W. D. RICHARDSON.

APPARATUS FOR MAKING CATALYZERS.

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Fig. 1.

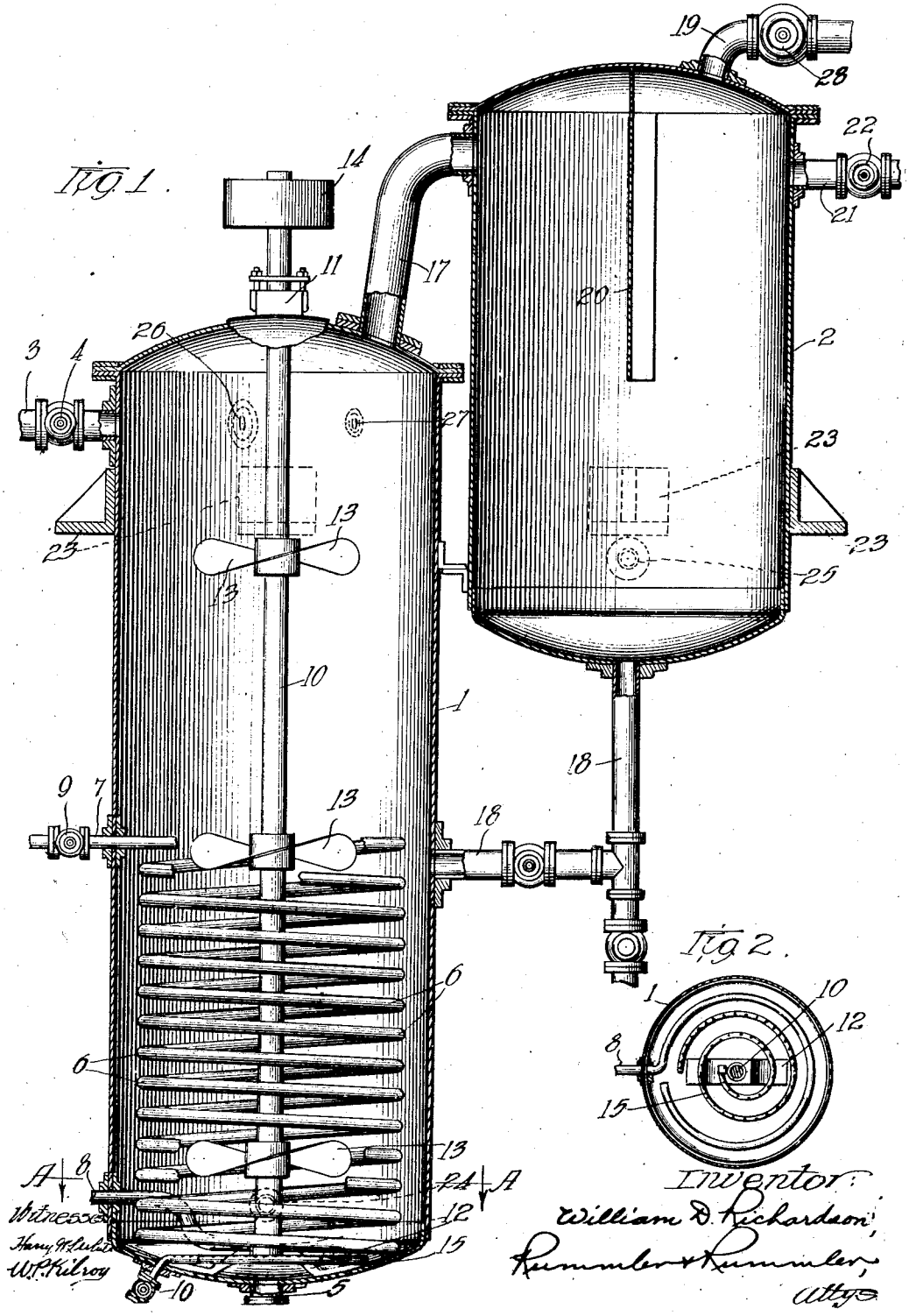


Fig 2.

Witnesses:
Harry W. Leibe
W. P. Kilroy

Inventor:
William D. Richardson,
Rummler & Rummler,
Attys

UNITED STATES PATENT OFFICE.

WILLIAM D. RICHARDSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO SWIFT AND COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APPARATUS FOR MAKING CATALYZERS.

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To all whom it may concern:

Be it known that I, WILLIAM D. RICHARDSON, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Apparatus for Making Catalyzers, of which the following is a specification.

My invention relates to the art of making metallic catalyzers such as those used for the purpose of hydrogenizing oils and the like. In particular it has for its object the production of metallic catalyzers suspended in an oily medium from the class of metallic compounds which are reduced to the metallic state or to the catalytic condition by the application of heat with or without the addition of a reducing agent such as hydrogen.

It is now well known that such compounds as nickel carbonyl, nickel formate, nickel oleate, and other nickel soaps, copper formate, copper oleate, iron formate, and various compounds of platinum, palladium and the like can be reduced to the metallic state or to the catalytic condition by the application of heat, aided if necessary by the addition of a reducing substance such as hydrogen.

The compounds above referred to may be termed "potential catalyzers", in so far that by the mere application of heat, with or without the addition of a reducing agent, they are converted to the catalytic condition.

The main objects of my invention are to provide an improved apparatus for making catalyzers and to provide such an apparatus whereby the production of metallic catalyzers from such compounds as those mentioned above may be effected principally by the application of heat in a simple, cheap and expeditious manner.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the apparatus.

Fig. 2 is a reduced section taken on the line A—A of Fig. 1.

In the construction shown in the drawings the apparatus is composed mainly of two principal parts, a heating chamber 1 and a baffle chamber or catch-all 2.

The charge consisting of the potential catalyzer mixed with or ground in a suitable oily medium may be admitted to the chamber 1 through an inlet pipe 3 controlled by a valve 4, and may be removed therefrom through an outlet 5 when the process is completed.

Heat may be supplied for treating the charge by means of a suitable heating coil 6, peripherally disposed about the interior of the chamber 1 and provided with an inlet 7 and an outlet 8. The supply of heating medium for the coil 6 is controlled by valve 9.

Means for agitating the charge comprise a vertically disposed shaft 10 rotatably journaled in bearings 11 and 12 and provided with a plurality of suitably disposed arms 13 which may be in the form of propeller blades. The upper end of the shaft 10 extends through the bearing 11 and carries a pulley wheel 14 keyed thereto.

The lower end of the chamber 1 is provided with a perforated spiral pipe 15 through which a reducing agent such as hydrogen may be introduced into the charge, and which is controlled by a valve 16 located outside of the chamber.

The baffle chamber or catch-all 2 is preferably located adjacent to and somewhat above the chamber 1. Communication is secured between the two chambers by means of gas conducting pipe 17 and a return drain pipe 18 entering the chamber 1 below the normal liquid level therein.

The top of the catch-all 2 is provided with a vacuum pipe 19 controlled by a valve 28 for exhausting the air from the apparatus and having a depending baffle plate 20 located so as to intercept the gases entering through the pipe 17 and remove any liquid which may be carried thereby. A blow-off pipe 21 controlled by a valve 22 may also be provided when it is desired to have the gases of reduction pass directly into the open air.

The tanks may be supported by flanged brackets 23 attached thereto and adapted to rest on a suitable supporting structure. The temperature of the reduction and baffle chambers may be ascertained by thermometers inserted through openings 24 and 25 respectively. A pressure gage and safety pop valve may be connected at 26 and 27 to the chamber 1.

By preference the entire apparatus is constructed of copper or so far as possible

all parts in contact with liquid or gas are made of this material.

In the operation of the apparatus, the inlet valve 4, outlet valve 5, and blow-off valve 22 are closed, making the apparatus airtight. The valve 23 is then opened and by means of a suitable vacuum pump the air is exhausted from the chambers. The valve 4 is then opened and the charge, consisting of the potential catalyzer mixed with or ground in a suitable oily medium, is sucked into the machine through the inlet pipe 3. Ordinarily the chamber 1 is filled about half full, or until the heating coil 6 is covered. With the vacuum still on, the agitator is started and steam which may or may not be superheated is introduced into and through the coil 6 by opening the valve 9. Heating may be controlled by observation of the thermometers which are inserted through the openings 24 and 25.

As the gases resulting from the decomposition of the potential catalyzer are formed, they pass out of the heating chamber 1 through the pipe 17 and into the baffle chamber 2 and vacuum line 19. If the liquid in the heating chamber 1 tends to foam or spray over and to follow the source of the gases such liquid is caught in the catchall or baffle chamber 2 and returned automatically and continuously to the heating chamber 1 through the pipes 18, entering such chamber below the normal liquid level therein. It may happen that under some conditions considerable foaming of this sort occurs, and in such cases the baffle chamber 2 serves to effectually retain any liquid material while allowing the gases disengaged in the operation to pass off through the vacuum line. The two upper arms 13 may be downwardly acting propellers and also assist in the disengagement of gases and vapors from the liquid.

During the reduction I usually follow the practice of allowing a moderate current of a reducing agent such as hydrogen to pass up through the charge in the reduction chamber by means of the perforated coil 15 controlled by valve 16. This current of reducing agent serves more than one purpose. It assists in the agitation of the liquid mass and prevents sedimentation at the bottom of the reduction chamber and also assists in breaking up bubbles formed by the gases of decomposition and tends to prevent the carrying over of liquid into the baffle chamber 2. It also assists in the reduction of potential catalyzer compounds even in cases where these are decomposable by heat alone. As a rule the introduction of hydrogen as in this apparatus tends to lower the temperature of decomposition.

When the reaction is completed and the potential catalyzer compound is completely reduced to the catalytic state, the charge may be drawn off through the outlet pipe 5, the vacuum being broken to allow the charge to drop.

By preference I maintain the vacuum on the apparatus throughout the operation of reduction; but it is also possible to effect the reduction in a reasonably satisfactory manner by simply allowing the gases of decomposition to blow off into the atmosphere through the outlet pipe 22.

In starting up my apparatus it is always desirable to remove any air from the apparatus by means of a suitable vacuum pump for the purpose of avoiding any combustible or explosive mixture of gases within the apparatus.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that the construction shown may be altered or details omitted without departing from the spirit of this invention as defined by the following claims.

I claim:—

1. An apparatus for making catalyzers, comprising a reduction chamber, a baffle chamber communicating therewith, means for heating the reduction chamber, means located in said reduction chamber for agitating the charge placed therein, and means for continuously introducing a gaseous reducing agent into said reduction chamber.

2. An apparatus for making catalyzers, comprising a reduction chamber, a baffle chamber communicating therewith, a heating coil peripherally disposed about the interior of said reduction chamber, a rotatable shaft provided with downwardly acting propeller blades journaled in said reduction chamber, and means for introducing a gaseous reducing agent into the lower part of said reduction chamber.

3. An apparatus for making catalyzers, comprising a reduction chamber, a baffle chamber communicating therewith, a heating coil peripherally disposed about the interior of said reduction chamber, a vertical shaft journaled in said reduction chamber, downwardly acting propeller blades on said shaft, a perforated coil located in the lower part of said reduction chamber for supplying gas thereto, and a baffle in said baffle chamber located so as to separate liquid from gases entering from the reduction chamber.

4. An apparatus for making catalyzers, comprising a reduction chamber, a baffle chamber communicating therewith, a heating coil peripherally disposed about the interior of said reduction chamber, a vertical shaft journaled in said reduction chamber, downwardly acting propeller blades on said shaft, a perforated coil located in the lower part of said reduction chamber for supplying gas thereto, a baffle in said baffle chamber located so as to separate liquid from

gases entering from the reduction chamber, and a vacuum line communicating with said baffle chamber.

5. An apparatus for making catalyzers, adapted to contain a pressure less than atmospheric, comprising a reduction chamber, a baffle chamber communicating therewith for eliminating liquid from gases passing therethrough, a connection for returning such liquid to the reduction chamber, a heating coil peripherally disposed about the interior of said reduction chamber, a rotatable shaft journaled in said reduction chamber, downwardly acting propeller blades on said shaft, and a perforated coil located in the lower part of said reduction chamber for supplying gas thereto.

Signed at Chicago this 24th day of Nov., 1915.

WILLIAM D. RICHARDSON.