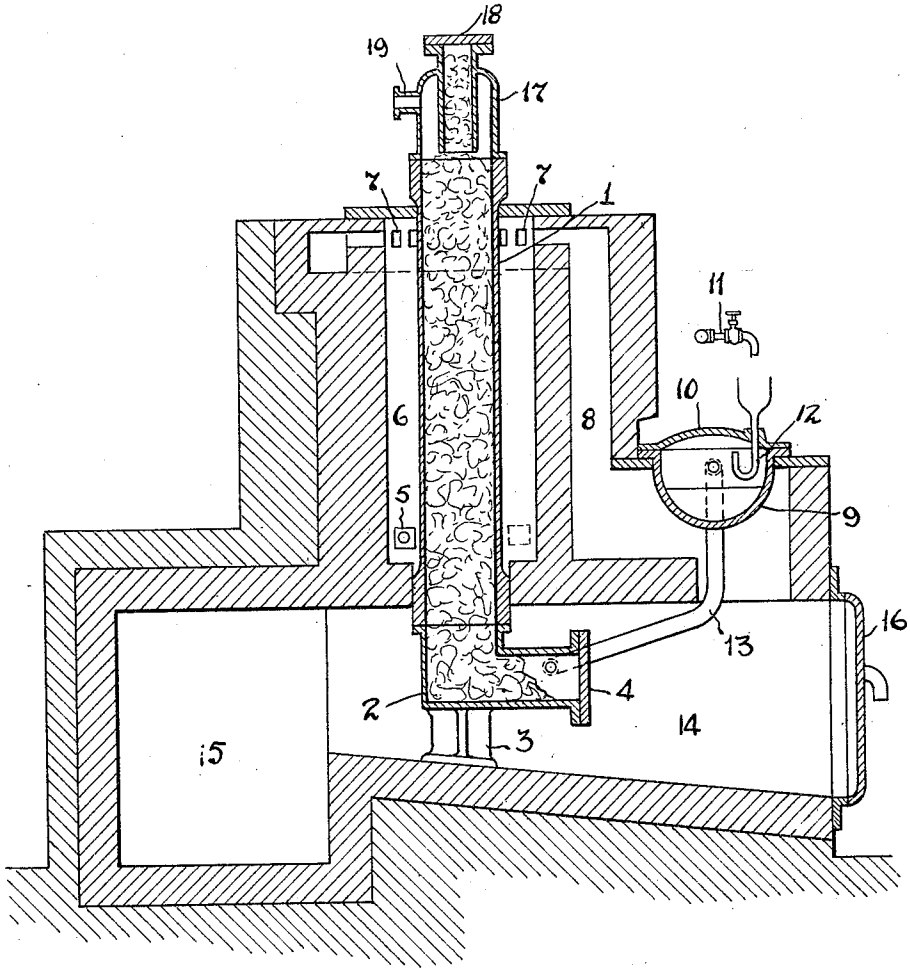
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APPARATUS FOR CONDUCTING CHEMICAL REACTIONS

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APPARATUS FOR CONDUCTING CHEMICAL REACTIONS

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This invention relates to apparatus for chemical reactions where there is a mass of solid material and a gasiform substance, at elevated temperature; and it is among the objects of the invention to provide for efficient supply to the reaction zone, and removal of refuse. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then consists of the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain structure embodying the invention, the illustrative form shown however being but one of the various ways in which the principle of the invention may be applied.

In said annexed drawing, the sole figure is a vertical sectional view of one form of apparatus contemplated.

The reference character 1 in the drawing designates a reaction chamber adapted to contain heated solid material through which a gasiform substance is passed. Such reaction chamber is preferably of a separable or removable character, and may be tubular, either of circular or elliptical or other cross section. Below the reaction chamber, and ordinarily forming more or less of a support also therefor is a clean-out chamber or ash pot 2. While this may be of a masonry construction, preferably it will be similar to the reaction chamber 1 as regards material, and it may have a pedestal or footing 3 as mounting. The reaction chamber and the ash pot may be made of metal, but generally ceramic material as one-piece units is preferable. A clean-out door 4 is provided on the chamber 2, and the ash pot is located in the path of a flue 14. The entire assemblage of reaction chamber and clean-out chamber is heated by any suitable means, for example oil or gas burners as at 5, these being placed in a flue 6 or combustion chamber about the retort 1. From the top of the flue 6 radial connections 7 lead to a flue extension 8 in which is set a vaporizing vessel 9. This is provided with a closure 10, and a valve-controlled feed line 11 supplies material to be vaporized, the trapped inlet 12 admitting the material to the vaporizing chamber. A duct 13 connects from the vaporizing vessel 9 to the ash pot 2, and preferably such duct may be passed through the flue so as to form a superheater duct.

Mounted upon the top of the retort or reaction chamber 1 is a head 17 having a removable cover 18 to allow access for charging, and an off-take 19 leading to a condenser or absorber system for the gasiform products produced.

A closure door 16 guards access to the flue and the clean-out door 4. It will thus be seen that when the doors 16 and 4 are open, ash or other refuse may be raked out from the pot 2, and any fumes escaping from the pot will be drawn off into the flue system 14, 15 without annoyance or danger to the operator.

Where solid material and a gasiform substance are subject to high temperatures, whether the solid material be in the nature of a catalytic mass or is a direct reactant with the gasiform substance, the mass is heated by means of the burners 5, and a gasiform substance is supplied through the duct 13 to traverse the column of heated solid, and the gasiform products produced are taken off at the off-take 19 to the condenser or absorber system, not shown. In the case of carbon disulphide manufacture, the chamber 1 is filled with carbon, preferably in the form of charcoal, and is maintained at a red heat. Sulphur previously melted in a steam-heated receptacle, not shown, and forwarded through pipe 11 is flowed into the vaporizing kettle 9 where the liquid is vaporized, and the vapor is thence passed through the duct 13, being superheated on the way, where passing through the heating flue. These hot vapors enter the chamber 2 and pass up to react with the hot charcoal, and the carbon disulphide is taken off at the off-take 19. From time to time refuse in the form of ash from the carbonaceous material is raked out from the clean-out chamber 2, the doors 16 and 4 being open temporarily for this purpose. Since what ash is formed will tend to settle at the base of a column of carbon, it may be kept from accumulating in a manner to hinder re-

action. As the mass of carbon is used up, the column settles down and is replenished by feeding in at the top 18 from time to time in accordance with the requirements.

It will be noticed that whereas in prior customary practice sulphur has been introduced into the reaction zone before being vaporized, thus requiring a sufficient heat supply to the retort to not only carry on the reaction but to additionally provide vaporizing heat for the sulphur, the present construction introduces the sulphur already adequately heated before coming to the reaction chamber and even additional heat may be carried to the reaction zone by means of the sulphur when superheated. In this manner the heat input to the retort per unit output is reduced with great advantages realized in increased output, longer life of retort, better heat utilization and lower cost for upkeep of equipment, as contrasted with practice where all heating for the process and for the primary vaporizing as well must be accomplished through the retort wall.

Other modes of applying the principle of the invention may be employed, change being made as regards the details disclosed, provided the means stated in any of the following claims, or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In apparatus of the character described, the combination of a separable ceramic reaction chamber, a separable ceramic ash pot thereunder, a vaporizer, and a connection in exposure to furnace heat from the vaporizer to the ash pot.

2. In apparatus of the character described, the combination with a vaporizing chamber, a heating flue, a reaction chamber, means to control a supply of fused vaporizable reaction material to said vaporizing chamber, a superheater connecting the vapor space in said vaporizing chamber with the reaction vessel, and a cleanout for refuse from the reaction chamber in relation with a draft flue whereby gaseous emanations are drawn away.

3. In apparatus of the character described, the combination with a sulphur vaporizing chamber set on a heating flue, of a reaction chamber, a superheating conduit connecting the vapor space in the vaporizing chamber with the reaction chamber, and a cleanout for refuse from the reaction chamber in relation with a draft flue whereby gaseous emanations are drawn away.

4. In apparatus of the character described, the combination of a vertical tubular reaction chamber, an ash pot thereunder, a separate sulphur vaporizing chamber, a superheater connecting said sulphur vaporizing chamber with said ash pot, a heating furnace with flues about said vaporizing chamber and superheater and ash pot, and a cleanout for refuse from the reaction chamber in relation to a flue adapted to draw off gaseous emanations.

5. In apparatus of the character described, the combination of a vertically disposed tubular reaction chamber, a separate ash chamber below said reaction chamber, a vaporizing vessel, and a vapor duct connecting between said vaporizing vessel and said ash chamber, all in a furnace-setting in which said reaction chamber is heated directly by the combustion of fuel, and said vaporizing vessel, duct and ash chamber are heated by the residual heat in the products of combustion.

6. In apparatus of the character described, the combination of a vertically disposed tubular ceramic reaction chamber, a separate ceramic ash chamber below said reaction chamber, a vaporizing vessel, and a vapor duct connecting between said vaporizing vessel and said ash chamber, all in a furnace-setting in which said reaction chamber is heated directly by the combustion of fuel, and said vaporizing vessel, duct and ash chamber are heated by the residual heat in the products of combustion.

7. In apparatus of the character described, the combination of a vertically disposed tubular reaction chamber, a separate ash chamber below said reaction chamber, a vaporizing vessel, and a vapor duct connecting between said vaporizing vessel and said ash chamber, all in a furnace-setting in which said reaction chamber is heated by the combustion of fuel, and said vaporizing vessel, duct and ash chamber are heated by the residual heat in the products of combustion in the order named.

8. In apparatus of the character described, the combination of a vertically disposed tubular reaction chamber, a separate ash chamber below said reaction chamber, a vaporizing vessel, and a vapor duct connecting between said vaporizing vessel and said ash chamber, all in a furnace-setting in which said reaction chamber is heated directly by the combustion of fuel, and said vaporizing vessel, duct and ash chamber are heated by the residual heat in the products of combustion in the order named, and a clean-out door in said ash chamber accessible through a door in the furnace setting.

Signed by me this 24th day of January, 1927.

THOMAS GRISWOLD, JR.