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J. E. MARTIN

2,004,375

CLEANING METHOD AND APPARATUS

Filed Jan. 18, 1930

2 Sheets-Sheet 1

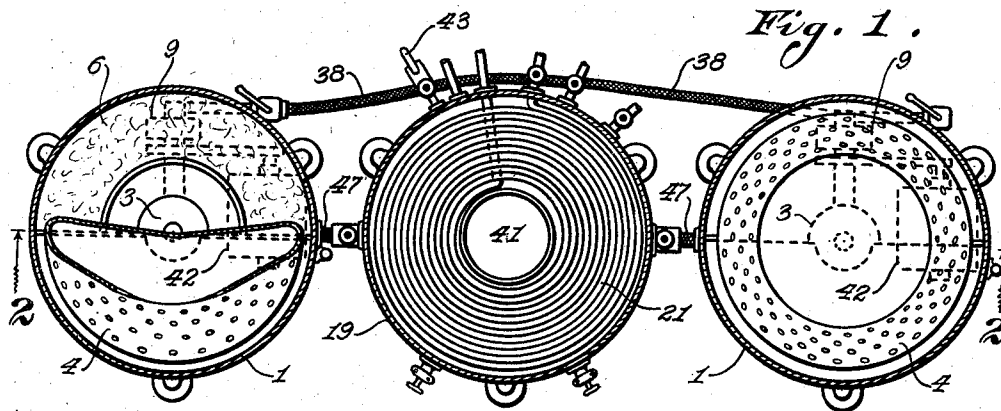
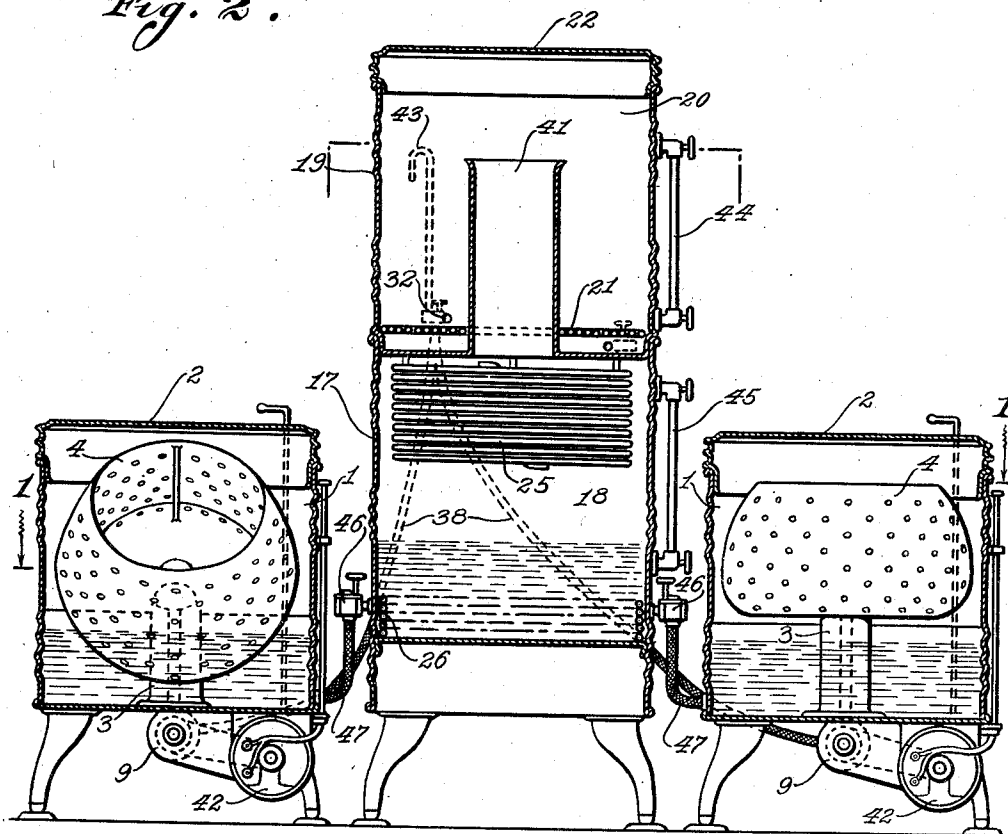


*Fig. 2.*



Inventor:  
JOHN E. MARTIN,  
By *John N. Buning*  
His Attorney.

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J. E. MARTIN

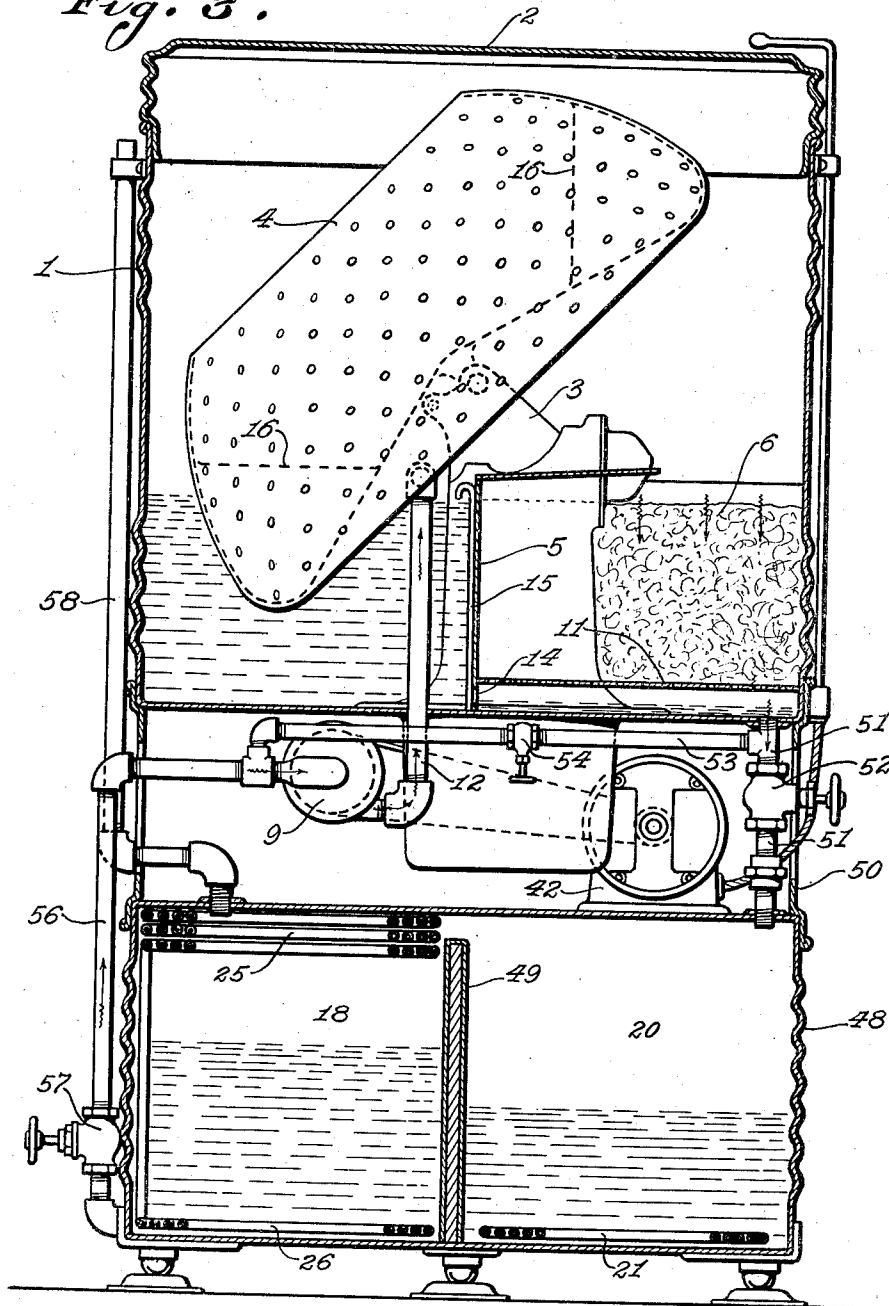
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2 Sheets-Sheet 2

*Fig. 3.*



Inventor:  
JOHN E. MARTIN,  
*By John W. Brunning*  
His Attorney.

## UNITED STATES PATENT OFFICE

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## CLEANING METHOD AND APPARATUS

John E. Martin, St. Louis, Mo., assignor, by mesne assignments, to The Band Box Corporation, St. Louis, Mo., a corporation of Missouri

Application January 18, 1930, Serial No. 421,852

3 Claims. (Cl. 68—38)

This invention pertains to apparatus for cleaning fabric articles and more particularly for cleaning in special cleaning liquids, such as naphtha or the cleaning liquid described in the application of Arnold Mohn, Serial No. 395,476, filed September 26, 1929, which is particularly adapted for use in this apparatus.

One of the objects of this invention is to provide cleaning apparatus of the type described in combination with means for clarifying the liquid so as to remove impurities in solution therein.

Another object is to provide apparatus whereby clarification of the cleaning liquid may be carried out at the same time that the cleaning operation is going on.

Another object is to provide apparatus so arranged that one batch of cleaning liquid may be clarified while another batch is in use for cleaning articles.

Another object is to provide such apparatus of convenient arrangement so that the cleaning operations may be carried on continually without interruption and clear and fresh cleaning liquid be supplied thereto.

Another object is to provide a method or process of cleaning fabric articles in which the cleaning liquid is filtered and clarified and returned to the cleaning chamber.

Further objects will appear from the following description taken in connection with the accompanying drawings; in which:—

Figure 1 is a horizontal sectional view of the apparatus embodying this invention taken on line 1—1 of Fig. 2.

Figure 2 is a vertical section on line 2—2 of Figure 1.

Figure 3 is a vertical section showing another embodiment of this invention.

The present invention is closely related to that described in the co-pending application of John E. Martin, Serial No. 421,853, filed January 18, 1930. In the present application, however, no claim is made covering the specific structure of the cleaning apparatus, such claims being presented in the above mentioned application.

Referring to the drawings, 1 designates a cleaning tub provided with a suitable cover 2. Within the tub is mounted a pedestal 3 which has mounted for rotation thereon a barrel or basket 4 adapted to receive the articles to be cleaned. The pedestal 3 is hollow and has housed therein driving mechanism with which the basket 4 may be connected so as to be rotated either in horizontal position as shown in Fig. 2 in the right hand tub or in inclined position as shown in Fig. 3. The tub 1 is divided by a partition 5 into a cleaning chamber and a filtering chamber adapted to contain a filtering medium 6 such as cotton or the like which is supported upon a perforated floor or partition 11 spaced above the floor of

the tub so as to provide a collection space for the filtered liquid.

The basket 4 may be mounted in inclined position as shown in Fig. 3 so that the lower edge thereof dips into the liquid in the cleaning chamber. In this position the articles to be cleaned are placed into the basket which is then rotated in its inclined position. The basket is provided with a series of partitions or baffles 16 which operate to tumble the articles in the liquid during the operation. During this operation some of the cleaning liquid is carried upwardly by the rotation of the basket and drips therefrom or is splashed thereby into the filtering chamber and deposited upon the filtering medium 6. This liquid passes downwardly through the filtering medium and collects in the space below the partition 11. The partition 5 is provided with an opening or port 14 communicating with the collection space below the partition 11 for a purpose which will be described later. A slide or gate 15 closes the port 14 during normal operation. This cleaning apparatus is described and claimed in the above co-pending application to which reference may be had for further details.

In accordance with the present invention, means are provided for distilling the cleaning liquid so as to clarify the same. As shown in Figures 1 and 2, a container 17 is mounted on a suitable support and is adapted to receive as a cover therefor a second container 19. The container 19 provides an evaporation chamber 20 and may be equipped with suitable heating means such as a steam coil 21. Any other suitable heating means may, of course, be used in place of the coil 21 as, for instance, an electrical heater. Rising from the bottom of the container 19 is a vertical duct 41. The duct 41 is open at its top to the evaporation chamber 20 and at its bottom to the condensing chamber 18 within the container 17.

Mounted within the condensing chamber 18 is a set of cooling coils 25. The coils 25 are mounted in the upper part of the chamber 18 to cool and condense the vapors descending through the duct 41. Mounted in the lower part of the chamber 18 is a second set of cooling coils 26 adapted to cool the condensed liquid which collects in the bottom of this chamber. The evaporation chamber 20 may be closed by a suitable cover 22.

As shown in Figures 1 and 2 there are two cleaning machines which may be placed one on each side of the clarifier as shown in Figure 2. Each of these cleaning machines is similar in construction to that described in the above mentioned application. Each is provided with a pump 9 driven by a motor 42 and connected so as to pump the liquid from the tub 1 through a pipe or flexible hose 38 to an inlet 32 in the evaporating chamber 20. This chamber may also be provided with an overflow pipe 43 so as to prevent

the liquid rising above the top of the duct 41. A suitable gauge glass 44 may be provided for the evaporating chamber and a similar gauge glass 45 for the condensing chamber. The condensing chamber is provided with one or more outlets each closed by a valve 46 and connected by a flexible tube 47 to the bottom of the cleaning chamber in the tub 1. It will be noted that the support of the clarifier is made high enough so that the condensed liquid may drain from the condensing chamber into the cleaning chamber by gravity.

In the operation of this apparatus, the cleaning chamber is supplied with cleaning liquid and the articles to be cleaned are placed in the basket 4 which is then rotated in inclined position. This rotation operates to agitate the articles in the cleaning liquid so as to clean them. During this operation a part of the cleaning liquid is carried or splashed over the partition 5 into the filtering chamber where it passes through the filtering medium, leaving its suspended impurities in that medium and collecting in a filtered condition in the space below the partition 11. From time to time when the cleaning liquid has become charged with dissolved impurities, the liquid is pumped by means of the pump 9 into the evaporating chamber 20. The steam is turned on in the coils 21 so as to heat and evaporate the liquid. The resulting vapors pass downwardly through the duct 41 to be cooled and condensed by contact with the cooling coils 25. The condensed liquid collects in the bottom of the chamber 18 where it is further cooled by the coils 26. The clarified liquid may then be returned to the cleaning chamber by simply opening the valve 46 so as to allow it to pass by gravity from the condensing chamber to the cleaning chamber.

It will be noted that in the embodiment of Figures 1 and 2, two or more cleaning machines may be connected with a single clarifier. In this way the liquid of one machine may be clarified while cleaning operations are being carried on in the other. By this arrangement one operator can handle a continuous run of cleaning operations and at the same time be able to continuously clarify the cleaning liquid by distillation.

Referring now to the embodiment of Figure 3, in this case the cleaning apparatus is mounted above the clarifying apparatus. A lower container 48 is divided by a partition 49 into an evaporating chamber 20 provided with a heating coil 21, and a condensing chamber 18 provided with a condensing coil 25 and a cooling coil 26. Communication between the chambers 18 and 20 may be had over the top of the partition 49.

An intermediate housing 50 is mounted upon the container 48 and in turn carries the cleaning tub 1 and its contained articles.

Mounted within the intermediate housing 50 is the pump 9 the motor 42 and appropriate pipe connections and valves for controlling the discharge of the liquid. A pipe 51 controlled by a valve 52 provides for draining the liquid from the collection space below the partition 11 into the evaporating chamber 20. Branching from the pipe 51 is a pipe 53 controlled by a valve 54 which leads to the suction end of the pump 9. The discharge end of the pump is connected to a pipe 12 which discharges into the cleaning chamber. A pipe 56 controlled by a valve 57 connects the lower part of the condensing chamber 18 to the suction end of the pump 9. A vent pipe 58 connects the condensing chamber 18 with the outer atmosphere.

In the operation of this embodiment of the invention cleaning operations in the tub 1 are carried out as previously described. Under normal operation the valve 54 is open and the valves 52 and 57 closed. Under these conditions the filtered liquid will be pumped from the collection space back into the cleaning chamber. When it is desired to clarify the liquid the slide 15 and the valve 52 are opened. The liquid then drains through the collection space below the partition 11 through the pipe 51 into the chamber 20. The liquid is distilled from this chamber into the condensing chamber 18 as previously described. The valve 57 may now be opened and the gate 15 closed and the pump may then be operated to pump clear liquid from the chamber 18 into the cleaning chamber.

It will be seen that this embodiment of the invention provides a simple self-contained unit arranged for easy operation and adapted to maintain the cleaning liquid always in a clean condition. A sufficient supply of liquid may be maintained so that the clarifying operation may be carried on simultaneously with the cleaning operation. Accordingly, the latter operation may go on continuously without interruption.

It will be seen, therefore, that this invention provides a method and apparatus whereby cleaning operations of the type described may be carried on continuously by a single operator. At the same time the cleaning liquid is at all times kept in perfect condition as it is clarified both by filtration to remove suspended impurities and by distillation to free it of dissolved impurities.

While this apparatus has been described as adapted for unitary operation, it is obvious that certain individual features or sub-combinations may be employed without reference to other features. It is understood, therefore, that the employment of such features or sub-combinations is contemplated by this invention and is within the scope of the appended claims.

It is obvious that various changes may be made in details, within the scope of the appended claims, without departing from the spirit of this invention. It is, therefore, to be understood, that this invention is not to be limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. In an apparatus for cleaning fabric articles, a clarifier, comprising an evaporating chamber, heating means therein, a condensing chamber, vapor condensing means in the upper portion of said condensing chamber, and liquid cooling means in the lower portion of said condensing chamber adapted to contact with the liquid therein.

2. In an apparatus for cleaning fabric articles, a clarifier, comprising, an evaporating chamber, heating means therein, a condensing chamber, a condensing coil in the upper portion of said condensing chamber, and a liquid cooling coil in the bottom of said condensing chamber.

3. In an apparatus for cleaning fabric articles, a container, a dam upstanding within said container, an evaporating chamber on one side of said dam from which vapors may rise to flow over the dam, and a condensing chamber beyond said dam, said dam having a height adapted to determine a low head of vapor in said evaporating chamber when operating on a liquid having a vapor heavier than air.

JOHN E. MARTIN.