is drawn off through line K through pressure regulating valve H¹ to any suitable place. Pressure is maintained on the entire apparatus and is regulated by the valve H.

A light fire may be maintained under the tubes C as shown in the drawings or said tubes may be heavily insulated with cel-o-cel insulating material or any other well known insulating material to prevent loss of heat by radiation and thereby dispense with the fire under the tubes C. The level of the liquid in the tubes C is ascertained by try-cocks H², H³, H⁴ and the level controlled by valve H¹. The per cent. of vapors generated from the oil as it passes through the tubes C will depend on the amount of heat acquired by said oil while passing through the 4" coils.

I do not wish to confine myself to the above described operation except as to illustrate the principal involved and which principal may be applicable in various arranged apparatus.

For instance, the reflux distillates may be returned to the heating coils B directly or indirectly, part of them direct and part of them indirect. For instance, instead of returning the reflux condensate direct to the tubes marked B by means of line F¹, the same may be discharged into a tank marked L through line L¹ by opening the valve H⁶ which otherwise would remain closed and closing the valve H⁵ on line F¹ or part of the condensate may be returned directly back to the tubes B through line F¹ by regulating the opening of valve H⁵ and the rest discharged to tank L through line L¹ by regulating the opening of valve H⁶. Tank L may be maintained under pressure or not and it may contain the raw material that is being treated or contain wholly the reflux distillate and from this tank the contents of same are fed to the tubes B through line M into pump J and from there discharged into line J¹.

It will be noted that the reflux condensate in all cases is trapped off from the vapor lines in such manner as to prevent their returning direct to the vaporizing tubes C.

An illustrative run of the described apparatus, in accordance with my process, is as follows:

Gas oil from mid continent crude oil, such as Kansas, or Oklahoma, oils of 32 to 36 Baumé gravity is taken and continuously supplied to the pump J and thence to the 4 inch coils B which are subjected to a temperature of 750° to 860° F. The heated oil then passes to the 10 inch coils C which are maintained about half full of oil and wherein vaporization takes place. The residue is constantly drawn off through the pipe K to a suitable storage. The vapors pass up through the lines D to the pipe E into the manifold G and from thence into the aerial condenser G' where the heavier distillates are condensed and the lighter distillates pass on to the water cooled condenser G³. The reflux condensation is diverted and returned to the inlet side of the tubes B, either directly through the lines F, F', or indirectly through the line F, tank L and line M to the pump. A pressure of approximately 100 lbs. to the square inch is maintained on the oil during treatment which is caused by the pressure of the generated vapors. This pressure is regulated by the valve H.

The gravity of the distillate discharge from the water cooled condenser is about 52 to 56 Baumé and in quantity is approximately somewhat more than half of the gas oil subjected to treatment.

I claim as my invention:

1. A process of converting relatively heavy into lighter hydrocarbons, consisting in passing a stream of oil through a zone where the oil is heated to a cracking temperature but without substantial vaporization, passed thence to and through a zone where vaporization takes place, removing the vapors, subjecting them to reflux condensation, returning reflux condensate for further cracking, removing the residue, after said vaporization, from the system without permitting intermingling of any substantial portion thereof with the oil in the heating zone and maintaining a pressure upon the material during distillation.
2. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a stream of oil through a zone where the oil is heated to the cracking temperature but substantial vaporization prevented and thence to and through a zone where vaporization takes place, removing the vapors and condensing them, returning a portion of the condensates to the heating zone for further treatment, removing the residue after said vaporization from the system without permitting contact or intermingling of any substantial portion thereof with the oil in the heating zone and maintaining a vapor pressure upon the material under treatment during distillation and condensation.
3. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a stream of oil through a heating zone where the oil is heated to the cracking temperature but substantial vaporization prevented and thence to an enlarged chamber where vaporization takes place, removing the vapors from said chamber and condensing them and returning a portion of the condensates to the heating zone for further treatment, withdrawing substantially continuously the residue from said chamber and discharging the same entirely apart from the feed of oil to the heating zone and maintaining a vapor pressure upon the material under treatment during distillation and condensation.
4. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a continuous stream of oil through a heating zone where the oil is heated to the cracking temperature but substantial vaporization prevented and thence to a chamber where vaporization takes place, discharging from the chamber substantially continuously a quantity of the residue proportional to the amount of oil supplied to the heating zone and said vaporization, condensing the vapors and returning a portion of the condensates to the stream of oil for re-treatment in the heating zone and maintaining a vapor pressure upon

wrapping of irregular bodies. Also the invention is not limited to any particular cycle of operations. Further the mechanical details herein described may be modified in various ways, and instead of a flexible disk any other soft and extensible body having a dilatable aperture therein may be used. In all cases, however, a pair of independently and conjointly movable plungers adapted to grip the chocolate and carry it through the different stages in the wrapping operation are employed.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:—

1. In machines for wrapping sweetmeats and like bodies with a thin enveloping medium, the combination comprising a sheet of flexible material having an orifice therein, upper and lower plungers between which the body and its enveloping medium are carried through the said orifice, grippers situated above the flexible material for holding the body and permitting it to be released by the plungers, slides for closing the ends of the enveloping medium against the underside of the body, and means for imparting movements to the said parts in their proper sequence, substantially as described.

2. In machines for wrapping sweetmeats and like bodies with a thin enveloping medium, the combination comprising a sheet of flexible material having an orifice therein, upper and lower plungers between which the body and its enveloping medium are carried through the said orifice, grippers situated above the flexible material for holding the body and permitting it to be released by the plungers, slides for closing the ends of the enveloping medium against the underside of the body, and means whereby after the completion of the wrapping operation the plungers are caused to seize the body and convey it to a discharge position, substantially as described.

3. In machines for wrapping sweetmeats

and like bodies with a thin enveloping medium, the combination comprising a sheet of flexible material having an orifice therein, upper and lower plungers between which the body and its enveloping medium are carried through the said orifice, grippers situated above the flexible material for holding the body and permitting it to be released by the plungers, slides for closing the ends of the enveloping medium against the underside of the body, means whereby after the completion of the wrapping operation the plungers are caused to seize the body and convey it to a discharge position, and means actuated by the plungers for ejecting the body from the plungers, substantially as described.

4. In machines for wrapping sweetmeats and the like with a thin enveloping medium, the combination comprising a sheet of flexible material having an orifice therein, a rotary feed table carrying the body beneath the said orifice, means for cutting off and feeding on to the body a piece of the enveloping medium, upper and lower plungers between which the body and its enveloping medium can be seized and carried through the said orifice, grippers situated above the flexible material for holding the body and permitting it to be released by the plungers, slides for closing the enveloping medium against the underside of the body, means for imparting movements to the said parts in their proper sequence, means whereby the plungers are caused to again seize the body and its enveloping medium after the action of the slides and convey it to a discharge position, and means actuated by the plungers for ejecting the body from the plungers, substantially as described.

In testimony whereof we have signed our names to this specification.

HENRY HACKETT.
ARTHUR SMITH.
CHRISTOPHER SOUTHALL.