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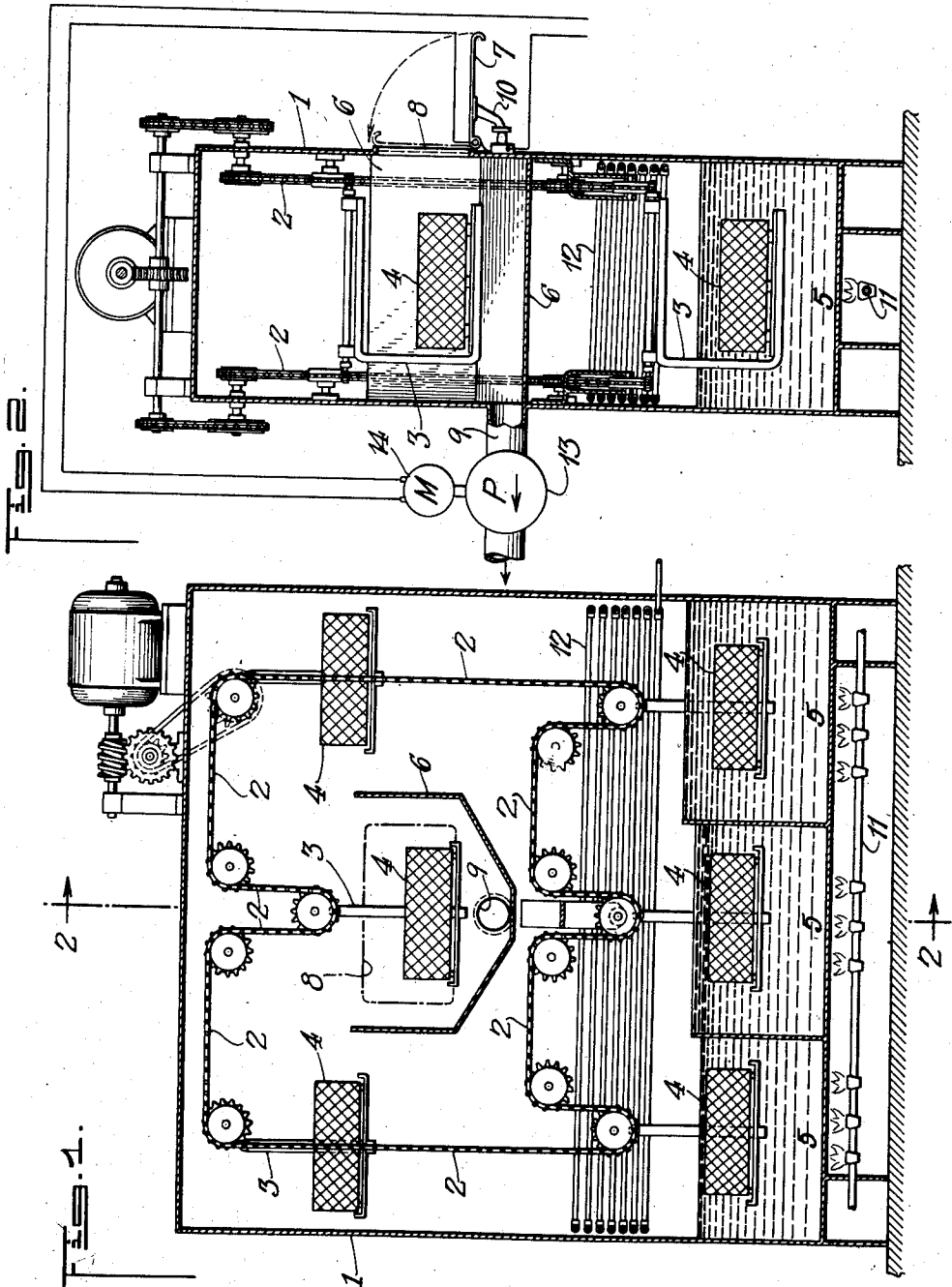
G. EDHOFER ET AL

2,280,811

TREATING ARTICLES WITH VOLATILE SOLVENTS

Filed Oct. 6, 1939

2 Sheets-Sheet 1



INVENTORS  
GEORG EDHOFER.  
GEORG WOLFF.  
BY *Karl A. Mayr*  
ATTORNEYS

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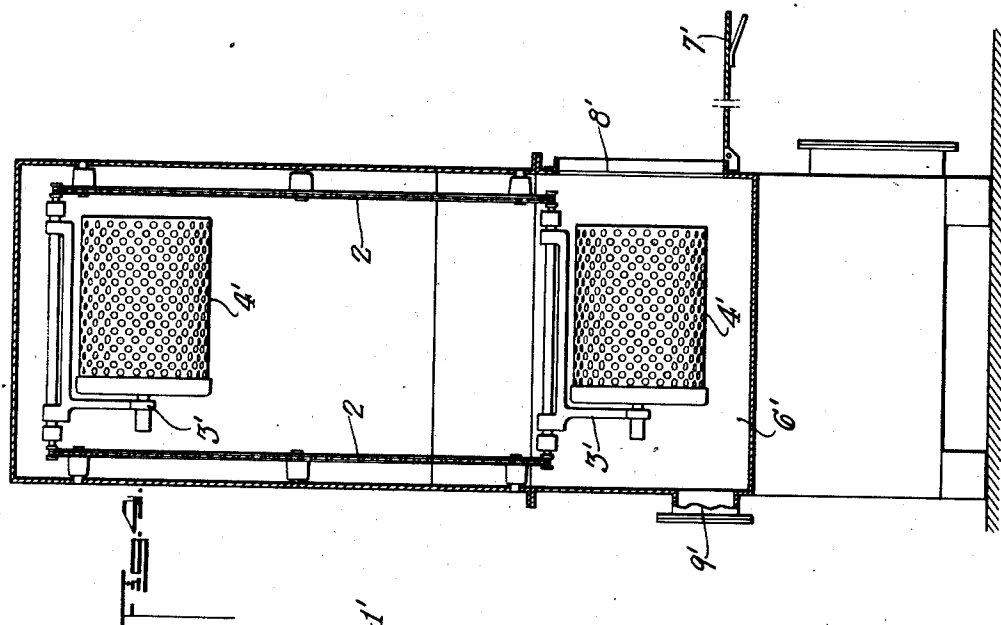
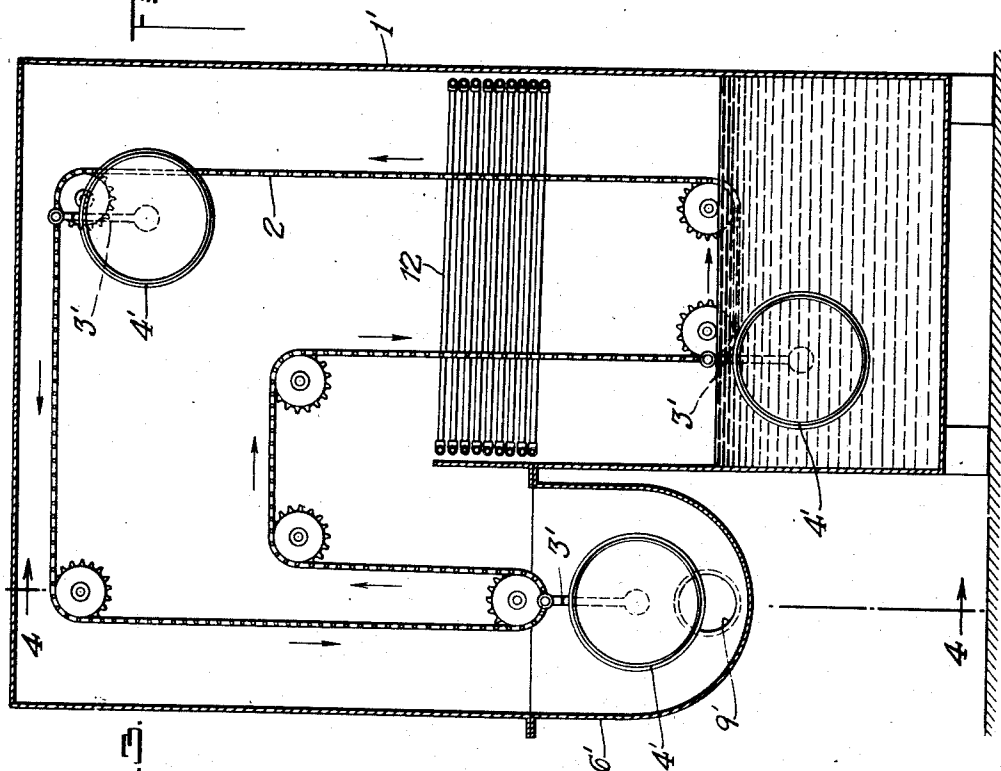
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BY

INVENTORS  
GEORG EDHOFFER.  
GEORG WOLFF.  
Karl A. Hays.  
ATTORNEY.

## UNITED STATES PATENT OFFICE

2,280,811

## TREATING ARTICLES WITH VOLATILE SOLVENTS

Georg Edhofer and Georg Wolff, Munich, Germany, assignors to Dr. Alexander Wacker Ges. für elektrochemische Industrie m. b. H., Munich, Germany, a corporation

Application October 6, 1939, Serial No. 298,184  
In Germany January 16, 1939

7 Claims. (Cl. 202—170)

The present invention relates to an apparatus for treating articles with volatile solvents, particularly to the provision of a loading chamber and loading door in apparatus of the type set forth and of suction means which operate in dependence on the position of said door.

It is known to treat articles in order to remove grease therefrom with volatile organic solvents such as: trichlorethylene, perchloroethylene, carbon tetrachloride, benzine, benzol and the like and to use for such treatment a vessel in which the articles are moved through the solvent by means of mechanical conveyors. Because of the volatility of the solvents it is unavoidable that solvent vapor is developed particularly if the solvents are used at boiling temperature. It is also well known to condense the vapor in the treating chamber by suitable cooling means whereby the treated articles particularly when they are made of metal are dried as soon as they are moved from the hot solvent into the cooling zone above the solvent; in spite of such condensing means a certain amount of vapor is present in the cooling zone due to diffusion and it is necessary to prevent the escape of the air containing such vapor from leaving the treating chamber in order to avoid annoyance. A complete air-tight construction of the treating chamber is not sufficient to accomplish this because they must be periodically a door opened for exchanging the articles to be treated. The escape of the air containing undesirable vapor can be prevented to a certain extent by removing the air containing the vapor by means of suction; this method, however, causes a great loss of solvent and does not completely prevent carrying of the vapor and the solvent to the outside which adheres to the articles to be treated particularly not when such articles have cavities which may contain solvent even in liquid state.

It is an object of the present invention to correct the above mentioned shortcomings by the provision of a special loading chamber, the interior of which is subjected to suction and which is provided with a loading opening and an upper opening which communicates with the interior of the treating chamber and which is otherwise completely closed on the sides and on the bottom. The articles to be treated are put on the conveyor in said loading chamber and the conveyor carries the articles through the top opening of the loading chamber into the treating chamber and then again through said top opening back into the loading chamber. Suction means are provided only in said loading chamber which

suction means also cause entrance of fresh air into the loading chamber through the loading opening whereby air current is produced which removes all solvent in liquid and vapor state from the articles so that they are completely dry after a short time and can be removed from the apparatus completely odorless. The loss of solvent in an apparatus according to the present invention is negligibly small because of the small volume of the loading chamber and the escape of air and vapor through the loading opening adverse to the direction of the incoming air is absolutely impossible.

Further and other objects and advantages of the present invention will be apparent from the accompanying specification and claims and shown in the drawings which, by way of illustration, show what we now consider to be a preferred embodiment of our invention.

In the drawings:

Figure 1 is a diagrammatic cross sectional view of the apparatus according to the present invention.

Figure 2 is a sectional view of the apparatus according to the present invention taken along line 2—2 of Figure 1.

Figure 3 is a diagrammatic cross sectional view of a modified apparatus according to the present invention.

Figure 4 is a sectional view taken along line 4—4 of Figure 3.

Like parts are designated by like numerals in all figures of the drawings.

The treating chamber 1 is completely closed but for the loading opening 8. A conveyor having two chains 2 which are conducted and held in position by means of guide rollers and to which at equal distances carriers 3 are connected which carry the articles to be treated in baskets 4 is provided within the treating chamber and transports the articles to be treated consecutively through a plurality of individual chambers 5 which are provided in the lower part of the treating chamber and which are filled with solvent. The carriers 3 are so distributed on the endless chains 2 that there is always a plurality of baskets 4 immersed in the solvent and one of the other baskets disposed in the loading chamber 6; the latter is positioned in the upper part of the treating chamber 1 and extends from one side wall of said chamber to the other side wall. The loading chamber 6 is open on top in order to provide for the free entrance and exit of the baskets and is completely separated from

the interior of the treating chamber on the sides and on the bottom.

A loading opening 8 which can be closed by means of a door 7 is provided in that portion of the side wall of the treating chamber which is in common with the side wall of the loading chamber 6 and which wall portion is parallel to the plane in which the conveyor chains 2 move; opposite to the opening 8 a suction conduit 9 is connected with the loading chamber. A suction pump 13 is connected with the suction conduit 9 and the pump 13 is connected and driven by electrical motor 14. Instead of providing the motor pump unit 13, 14 conduit 9 may be connected to another source of suction. Fresh air enters through the loading opening 8 into the loading chamber 6 to the same extent as air containing solvent vapor is removed through suction conduit 9 from the loading chamber so that no solvent vapor can accumulate in the loading chamber and the treated articles are quickly and completely freed from solvent which may adhere to said articles.

Whenever a loaded basket is brought into the loading chamber 6 by means of the conveyor the conveyor is stopped in order to provide time for a complete removal of the air which may be loaded with vapor from the articles, and exchange of the treated articles for new untreated articles; after the exchange is carried out through the loading opening 8, the conveyor is again started and the newly inserted basket starts its passage through the treating chamber and makes room for the next basket entering the treating chamber. If the operation is to be discontinued for a longer period of time, the loading opening 8 is closed by means of the door 7 and suction is discontinued; the latter is preferably accomplished by providing an electric switch 10 the operation of which is dependent on the position of the door 7. The switch 10 interrupts the flow of electric current to motor 14 whenever the door 7 is closed.

For operating with heated solvent a gas heater 11 may be provided at the bottom of the treating chamber and a cooling system 12 may be provided in the vapor space of the treating chamber; when operation of the apparatus is discontinued for a long period of time, of course, the fuel supply to the heater 11 and the cooling agent supply to the system 12 must be interrupted.

Without departing from the scope of the present invention, the apparatus illustrated in the drawings can be changed. For example, the loading chamber may be located, instead of substantially in the center of the treating chamber, at some other place in the interior of said chamber or it may be attached to the outside of the treating chamber. The conveyor may be provided with well known means for swinging or for revolving the baskets; depending on the configuration of the articles to be treated, the baskets may be omitted and the articles connected directly or by means of suitable frames with the conveyor.

Figures 3 and 4 show an embodiment of the present invention in which the loading chamber 6' is not directly within the main treating chamber 1' but adjacent thereto. The open top of the loading chamber communicates with the interior of the treating chamber. The loading chamber 6' is flanged to the side of the treating chamber 1' and is provided with an outlet 9' through which air and vapor is permanently withdrawn from the loading chamber.

In the embodiment of the invention shown in Figures 3 and 4 drums 4' are used instead of the baskets 4 shown in Figures 1 and 2. The drums 4' are supported in the center by means of the brackets 3' and may rotate while they travel through the treating chamber.

We claim:

1. An apparatus for treating articles with volatile solvents comprising a treating chamber, a combined loading and unloading chamber having an opening in its upper part, said opening communicating with the interior of said treating chamber, a conveyor within said treating and loading chambers for moving the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading and unloading chamber, and a door in one side of and connecting said loading and unloading chamber with the outside and providing exit and entry for the articles to be treated.

2. An apparatus for treating articles with volatile solvents, comprising a treating chamber, a loading chamber having an opening in its upper part, said opening communicating with the interior of said treating chamber, a conveyor within said treating and loading chamber and moving the articles to be treated through said chambers, and a suction conduit connected to the lower part of said loading chamber, said loading chamber being disposed within said treating chamber and having a door connecting said loading chamber with the outside.

3. An apparatus for treating articles with volatile solvents comprising a treating chamber, a loading chamber having an opening in its upper part which opening communicates with the interior of said treating chamber, a conveyor within said treating and loading chamber and moving substantially in a plane and carrying the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading chamber, said treating chamber and said loading chamber having a wall portion in common which is substantially parallel to the plane in which said conveyor moves, and a loading door in said wall portion.

4. An apparatus for treating articles with volatile solvents comprising a treating chamber, a loading chamber having an opening in its upper part which opening communicates with the interior of said treating chamber, a conveyor within said treating and loading chamber and carrying the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading chamber, said loading chamber having a door to the outside and being disposed opposite said suction conduit.

5. An apparatus for treating articles with volatile solvents comprising a treating chamber, a loading chamber having an opening in its upper part which opening communicates with the interior of said treating chamber, a conveyor within said treating and loading chamber and carrying the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading chamber, suction supply means connected with said conduit, a door connecting said loading chamber with the outside, suction control means connected with said door and with said suction supply means and controlling the supply of suction in dependence on the position of said door.

6. An apparatus for treating articles with volatile solvents comprising a treating chamber, a loading chamber having an opening in its upper part which opening communicates with the interior of said treating chamber, a conveyor within said treating and loading chamber and carrying the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading chamber, said loading chamber having a door to the outside and being disposed opposite said suction conduit, and a door connecting said loading chamber with the outside, suction control means connected with said door and with said suction supply means and controlling the supply of suction in dependence on the position of said door.

tile solvents comprising a treating chamber, a loading chamber having an opening in its upper part which opening communicates with the interior of said treating chamber, a conveyor within said treating and loading chamber and carrying the articles to be treated through said chambers and through said opening, a suction conduit connected to the lower part of said loading chamber, said treating chamber being completely closed but for the opening with which it communicates with said loading chamber. 10

7. An apparatus as claimed in claim 1 in which said loading and unloading chamber is disposed at the side of said treating chamber and said suction conduit is connected to a side of said loading and unloading chamber which is opposite the side in which said door is provided. 5

GEORG EDHOFER.  
GEORG WOLFF.