Sept. 8, 1925. 1,552,433

H. A. HILLS

PREHEATER FOR STILLS

Filed July 11, 1921

Fig. 1

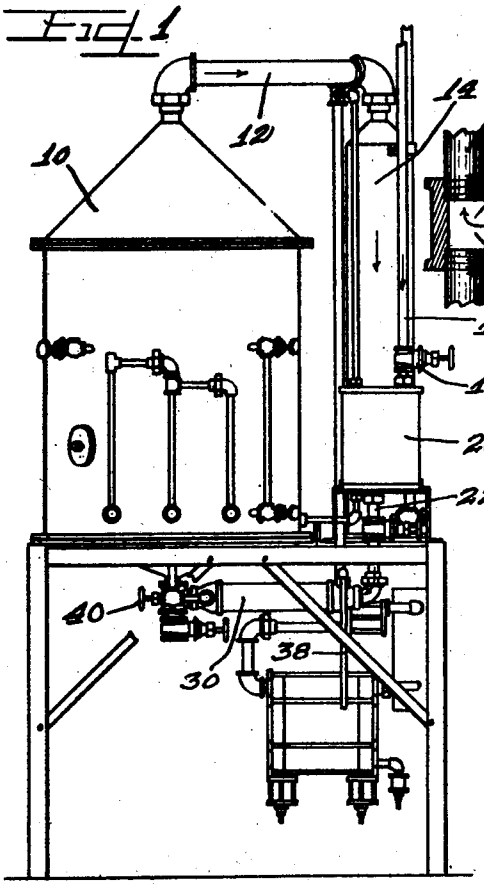


Fig. 4

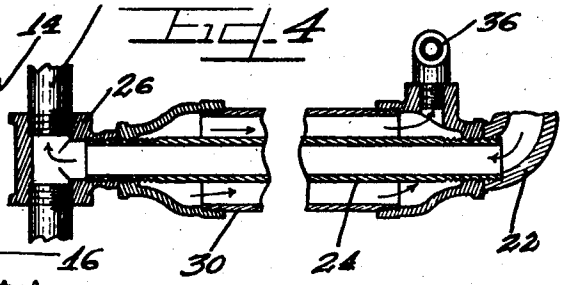


Fig. 5

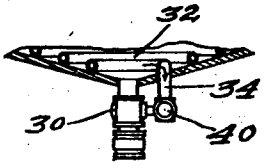


Fig. 2

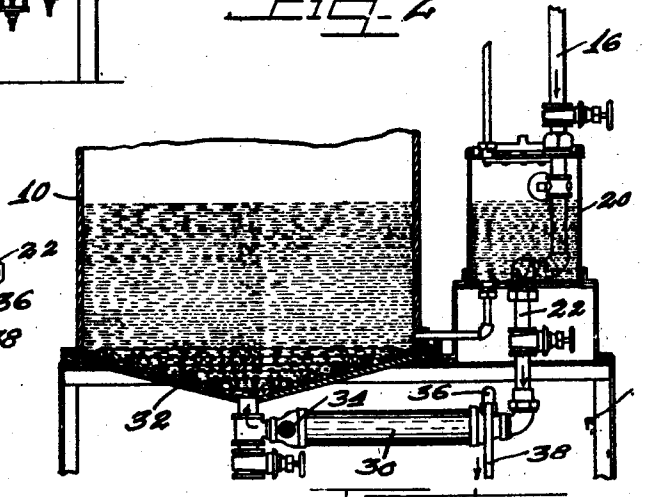
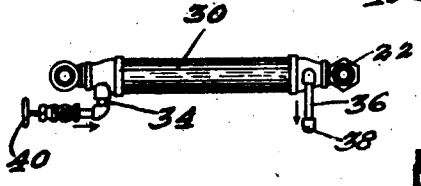


Fig. 3



Witnesses

Rudolph J. Berg.

Herbert Hills Jr.

Inventor

Henry A. Hills.

By Charles A. Hills

Atty.

Patented Sept. 8, 1925. 1,552,433

UNITED STATES PATENT OFFICE.

HENRY A. HILLS, OF GRAND RAPIDS, MICHIGAN.

PREHEATER FOR STILLS.

Application filed July 11, 1921. Serial No. 483,679.

To all whom it may concern:

Be it known that I, HENRY A. HILLS, a citizen of the United States, and a resident of the city of Grand Rapids, county of Kent, and State of Michigan, have invented certain new and useful Improvements in a Preheater for Stills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to stills, particularly those adapted for the purifying of gasoline, benzine and naphtha, or other cleansing fluids, which after having been used in the cleaning of clothes or the like, necessarily must be distilled in order to be reclaimed and used over again. In distilling such liquids it is customary to preheat the dirty liquids by the vapors given out from the still to save fuel. In gasoline stills it has been customary heretofore to pass the vapors through pipes arranged within a tank for the gasoline to be preheated. It has, however, been found that the heating of this dirty gasoline causes a part of the grease and other material in solution or suspension to separate or precipitate out with the result that a greasy deposit forms over the vapor pipes and on the walls of the tank which eventually interferes with the flow of the liquid and the transfer of heat from the vapor to the liquid. It has been discovered that if the incoming gasoline is preheated to a higher temperature than that possible from vapors escaping from the still, such deposition of grease or dirt upon the intake pipe will be avoided, and one of the objects of this invention, therefore, is to provide means for so heating the exterior of the intake pipe for the dirty cleansing fluid so that the deposition of dirty or greasy matter on the interior thereof will be avoided.

Further, if a new charge of dirty liquid is introduced into the still at a temperature lower than that of the liquid already therein, a chilling effect takes place which renders the subsequent distillation more difficult. This chilling effect also condenses the vapors present, producing a partial vacuum, which sometimes strains the material of the still walls to almost the collapsing point.

One of the principal objects of the present invention, therefore, is to provide means for preheating the fluid to be distilled without causing the deposit of grease or the like on the heating and other surfaces.

Another object of the invention is to eliminate the vacuum effect caused by the sudden condensation or chilling of the vapors in the still, and thereby prevent the possibility of accidents.

A further object of this invention is to provide means for so preheating the incoming dirty fluid that it will be brought to a higher degree of temperature than has formerly been thought possible, thereby saving fuel and moreover using as a heating means for the incoming liquid the exhaust steam or the like which has been employed for applying heat to the gasoline in the still.

Another and further important object of this invention is to so use the condensed hot water discharged from the steam heating pipe within the still to preliminarily heat the incoming dirty cleansing fluid and thereby avoid any loss of heat from the waste or flowing away of such discharged hot water.

Other and further important objects of this invention will be apparent from the disclosures in the accompanying drawings and following specification.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevation of a still embodying the features of the present invention.

Figure 2 is a sectional view illustrating the connection of the preheater to the still and its relation to the automatic regulating device with which this particular still is provided.

Figure 3 is a perspective view of the preheater.

Figure 4 is an enlarged sectional view of the preheater.

Figure 5 is a sectional view showing the connection of the exhaust pipe of the steam heating coil to the preheater.

As shown on the drawings:

The reference numeral 10 indicates the tank or container of the still proper or vaporizer having an enlarged outlet pipe 12 leading from the top thereof into the condenser 14. An intake pipe 16 is provided for the flow of dirty gasoline or other cleaning fluid from the collecting tank and a valve 18 is positioned in this pipe for the

regulation of the flow of gasoline therethrough. An automatic regulating device to control the height of liquid in the still and which comprises a float chamber shown at 20 is shown as installed in this apparatus, the construction and operation of such regulating device being shown and described in my co-pending application for U. S. Letters Patent on "still regulator," Serial No. 483,678, filed the 11th day of July, 1921. A feed pipe 22 leads from the bottom of this automatic regulating tank to the bottom of the still 10 and it is on the portion of this pipe 22 which extends from the regulating tank to the still on which the preheater 24 is installed.

The pipe 22 is provided at its lower end with an internally threaded portion bent at right angles to the downward direction of the pipe and adapted for the insertion of an externally threaded pipe 24 which forms a horizontal extension of the pipe 22 and which is externally threaded at its farther end so as to connect with a T-head 26 adapted for connection with the pipe 28 leading into the bottom of the still 10. This pipe 24 is surrounded by a jacket 30 through which circulates the steam or hot water which has been used in the coils 32 for heating the liquid in the still 10. This steam and any condensed hot water flows from the coils 32 in the still and is fed into the annular space between the pipe 24 and its surrounding jacket 30 by means of a pipe 34 leading downwardly from the coils 32 through the bottom of the still. An exhaust pipe 36 for the hot water and any uncondensed steam is provided and leads out of the top of the far end of the preheater and then bends downwardly at 38 as best shown in Figure 2, thereby positively insuring that the preheater is always kept filled with hot water from the exhaust steam used in coils 32. A valve 40 is provided on the pipe 34 so as to control the flow of hot water or steam from the coils 32 into the preheater.

The operation is as follows:

A quantity of the cleansing fluid or liquid to be distilled is allowed to run into the tank 10, its height in the tank being automatically controlled by the regulating device 20 which includes a float valve operating on the surface of a column of liquid maintained in connection with the liquid in the still 10 as best shown in Figure 2. After the desired amount of liquid is in the still 10, a supply of heating steam is allowed to flow through the coils 32 thereby heating the liquid in the still and vaporizing the same, causing the vapors to flow over through the pipe 12 into the condenser 14. The exhaust hot water from the steam in the heating coil 32 is then allowed to run into the pipe 34 by opening the valve 40 and from the pipe 34 this hot water flows into the annular space between the intake pipe 24 for the dirty liquid and the jacket 30 therearound.

This hot water coming from the coil 32 is at a temperature of approximately 212° F. and has the effect of preheating the incoming cleansing fluid to quite a considerable degree, and as the pipe 24 is comparatively large the flow therethrough will not be prevented or retarded by any deposition of grease or other dirty matter upon its inner surface which moreover is not very likely, on account of the high temperature of the water maintained in the jacket 30. Any excess of hot water is allowed to overflow from the jacket 30 through the pipe 36 which, as will be seen in Figure 4, extends upwardly from the top of the jacket so that it will always be maintained full of such heating liquid, and the excess is allowed to drip away through the downwardly extending pipe 38 which may be connected to a drain or sewer.

It will be seen that in this manner the incoming dirty gasoline or other cleansing liquid is positively and thoroughly preheated before entering the still 10, thereby resulting in a great saving of fuel and which will be particularly advantageous from a consideration of the fact that such preheating is accomplished by waste water from the steam in the heating coil which would ordinarily be thrown away. An automatic regulating device 30 further insures a rather slow flow through the preheater 24 and this insures a thorough preliminary heating of the liquid as it passes therethrough.

I am aware that many changes may be made and various details of construction varied without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

In a distillation apparatus means for circulating a heating medium through the liquid in a still and preheating means for the liquid entering the still, comprising a supply pipe for the liquid, a jacket surrounding the same, a connection adapted to convey the spent heating medium from the still to the jacket and an elevated outlet from said jacket to form a water seal for the condensate in said spent heating medium.

In testimony whereof I have hereunto subscribed my name.

HENRY A. HILLS.